



Nordes '11: the 4th Nordic Design Research Conference

# MAKING DESIGN MATTER!

29-31 MAY 2011

SCHOOL OF ART AND DESIGN, AALTO UNIVERSITY,  
HELSINKI, FINLAND

Proceedings of the

**Nordes'11: The 4<sup>TH</sup> Nordic Design Research Conference**

**MAKING DESIGN MATTER!**

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School of Art and Design, Aalto University, Helsinki, Finland

Edited by

Ilpo Koskinen

Tiina Härkäsalmi

Ramia Mazé

Ben Matthews

Jung-Joo Lee

# INTRODUCTION

## Making Design Matter

Welcome to the fourth Nordic Design Research Conference (*Nordes*). The first Nordes conference was organized in Copenhagen in 2005. It has since been held every second year – in Stockholm in 2007 and Oslo in 2009. This conference in Helsinki completes the round of Nordic capital cities. It is also the first major design conference in Helsinki's new Aalto University, named appropriately enough after the architect Alvar Aalto.

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The theme of the conference, Making Design Matter, came from three sources. First, it reflects a lingering question in design research, the meaning of design in society. As the opening keynote speaker of Nordes 2011, Andrea Branzi, has recently noted, design is not what it used to be in days gone by. It has become a mass profession and, with this growth, new questions are raised about how design contributes to society and how design research anticipates and *matters* in light of such developments.

Second, it came from the feedback from previous conferences. While these conferences have been important in developing a vibrant discourse on issues central to the Nordic community, such as relations between materials (*matter*, in its basic sense) and new technologies, one key feedback was that they were becoming too much focused on interaction design. Scientific quality aside, we felt that this focus was turning Nordes away from some of the bigger questions that design – and by implication design research – has to face.

Third, we wanted to make the conference theme interesting and relevant for a variety of design researchers, ranging from industrial and interaction design to design history and design management. While the materials, processes and outcomes of design and research remain fundamental, a focus on the wider issues facing design expands the discourse to other disciplines relevant to developing and understanding the impact of design. Hence Making Design Matter is deliberately ambiguous.

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The call was successful in two ways. First, as the reader of this volume can see, Nordes 2011 exhibits papers from many design disciplines. For example, the morning programme on the first day of the conference includes a keynote, a plenary session and two parallel sessions that take up questions of social and environmental sustainability with perspectives on design in political economies and social movements. In addition to papers concerning interaction and participatory design, the conference programme also features contributions from architecture and urban planning, innovation management, design education and textile design. Design research relations to anthropology and sociology as well as critical practices of design and design activism also figure prominently. This disciplinary diversity as well as traditionally strong and emerging thematics bodes well for a vibrant discourse!

Second, the conference features a number of reflective papers from senior researchers within the Nordic community. An important basis of the Nordes organization remains doctoral education and training, as demonstrated in the dynamic Summer Schools that take place every second year (alternating with the Nordes conferences). The conference this year presents a healthy mix of papers representing many levels of experience in design research – from fresh doctoral students all the way up to senior professors, including a few professional practitioners as well. This is a sign of a vibrant community and, we believe, it will give participants a healthy dose of thoughts to take home.

Given the diversity of perspectives and range of experience of contributors to Nordes this year, we have taken special care and creativity with the conference programme. With our focus on quality within the review process as a whole, we embrace the intimate quality of the conference this year. Plenary sessions ‘bookend’ the conference days, which means that we will largely share the same content during the conference, as well as highlight a variety of perspectives that are particularly relevant to the conference theme. We have tried to group sequences of sessions in ways that build a thematic – for example, the morning session and all plenaries on the first day revolve around the theme DESIGN MATTERS – IN SOCIAL AND PUBLIC LIFE. The morning of the second day begins with a plenary with reflections on significant and recurring topics of theory-practice relations and participatory processes in research – these circle the theme MAKING DESIGN – RESEARCH MATTERS, and the parallel sessions in the morning will take this up from more specific perspectives. Again raising issues of design activism and participation, the last plenary in the conference, appropriately enough, takes up the critical question of ethics.

The format for sessions within the conference is explicitly crafted towards encouraging discussion – in addition to presentations by authors, each session is timed to end with some time for an interactive discussion among all the authors, to be moderated by the session chair. We believe that such opportunities for discourse is one of the unique possibilities for those choosing to publish and to contribute to conferences. It is also important for all of us who are here building academic quality and community within the Nordic countries. This explicit commitment to the discursive component of the conference has required extra effort on behalf of authors and chairs, and we hope that it produces a rewarding and ongoing dialogue. We have developed some experimental formats for the breaks as well, which we hope will support the social part of the programme as well as start to build relations and potentially themes to take up in future venues.

Nordes 2011 is the result of almost two years of work. The process began with the Nordes Commons meeting at the conference in Oslo in 2009 – welcome to the Commons meeting at this year’s conference, which is open to all! That meeting was closely followed by a meeting in Aarhus, Denmark, which outlined the conference theme and decided the organizing group, and, in spring 2010, a meeting in Gothenburg, Sweden, set the conference dates and fixed some of the policy issues such as a focus on quality versus quantity and a draft of the Call for Participation.

The hard work of writing and submitting papers began when the conference website was launched in autumn 2010, and the Call for Participation was distributed through the large programme and review committee of leading academics and institutions within the Nordic community (see the Organizers section of this book). By then, backstage was also full of activity, with things like setting up the conference systems, budgeting and contacting keynotes.

When the conference system was closed in January 2011, the blind review process began as the reviewers started their work. This culminated in a two-day review meeting in Helsinki at the end of February. This meeting, attended by more than 20 participants,



and run by Programme Chairs Ramia MazeÅL and Ben Matthews, decided which papers were accepted and created an initial version of the conference programme.

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The meeting went for quality. Out of about 85 submissions to all submission categories, only 18 were accepted as full papers and 24 as exploratory papers. The meeting rejected 24 papers and made several conditional acceptances. Papers were accepted from fifteen countries, of which the best represented are Denmark and Sweden, with 25 authors from each. In terms of gender, the conference is well balanced– however, there is a disproportionate number of single-authored and full papers authored by males. If there is something to be remedied in the conference in the future, it would be encouraging more seniority and representation of women within the community. Towards such ends, we welcome a number of strong Finnish as well as female academic leaders as session chairs this year.

One encouraging thing in Nordes 2011 is that it has attracted quite a few papers and workshops from outside Scandinavia. We are also particularly delighted to see European keynotes. In particular, we would like to thank professor Andrea Branzi for accepting our invitation; it is a great pleasure to hear the opening keynote by perhaps the world's most important living design writer.

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When the process began, we already knew that what had previously been known as the University of Art and Design Helsinki would merge with two other Helsinki-area universities to form Aalto University. By now, Aalto University School of Art and Design, as the former UIAH is called today, is but one of Aalto's six schools. An important one it is, though: internationally respected and well known all over the design world.

Nordes, on its part, still continues as a delightfully collegial organization with leanings towards anarchy. As always, it has been a pleasure to work with the key members of the Nordes community. The preparation process of this conference has taken the community to Norway, Denmark, Sweden and finally, Finland. Over the last two years, we have enjoyed discussions, dinners, and quite a few glasses of red. We think this is more than appropriate. Design, after all, is not all about science: it is about enjoying and contributing to life in its diversity.

Welcome to Nordes 2011!

*Ilpo Koskinen, Tiina Härkäsalmi, Ramia Mazé and Ben Matthews*

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# THE ABSORPTION OF DESIGN MANAGEMENT CAPABILITIES IN SMEs WITH LITTLE OR NO PRIOR DESIGN EXPERIENCE

CLAUDIA ACKLIN  
LUCERNE UNIVERSITY OF APPLIED SCIENCES  
AND ARTS – ART & DESIGN  
CLAUDIA.ACKLIN@HSLU.CH

## ABSTRACT

In the past, design support programmes for companies with little or no design experience have focused on match-making between designers and SMEs. In addition, it has been recognised that design support should be about the business and leadership role of design and about promoting design tools as well as design management methods. However, a sustainable introduction of new design knowledge involves a process of organisational learning on the side of the SME. How exactly companies absorb new design knowledge has been underinvestigated. There is also a lack of a tool to analyse or guide such a learning process. Based on the Absorptive Capacity and the Dynamic Capability constructs, this paper proposes a Design Management Absorption Model to measure the progression of new design knowledge absorption. This model, which connects the three streams of innovation, strategic management and design studies, makes a contribution to practitioners from national design support programmes, to the design practice

working with SMEs as well as to companies themselves. It represents a blueprint and an instrument for the analysis of a learning journey to introduce design management capabilities in companies with little or no design experience.

## INTRODUCTION

It has been argued that design has four powers to add to a company's bottom line and innovation capability. Borja de Mozota (2006) states that, firstly, design is a differentiator and through that a source of competitive advantage; secondly, design is an integrator by improving new product development processes, thinking in product lines and fuzzy-front end project management, and using user-oriented innovation models; thirdly, design is a transformer through creating new business opportunities and improving the company's ability to cope with change; and fourth, design is good for business because it increases sales, margins, brand value, greater market share, return on investment and others (Borja de Mozota 2006). While design-oriented companies in the B2C business mostly are aware of these powers and use them skillfully, many technology-driven or service-oriented companies are up to now unaware of design as a strategic resource and/or unskilled in the use of it (Bruce, Cooper et al. 1999; Acklin and Hugentobler 2008; Kootstra 2009). Design is an "experience good" (2009), meaning that trust in the powers of design has to be built up by experiencing its efficiency and effectiveness. Knowledge about design as a strategic resource has to be *acquired, assimilated, transformed and exploited* either through the integration of designers into business processes or by other forms of incorporation of design knowledge and capabilities. The adoption of design and

design management by companies with little or no design experience is an active learning process because these companies are only partially able to build on prior knowledge of the value of design and design management.

In recent years, different national design support programmes have been promoting the value of design and supporting companies to adopt it. Other vehicles in introducing design approaches and capabilities to SMEs are knowledge transfer and applied research projects between universities and companies. Lately, it has been recognised (Boult 2006) that design support should be about the business and leadership role of design and about promoting innovative tools as well as design management methods. This proposition has been supported by the broader discussion on design thinking (Boland Jr. and Collopy 2004; Brown 2008; Brown 2009; Martin 2009), which also strongly focuses on the issue of enabling companies to manage as designers. Past research (Kotler and Rath 1984; Bruce, Cooper et al. 1999; Perks, Cooper et al. 2005; Borja de Mozota 2006; Chiva and Alegre 2009) identified different design and design management capabilities to deploy design effectively in companies. However, how exactly design and design management capability is built, is underinvestigated.

In innovation studies, the ability to absorb and assimilate external knowledge is viewed as critical for a company to innovate (Cohen and Levinthal 1989; Cohen and Levinthal 1990; Nonaka 1994; Nonaka and Takeuchi 1995). In 1989, Cohen and Levinthal introduced the Absorptive Capacity (ACAP) construct, which deals with the question of how companies absorb external knowledge and to which end.

The ACAP construct provides a helpful framework to describe the absorption process of external design knowledge during new product development or innovation projects<sup>1</sup>. In 2002, Zahra and George connected the ACAP construct from the innovation studies to the resource-based view and to the dynamic capability concept from strategic management studies suggesting that absorptive capacity can lead to deep organisational change through impact on the overall resource base of a company and thus increase strategic flexibility.

There are strong overlaps between design management and strategic management (see e.g. Borja de Mozota, 2003) and between design and innovation (2009).

Although design is often only part of the bigger equation of creativity + design + implementation = innovation (Von Stamm 2008), there still are strong overlaps between the two notions. Both stress the point that learning is a fundamental activity of design and

innovation processes (Kelley and Littman 2004; Lazonick 2005), or design-driven innovation is seen as the result of generating and integrating new knowledge in the area of technology, user needs and language (Utterback, Vedin et al. 2006).

While Cohen and Levinthal (1990) mainly look at the R&D activities of a firm without connecting the ACAP construct to design knowledge and design capabilities, a later publication (Abecassis-Moedas and Mahmoud-Jouini 2008) focuses on complementarities of the learning relationship between recipient (firm) and source (external design company) when designing new products. The paper's point of departure, though, is the interaction of the firm with the "archetypical" designer who as author introduces his knowledge to the recipient team rather than the absorption of design management capabilities by the firm as part of their organisational capability.

In this paper, we adopt a process-oriented view of design and design management capability as a result of an organisational learning and absorption process rather than extracting specific single design capabilities from best practice of e.g. product development processes or as a result of collaboration with external designers. Transformation through design and design management can only be described properly by looking at the processes of the adoption of design.

For this reason a conceptual model that connects the ACAP construct to the absorption of design knowledge and design management capabilities in design and innovation processes has been developed. It facilitates the analysis of the absorption process a company goes through if it is willing to use design as a strategic resource.

In Central Switzerland, an action research project was conducted with five companies with little or no design experience with the aim to develop company-specific design strategies and projects and to improve their design capability. In this paper we will analyse the results of this project in the light of the Absorptive Capacity construct as introduced by Cohen and Levinthal (1990) and reconceptualised by Zahra and George (2002). With our sample of five SMEs, we intend to give insights into the progression of the design management absorption. We aim to understand whether these companies were able to absorb design by valuing, acquiring, assimilating, transforming and exploiting new design and design management knowledge during and after the research project. We will also ask whether the newly acquired design management capabilities act as a dynamic capability, meaning that design management can have an impact on the overall resource base of a company. However, due to the relatively short time of collaboration with the companies, we are not able to measure whether the newly acquired design and design management capability sustainably heightens the overall capacity to absorb new knowledge.

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<sup>1</sup> The roots of this concept go back to the economic evolutionary theory Nelson, R. R. and S. G. Winter (1982). An Evolutionary Theory of Economic Change. Cambridge Mass., Harvard University Press. which states that the distinctive factor for the successful survival of firms are organisational capabilities or their ability to shape their "routines".



## LITERATURE AND THEORY

In 1990, Cohen and Levinthal coined the term absorptive capacity. ACAP is “the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends” (p. 128). Although the APAC construct revolves mainly around the acquisition of technological and scientific knowledge through the R&D activities of a firm, Cohen and Levinthal (1990) also name other business units such as manufacturing, design or marketing as the beneficiaries.

ACAP can best be described through the cognitive structures that underlie learning. Citing insights from cognitive behavioural science Cohen and Levinthal (1990) state, that “prior knowledge confers an ability to recognize the value of new information, assimilate it, and apply it to commercial ends” (p. 128). Building on an already existing memory (of knowledge) reinforces the learning process itself. Thus, new knowledge might be acquired but subsequently not be utilized well because the individual did not already possess the appropriate knowledge to put the new knowledge into context.

Cohen and Levinthal (1990) also argue that the prior possession of relevant knowledge and skills is what gives rise to creativity, “permitting the sorts of associations and linkages that may have never been considered before” (p. 130). Problem solving and learning capabilities are similar, the authors state, although exactly what is learned may differ. While learning capabilities involve the development of the capacity to assimilate existing knowledge, problem-solving skills represent a capacity to create new knowledge. Also knowledge diversity facilitates the innovative process by enabling individuals to make novel associations and linkages. However, an organisation’s absorptive capacity is not the achievement of any single individual inside a company, but depends on the links across individual capabilities. New knowledge must actively be exploited by the organisation. To this end, transfer across subunits is necessary as well as a structure of communication with external environments.

Cohen and Levinthal (1990) come up with the notion of the *gatekeeper* that stands at the interface of both the firm and the environment; the gatekeeper also connects the subunits of the firm, because cross-functional interfaces such as the interface between R&D, manufacturing, design or marketing also affect ACAP. In 2002, Zahra and George proposed a reconceptualisation of ACAP “as a dynamic capability pertaining to knowledge creation and utilization that enhances a firm's ability to gain and sustain a competitive advantage” (p. 185). According to Zahra and George (2002) ACAP can be divided into two subsets: potential (PACAP) and realized absorptive capacities (RACAP). Potential capacity consists of the ability to acquire and assimilate knowledge, realized capacity enables to transform and exploit new knowledge. PACAP makes a company susceptible to

learning. RACAP enables the company to leverage PACAP. The authors posit “that potential capacity provides firms with the strategic flexibility and the degrees of freedom to adapt and evolve in high-velocity environments (p. 185).” Referring to Barney’s (1991) concept of the resource based view and to the dynamic capability concept of Teece, Pisano and Shuen (1997), Zahra and George (2002) define ACAP as a set of organisational routines and processes, and connect it to the dynamic capability concept by viewing ACAP as a dynamic capability that impacts on the resource base of a company to provide a company with multiple sources of competitive advantage. They suggest that the four organisational capabilities of knowledge acquisition, assimilation, transformation, and exploitation build on each other and influence “the firm’s ability to create and to deploy the knowledge necessary to build other organisational capabilities (e.g. marketing, distribution and production)” (p. 188).

Internal or external triggers such as an organisational crisis or performance failure or technological shifts or radical innovations that occur outside the company activate the absorption of new knowledge (Zahra and George 2002). Social integration or the sharing of information contributes to knowledge assimilation and transforms PACAP into RACAP, a process that can be measured by an efficiency factor. Finally, ACAP will lead to sustainable competitive advantage. Following Barney’s (Barney 1991) concept that resources need to be valuable, rare, imperfectly imitable and to substitute, ACAP can be described as “knowledge-based capabilities” that will increase innovation and strategic flexibility. RACAP will impact on product and process innovation.

### *What are resources, capabilities and capacities?*

Barney (1991) defines *firm resources* as all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. “controlled by a firm that enables the company to conceive of and implement strategies that improve its efficiency and effectiveness” (p. 101). While a company might own many different resources, only specific ones will be able to sustain competitive advantage in the sense of the resource-based view (RBV). They must be valuable, rare and imperfectly imitable to substitute (VRIN).

Amit and Schoenmaker (1993) define resources in a similar way as Barney (1991), but they clearly distinguish *capabilities* from *resources*; the former are the firm’s capacity to deploy resources. Capabilities are “intermediate goods” which are able to enhance the productivity of a company’s resources. Unlike the resources of a company, capabilities are built through exchanging information through the firm’s human capital or are even acknowledged by the firm’s customer base (e.g. as brand names).

The dynamic capability concept (Helfat et al. 2007) defines *capacity* as the ability to perform a task in at least a minimally acceptable manner. A dynamic capability enables a company to do something different

not necessarily better. However, as to qualify as a *capability* this specific capacity must contain a “patterned” or recurring element. Capabilities are not a one time lucky action or an innate talent. A company needs to be able to apply capabilities “purposefully” which includes some degree of intention and the ability to react to emergent streams of activity. There is also some kind of “search” involved, e.g. in product development this would involve the search for new products to introduce, and with this comes “decision making” whether or not to enhance current assets and capabilities.

*What are design and design management resources and capabilities?*

Many design management scholars described design as a strategic resource (Kotler and Rath 1984; Cooper and Press 1995; Bruce and Bessant 2002; Borja de Mozota 2003) yielding various results if deployed properly. Kotler and Rath (1984) offer two categories to describe the *design capabilities* of a firm: *design sensitivity* and *design management effectiveness*. The authors make a distinction between the use of design and the use of design management, a distinction that is often blurred if made at all. *Design sensitivity* assesses to which extent design is part of the marketing decision making process, to which extent design is being utilised in product development, in the design of environments, of information and corporate identity.

*Design management effectiveness* is concerned with the overall orientation of the design staff and questions such as: Are designers operating as authors and neglecting the needs and wants from the marketplace or do the design solutions start with the awareness of customer needs? Or: Are there close working relationships between the design staff and marketers, sales, engineering and research?

Chiva and Alegre (2009)<sup>2</sup> propose the following design management skills (or capabilities): *Basic skills* include managing activities of the design process such as designing for high quality and manufacturability or designing and launching products faster. *Specialised skills* entail abilities to manage specialised activities such as cost estimation of new products, ability to use the latest computer-aided design tools, testing manufacturability of new products during the design process and finding people with excellent design skills. Chiva and Alegre (2009) mention *involving others* such as customers and suppliers in the design process and getting new product ideas from customers as a design management skill, and *organisational skills* to change

the way things are traditionally done in a company; the latter also entails getting different functions in the firm to work together or replacing sequential with concurrent design.

Bruce, Cooper and Vasquez (1999) name three central design management *skills* for SMEs: *sourcing* the right designer for a project, *briefing* him/her and *evaluating* the results of the design projects. Perks, Cooper and Jones (2005) describe the following design skills used in new product development processes: *functional design skills, integration design skills and leadership skills*.

## CRITICAL FRAMEWORK

We will use design as a transformer (Borja de Mozota 2006), as one of the building blocks of the Design Management Absorption Model (see Figure 1) and reconceptualise this power as (potential) *design resource/s*. As long as a company does not recognise the value of design resources for its business, these resources will lie dormant. In this paper, we define *design management capabilities* as organisational capabilities to use these *design resources* to achieve competitive advantage. The absorption process and design management capability building can be supported by the use of *design approaches* such as user-centred design, and *design tools* such as a customer journey or a brand persona as well as by sustained collaboration with external designers.

In our Design Management Absorption Model, following Zahra and George (2002), we list the four organisational capabilities of acquiring, assimilating, transforming and exploiting. The *acquisition phase* consists of recognising the potential of design as a resource and identifying specific design contributions to a company’s bottom line. During this phase, it is of utmost importance that design knowledge can be related to prior knowledge or company rationale. Once this has been done, specific design resources will have to be assimilated, transformed and exploited.

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<sup>2</sup> Chiva and Alegre (2009) use a skill set developed by Dickson et al. Dickson, P., W. Schneider, et al. (1995). "Managing Design in Small High-Growth Companies." *The Journal of Product Innovation Management* 12: 406-414., which derived these categories empirically from 200 telephone interviews with CEOs of the small and medium sized high growth company sector in the US.

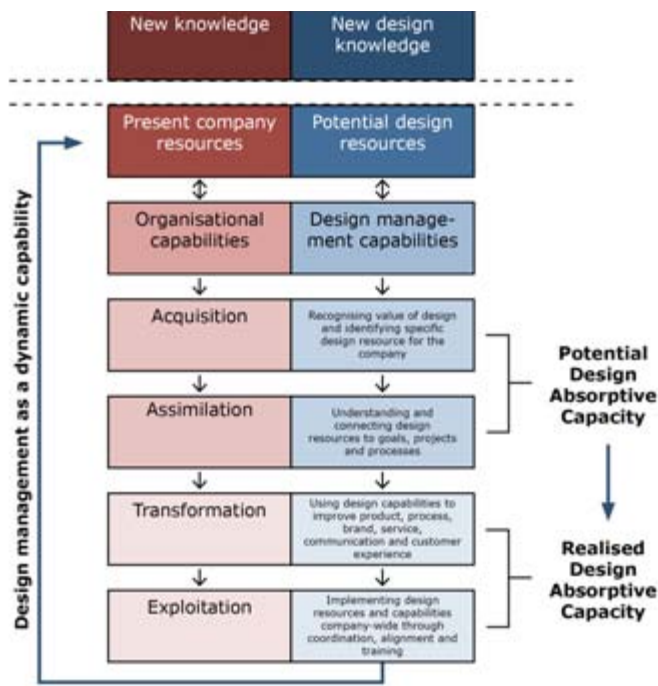


Figure 1: Design Management Absorption Model

*Assimilation* will entail a deeper understanding of the new design knowledge by connecting it to company goals, projects and processes. During the *transformation* phase, the new design knowledge has to be deployed effectively through building *design management capabilities* and using *design tools* to improve all customer touch points such as products, brands, services, communication, or processes such as NPD or innovation processes. The *exploitation* will involve the company-wide implementation of the design resources through integrating design into processes, coordinating functions, aligning core values, training the staff etc. Based on Zhara and George (2002) in our model we suggest the same distinction between Potential Design Absorption Capacity and Realised Design Absorption Capacity; much like them we state that the development of potential design management capabilities does not guarantee the successful transformation and exploitation of these capabilities. Potential resources will need to be changed into specific *design management capabilities* that include a “patterned element” (Helfat et. al. 2007), a capacity to repeat certain actions. Once design as a potential resource has been recognised, assimilated, has transformed business routines and has been exploited successfully, design and design management capabilities can impact on existing company resources. Ultimately, design management can act as a *dynamic capability*, change the company on a deeper level and improve its overall competitiveness and strategic flexibility.

## DATA AND METHODS

To explore companies’ capability to acquire, assimilate, transform and exploit design resources, an action

research project was conducted followed by an evaluation of results and company lessons. The sample comprised two companies from the service sector (including a health clinic) and three firms from the manufacturing sector. At the beginning, researchers and companies assessed the strengths and weaknesses of the present use of design (as evident in products, services, communication, brand and overall customer experience) and current threats and opportunities from the environment<sup>3</sup>. Based on the initial analysis, design strategies and (innovative) design projects for each company were identified. Researchers worked as “facilitators who catalysed the process within the subject company” (Platts 1993) by introducing different frameworks to support design absorption. During five workshops with each company, which stretched over a period of seven to seventeen months, several design and design management approaches and tools were introduced such as customer journeys, experiential research methods (e.g. using an ageing suit to understand the experience of patients with the way-finding system of the clinic), user-centred design processes etc. with the end to support the acquisition and assimilation of design capability. Also, the sourcing and briefing of and the communication with external designers were facilitated where design work was needed.

Six to nine months after these series of workshops took place, an evaluation was conducted to understand whether or not the companies had carried out their projects and how deeply the companies had absorbed design management knowledge. Semi-structured interviews were arranged with each company, aiming to find out how they made use of design and design management since the action research phase, whether their perception of design had changed and - last but not least - how the specific design projects had been implemented. The results from the research are presented in three ways: firstly, in a descriptive way. Table 1 (see appendix) gives an overview over the design projects, the design activities carried out, the design management capabilities developed, the tools used, and the results of the projects. Secondly, we analysed the absorption process of each company through the stages of acquisition, assimilation, transformation, and exploitation; Table 2 (see appendix) rates the progression of the absorption process at each stage and analyses the success of the absorption process in regard to the impact it had on the overall resource base of the company. Thirdly, the central findings are summarised and discussed.

<sup>3</sup> In prior research the “Design Management Travel Guide” (Acklin and Hugentobler 2008), a visual design management assessment tool based on the Danish concept of design maturity has been developed. One aim of our research project was to test and refine this tool (see also Acklin 2010). Assessment results from the DM Travel Guide can include desirable outcomes in the field of their offerings as well as the positioning of the company.

## RESULTS

Table 2 indicates that one company succeeded in realising ACAP, two are on the way of doing so and two companies failed. One firm from the manufacturing sector succeeded completely in absorbing and integrating new design knowledge. At the beginning of the workshops with the researchers, the CEO doubted that design is relevant in his field at all. However, in cooperation with the industrial designer, the company simultaneously managed to cut production costs, to install a modular architecture, and to improve ergonomics and product semantics of the machine. Furthermore, by exploiting design and design management the company moved from a mechanical engineering company, who have been constructing and selling machinery to a system provider, who now offers innovative services based on a well-designed machinery as a core. The company made use of design as a differentiator (form giving of new product), as an integrator (integration of various types of expertise) and as a transformer (transformation of the company); the result is “good business” (Borja de Mozota 2006) as an (intended) 10 % growth of the profit margin and a 25 % reduction of production cost indicates. The CEO also pointed out that the technological know-how the company possesses has been made more visible and tangible to customers and stakeholders with the help of design. One year later, with a new project the company continued its cooperation with the designer. The organisational structure was changed to permanently integrate a design function into the innovation process. The changes of the resource base indicates that design management has acted as a dynamic capability. Also the company from service sector was able to absorb new design management knowledge in a way that it impacted on the overall resource base of the company; a new customer experience strategy became part of the overall strategy of the company. The use of tools such as the customer journey and the brand persona resulted not only in a re-design of most communication media such as the logo, business documents and website, the company also reworked and refocused single services, all of the service portfolio and their overall customer experience strategy. As a result, since the end of the project, the number of unsolicited enquiries from customers increased. The company still uses some of the design tools to check whether it keeps to its customer experience strategy. However, it is not completely clear as to how the company will be using these tools under different circumstances or whether they will stick to what has been developed together with the research team.

The health care organisation made some progress on its absorption of new user-centred design knowledge. However, changes in the responsibility for the design project and internal pressures from the head office slowed down the absorption process to an extent nearly bringing it to a stop. While customer-orientation was part of the culture of the clinic before, certain design tools such as the use of an ageing suit by some members

of the board made a strong impression on the perception of human-centred approaches. The clinic is planning to use this method again.

In two cases the researchers observed no design absorption process in the company. In one of the cases this was due to external obstacles. To increase visibility and market power the manufacturer aimed to become independent from the economic department. During the action research period, a corporate identity and branding project, a strategy to open up new market segments, and eventually to offer new proprietary products was developed. The manufacturer handed in a business plan to the local authorities and has been waiting for its decision ever since. Thus, the researchers had little evidence to conclude that ACAP had been realised. In the second case of no RACAP, the transformation and exploitation of design management capability was due to internal obstacles; instead of developing new business opportunities and eventually a new product, questions on how the succession of one of the CEOs should be handled took central stage. One team member displayed interest in the design and design management tools, but she was not able to implement them because of her position in the company. In this case, potential capacity was given, but a lack of power to transform and exploit the new knowledge inhibited the realisation of the capacity.

## DISCUSSION

Picking up on the experience of the design support community, our own experience in applied research projects (Acklin and Hugentobler 2008; Acklin 2010) and exemplified again in this project, SMEs first need to be sensitised to the value of design as a strategic resource before they are ready to consider it as complementary knowledge. The acquisition phase is supported by recognising the potential financial gains or other results coming from the use of design. E.g. the CEO of the manufacturing company was convinced of the benefits of working with a designer after hearing that the latter would be able to reduce production cost. The presence of *gatekeepers* as described by Cohen and Levinthal (1990) is another facilitating factor right at the beginning of the process as well as in later stages. In the ACAP construct the gatekeeper is seen as an enabler of learning and knowledge acquisition; in former design management literature this position is often referred to as design champion (Dumas and Mintzberg 1989; Borja de Mozota 2003).

Another vital step in the absorption of new design knowledge is the movement from the assimilation to the transformation and, finally, the exploitation stage: Tools such as brand personas, customer journeys or design processes can support the development of design and design management capability which then act as “intermediary” goods to change the overall resource base of the company. To enable teams in SMEs to use these tools facilitates the development of a shared language for the successful cooperation with external designers who already use these tools; they also convert

tacit (design) into more explicit or tangible forms of knowledge. The exploitation of new design knowledge can lead to a change of the resource base of the company and, thus, design management capabilities can act as a dynamic capability. However this is not necessarily so. The exploitation can remain an ad hoc event with no recurring pattern.

The Design Management Absorption Model is a valuable contribution to the design support community as it provides the theory and a tool to measure design integration in companies with little or no prior design experience. It can also be used by the design practice working with SMEs or by the companies themselves. The model also connects design management to the dynamic capability concept as formulated by Teece, Pisano and Shuen (1996) and our research was able to provide evidence that design management can change company resources and, thus, act as a dynamic capability. However, this is only a start. More empirical research is needed to study the longterm effects and impacts of design absorption on company resources, their dynamic capability and overall absorptive capacity.

#### ACKNOWLEDGEMENTS

This paper is based on an applied research project funded by CTI, the Swiss Confederation's Innovation Promotion Agency (<http://www.bbt.admin.ch/kti/index.html?lang=en>).

Many thanks go to my colleague Dagmar Steffen who was part of the research team, commented the paper and added her observations. Also Swiss Design Transfer, a regional design support organisation, represented by Oscar Steffen, was a partner in this research project (<http://www.swissdesigntransfer.ch>).

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## APPENDIX

**Table 1: Summary of design projects, activities, capabilities, tools and approaches, results per company**

	<b>Company 1</b> Service company	<b>Company 2</b> Manufacturer B2B (textile print)	<b>Company 3</b> Healthcare	<b>Company 4</b> Manufacturer B2B (engineering)	<b>Company 5</b> Manufacturer B2B (textile industry)
Design project	Optimisation of touch points and improvement of customer experience (incl. services)	Optimisation of innovation process and organisation; Exploration of new business opportunities (development of a B2C product)	Optimisation of way-finding system to and inside clinic (entrance hall)	Introduction of industrial design in NPD process, development of services and business model connected to new product	Development of corporate identity, corporate design, brand values and brand name
Design activities	Redesign of corporate design, communication media, and internet site (through designer); partial redesign of single services and whole service portfolio (through company)	Analysis of existing innovation process and organisation; development of blueprint for new innovation process and organisation; exploration business case for potential B2C product	Evaluation of touch points of patient's customer journey (incl. mirroring touch points against brand values); analysis of way-finding system; concept development for improved way-finding system	Design of machine based on engineering prototype; branding machine; development of services, internet site, partnerships, and connecting elements to a system of offerings; visualisation of system	Development of an overall design strategy for organisation; development of brand values as a basis for the corporate identity; renaming the organisation
Design capabilities	Design strategy building; using human-centred design models (e.g. analysis of customer journey); using storytelling elements for branding	Design strategy building; designing innovation process, portfolio and organisation (structure, human resources); exploring new business opportunities	Design strategy building; using human-centred design models (e.g. analysis of customer journey); branding using storytelling elements	Design strategy building; improving NPD through integration of functions; human-centred design models (e.g. analysis of customer journey); visualisation	Design strategy building; using storytelling elements for branding and corporate identity building
Design tools and approaches	Design Management Travel Guide*; Brand Personas; Briefing; Customer Journey	Design Management Travel Guide*; Design-driven innovation process as a tool	Design Management Travel Guide*; Customer Journey, Shadowing, Experiential Research (Aging Suit)	Design Management Travel Guide*; Briefing; system's and information design	Design Management Travel Guide*; Brand Personas, Naming, Briefing
Results	More unsolicited requests from customers	Employment of a design manager	Single adjustments of details of way-finding system; revision of customer entry forms	Form giving and cost reduction manufacturing of approx. 25%; new (systemic) business model	none

\* The DM Travel Guide is a tool that has been developed in prior research and that can be used to assess current design use and capability of a company and opportunities and threats from the environment. One of the aims of this research project was to test the prototype of this tool

**Table 2: Evaluation of interviews about Design Absorptive Capacity (in retrospect)**

	<b>Company 1</b> Service company	<b>Company 2</b> Manufacturer B2B (textile print)	<b>Company 3</b> Healthcare	<b>Company 4</b> Manufacturer B2B (engineering)	<b>Company 5</b> Manufacturer B2B (textile industry)
<b>Acquisition</b>	Recognition of value of design (some questions on nature of design mgmt.)	Recognition of nature of innovation process; design as a driver of new business opportunity	Recognition of human-centred design models for designing relationship with customers/patients	Recognition of value of design in all company areas	Recognition of design as something more complex than assumed
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>Assimilation</b>	Understanding design and design mgmt. contributions to company goals (customer experience) results in design project development	Understanding problems with then current innovation process, innovation organisation and attributed human resources	Understanding of problems with way-finding system and understanding contribution of design results in design project	Understanding of contribution of industrial design to form giving, ergonomics and cost reduction of new machine; of system's and information design to business model generation and communication	Understanding of contribution of design to corporate identity building results in naming and corporate identity project
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>Transformation</b>	Cooperation with external designer; use of design tools for analysis and synthesis for design project through company	Employment of design manager (successor to leaving CEO)	Formulation brief for concept development to optimise way-finding system, sourcing designer; revision of customer entry forms.	Formulation brief for design of engineering prototype, sourcing designer; use of design tools such as visualisation, customer journey etc.	None (external obstacle to progression of project)
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>Exploitation</b>	Use of design tools (e.g. customer journey as blueprint for sustained adaption of services; brand persona to outline prospective CI)	None (internal obstacles due to change in leadership and human resources)	Partial adoption of user-centred perspective for management decisions; synergy between human-centered design view and change in cultural values and leadership	Following product was developed with industrial designer right from the start; use of visualisation for internal communication	none
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<b>Impact on company resources</b>	Inclusion of customer experience strategy in overall business strategy	None	Reinforcement of human-centered view	New organisational structure (with design); adaptation of corporate design	none
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

\* Incremental progression by 20 % increasing from left to right



# DESIGN INTERVENTIONS AS MULTIPLE BECOMINGS OF HEALTHCARE

TARIQ ANDERSEN\*, JOACHIM HALSE\*\*, JONAS MOLL\*

\*DEPT. OF COMPUTER SCIENCE, UNIVERSITY OF COPENHAGEN, DENMARK

\*\*THE DANISH DESIGN SCHOOL, DENMARK

TARIQ@DIKU.DK, JHA@DKDS.DK, JONAS@JERMIIN.DK

## ABSTRACT

Research on design of IT traditionally treats the production of scholarly knowledge and the design of new systems as related, but separate processes. We propose the fruitfulness of practicing a closer relation informed by interventionist design research (appreciating a problem through attempts at solving it) and actor network theory (reality is enacted and constructed through our engagement). Through three concrete design interventions with cardiatric healthcare, we illustrate how diverse agendas of sociological inquiry and practical design considerations are intertwined and come to enact healthcare in specific ways. We suggest this as a *strategy of multiple becomings*, wherein assemblages of patients, health professionals, diseases, information technology, prototypes, and design researchers together perform shifts between promoting new practical design solutions and raising novel questions on the socio-material complexities of healthcare.

## INTRODUCTION

When the cardiologist-patient consultation was coming to an end, the design researcher intervenes to propose a new design-research concept in *myRecord* – a web-based prototype of a patient-centric health record.

Design researcher: “*There is one more thing. We’ve created what we call ‘assignments’, which are a little experimental, but in your discussion with Karl [heart patient] you indirectly ask him to do some tasks – that he must keep an eye on this and that – so, what should he write down [in myRecord]?*”

Cardiologist: “*Oh – Yes, okay [...] Karl, we’ve talked about that you need to find out how your breath is. This means that you every day have to go out on the street and walk until you need a break. Then it’ll say [in myRecord]; Monday 50 m., Tuesday 50 m., Wednesday 45 m., Thursday 70 m. – anything [...]*”

Karl strives to follow the cardiologist’s suggestions and almost daily for three weeks he records his weight and blood pressure in myRecord (picture 3). However, as the logbook in myRecord reveals, he is too weak to measure his walking distance. As we elaborate further in the case of ‘Patient Homework’, this snippet is meant to illustrate how design interventions enable us to enact entanglements of sociologically-inspired inquiries in healthcare practice and explicit and change-driven promotion of new design-research solutions for improved healthcare. Through design interventions new relations are performed in assemblages of healthcare professionals, diseases, information technology, prototypes, design researchers, and theoretical conceptualizations and themes from IT research in healthcare. We suggest that conventional approaches to knowledge production within the primary fields that do IT (design) research in healthcare, such as Computer-Supported Work (CSCW), Information Systems (IS), and Participatory Design (PD) can be fruitfully complemented by more interventionist approaches as practiced within contemporary design research (Medical Informatics is focused on evaluation of IT and less on the design process, thus not included in this positioning). By three cases of design interventions we engage multiple interests within interventional assemblages and show how new relations are performed between concrete

design proposals and more theoretically conceptualized inquiries. We report from a PD project entitled Co-constructing IT and Healthcare (CITH), engaging heart patients and relatives, health professionals and us (design researchers) for nearly three years (2008-11) to explore and experiment with re-organizing current work practices through the design and use of seven hi-fi versions of myRecord ('Egenjournalen' in Danish). myRecord is essentially a prototype of a personal health record (Kaelber et al., 2008) – a patient-centric, collaborative, web-application that enables heart patients to produce, collect and share health related information with health professionals and other patients in their network (for details on CITH and myRecord see Andersen et al., In press).

### IT (DESIGN) RESEARCH

Practicing interventions are not new to PD, CSCW, IS, or human-computer interaction (HCI). However, we find that design interventions as performative arenas for explicit instantiations of theoretical conceptualizations and themes are not thoroughly discussed. By employing design interventions we argue that a closer relation between, not only research and design but multiple logics come into being. Early studies at Xerox PARC (Blomberg et al., 1995; Suchman et al., 1998) as well as work coming out of the Scandinavian approach to systems design (Bødker and Grønbaek, 1992; Mogensen, 1992; Kensing, 2003) took on experimental and interventionist approaches to design and research. Influences from action research (Checkland and Holwell, 1998) and intervention theory (Argyris, 1970) pushed for intervention, which is much appreciated in PD today. In PD, methods and techniques from design practice are employed to support a combined research and development process. However, PD is mostly concerned with research on methods and techniques for the practice of participatory and democratic design and contributions rarely emphasize methodological discussions. The episteme of classic PD work could be argued as subscribing to Schön's (1983) reflective practicum, wherein problems are made intelligible only through attempts at solving them.

In CSCW, ethnography and qualitative methods are highly developed and the debate on workplace studies' role in IT design has been heavily debated (cf. Crabtree et al., 2009; Dourish, 2006; Plowman et al., 1995). It is widely argued that detailed analyses of work and technology-in-use create 'insights', 'implications', and 'recommendations' to *inform* system design (Plowman et al., 1995). A view that is also reflected in Crabtree et al.'s critical argument favouring ethnomethodologically-informed ethnography in systems design: "*Our purpose is to inform systems designers – i.e., those parties who are actively involved in the development of computing systems and applications [...]*" (2009, p.879). The practice of doing research (ethnographical work) and designing IT are traditionally kept as separated processes in studies that actually argue for the promising results of integrating research and design of IT (Luff et al., 2000; Crabtree et

al., 2009). While the proponents of joining ethnographic practice and design are increasing (Wolf et al., 2006; Halse, 2008; Karasti, 2001; Simonsen and Kensing, 2005; Zimmerman et al., 2007), the debate on the role of ethnography in design of IT continues (Button and Harper, 1996; Crabtree et al., 2009).

Within IS, action research and design science seek to accomplish change relevant to practice by proposing a closer relation between the study of organizational work practices and the design and implementation of relevant IT artefacts (Hevner et al., 2004; Baskerville and Wood-Harper, 1996; Checkland and Holwell, 1998). However, the heritage from behavioural science combined with a wish for hypotheses-driven rigour renders the process of designing secondary, in that the artefact comes to play the role of a utility that (only) "*allows [for] many types of quantitative evaluations [...], including optimization proofs, analytical simulation, and quantitative comparisons with alternative designs*" (Hevner et al., 2004, p.77). Karasti (2001, p.211ff) critiques these disciplinary dichotomies i.e. descriptive vs. prescriptive, present vs. future, understanding vs. intervention and argues for a more "*appreciative intervention [which] calls for envisioning images of future system and context through a recognition of presence and change intertwined in the existing ways of working.*"

In design research and increasingly in HCI, design practice is argued as a fruitful vehicle to drive research inquiries (Wolf et al., 2006; Zimmerman et al., 2007). Proponents of critical design (Gaver et al., 2004) use designed artefacts to 'instantiate' philosophical ideas whereas the design process becomes a necessary mode of inquiry. In this paper, we subscribe to a design research program and propose design interventions as situations of enactment with opportunities to live out and explore change potential as well as "*open new ways of conceiving the world*" (Halse, 2008, p.2). We claim that in one and the same poignant moment, understanding and designerly creation co-exist as inseparable modes of socio-material knowledge production.

### STRATEGY OF MULTIPLE BECOMINGS

Koskinen, Binder and Redström (2008) review how researchers integrate design experiments in their research inquiries. Through three categories, *lab*, *field* and *gallery*, they describe how "*design researchers have developed several approaches that integrate design-specific work methods into research.*" They make a division along the lines of traditional scientific methodologies and the arts, and argue that design research has been practicing extensions and sophisticated variations to more established institutional approaches to research. In later contributions the three categories converge and this could be seen as a movement towards design research achieving a degree of maturity, with less need to honour standards in other disciplines. Mattelmäki and Matthews (2009) expand this point and focus on the practical concerns of how those differences play out in

a diverse set of ways. They recognize that Frayling's notion of *research-through-design* unites many and stress that it should not be seen as a method, but rather as a family of heterogeneous approaches to design research (2009, p.9). Their affinity lies in considering the design project, process or artifact as fundamental to the research contribution.

With this paper we propose design research as a making of explorative assemblages of not only 'design' and 'research', but multiple entanglements of patients' and health professionals' practices, diseases, information technology, prototypes, and design researchers. In particular, as we sketch out below, we are inspired by later developments in actor-network theory that treats 'being' as inherently performative and holds multiple interdependent realities (Law and Hassard, 1999; Pickering, 1995; Barad, 2003).

#### DESIGN INTERVENTIONS AND MYRECORD

On the CITH project we have engaged an interventionist approach as a way to extend classic PD with a more critical mode of design research-led inquiry. In the outset of the project we sat in on medical consultations, overlooked heart surgery, followed patient referrals in between hospitals, and observed work practices in several cardiac wards. We interviewed secretaries, nurses, doctors and bioanalysts on three related hospitals and visited patients and their families in their homes. A couple of months into the project, we began to put more emphasis on introducing proposals and discussions of premade and in-the-moment ideas of (IT) solutions as well as carrying out participatory design workshops. Alongside these activities we studied the literature on IT research in healthcare, e.g. (Mol, 2008; Berg, 1997; Pratt et al., 2004; Aarhus et al., 2009), and discussed how we could integrate a mode of inquiry that would add to the academic discourses found in the literature, but also how we could enact them concretely in the process.

This endeavor was particularly enhanced when we, a year into the project, introduced action cycles and turned the project into a cooperative prototyping process of a patient-centric web-application. It kick-started a long range of design interventions with myRecord wherein we engaged different health professionals and heart patients in various situations and locations. What moreover followed was many internal meetings and workshops where we inscribed theoretical conceptualizations and themes in myRecord through discussions and co-sketching interactions and wireframes. Typically, as continuations to ongoing dialogues with patients and health professionals we carried out co-design and use sessions at patients' homes. We then followed patients to consultations as observers of use but also as design research advocates enacting explorative and critical inquiries. The interventions, then, became a space for the simultaneous enactment of multiple logics, interests, and ideas. Our strategy of applying design interventions became instantiations of what Law (2004) calls *method assemblages*. By staging situations

of (creative) use in realistic healthcare situations we were able to intervene and cooperatively interweave the current with enactments of new instances of healthcare. Moments, where not only relations between practices of 'design' and 'research' were performed, but multiple becomings of healthcare (Mol, 2002). A lot of work went into preparing for the interventions to allow for the otherwise absent (in the situations) to possibly become present. Priority was put on loading each intervention with the possibilities to enact patients' and health professionals' wishes as well as to enact and explore questions such as 'how to make patient participation a resource in diagnostic work?' and 'how to support patients' invisible work of bridging interinstitutional care?' (cf. Unruh and Pratt, 2007).

In the following, we present three cases of design interventions with myRecord in cardiac healthcare, to show how an interventionist approach can be employed as means to enact and inquire into different healthcare practices together with empowered patients.

#### CASE I: MANAGING BY CONCEALING

From our fieldwork on medical consultations we learned how precious time is spent at each meeting on 'getting to the point'. During the consultation, the physician and the patient work together to reach a shared understanding of which issue(s) should be made central to the consultation, and thereby the diagnostic work. The physician is constantly searching for indications of symptoms or other information vital to perform the diagnostic work. Patients often arrive with a set of (not yet fully conceived) questions regarding their health situation and recent experiences. However, once the consultation begins, we found that most patients were overwhelmed by the urgency of the situation and often held back or simply forgot to present their own questions. The different reasons for this ranges from patients forgetting or thinking, "*it's probably not that important anyway*" to feeling self-conscious about the very private character of their concerns (e.g. questions regarding either marital problems or issues of intimacy caused by their disease).

As our understanding of healthcare work practices matured through our initial fieldwork, we were inspired by Berg's (1997) analyses of medical work. In particular, how he characterises the work of physicians. Berg draws on the work of Fujimura (1987), who demonstrates how scientists make research problems doable through the iterative and seemingly mundane processes of continually aligning and reorganizing their work. Berg presents the work done by physicians during consultations as ways of making patients' problems manageable. Work that is "*characterized by the smooth interweaving of ,social' and ,medical' issues*", in which patient-problems are transformed into 'doable' problems (1997, p.137). Berg shows the distributed character of medical work and stresses how "*the transformation of a patient's problem into a ,doable' problem is not a cognitive reconceptualization*

*of the patient's case, but a collective achievement of an interlocked assembly of heterogeneous entities*" (ibid.). To understand the consequences of this making and becoming of manageable patients we chose to explore the ways in which we could design support for patients to become more manageable for the physicians. From the physician's perspective, this would mean having important information about the patient ready-to-hand (Ehn (1988) and Dourish (2004, p.109) invite Heidegger's notion to inform systems design) before the consultation, including the specific questions and symptoms the patient would like to discuss. We were curious to see how, if at all, the new way of patients preparing for consultations would be useful or just be considered 'more work'.

#### DESIGN INTERVENTION

The following case illustrates how the interventional setup and the use of myRecord worked as a way to query into aspects of patient manageability, and in particular how the intervention unexpectedly taught us the ways in which a patient take active part in collaboratively making the situation more 'doable'.

Mary (aged 54) and the design researcher, Jonas (aged 30), are sitting in her living room in front of her laptop, preparing for her upcoming consultation at the Heart Centre. Mary is going through the step-by-step preparation which involves answering a set of predefined questions, updating and approving her medication list, and indicating if she is experiencing any of nine specific symptoms.



Picture 1: The design researcher and Mary sitting in her home, preparing for the upcoming consultation

Lately, she has been feeling that her heartbeat is too rapid and is worried about the stabbing pain she sometimes experiences. Going through the symptoms section, Mary initially ticks 'abnormal heartbeats', but then pauses when she is to indicate whether the symptom appears during 'heavy', 'medium', 'light' or 'no physical activity'.

Mary: *"Hmmm, I would say... it's this one [pointing at 'during no physical activity']... Not necessarily during physical activity."*

Design researcher: *"Ok... so, that would mean you experience it at rest?"*

Mary: *"Not necessarily. It can come at any time. At rest or, for example, when bicycling or walking. But there is no category to capture that..."*

Design researcher: *"You would need a new category then?"*

Mary: *"Yeah, because if I state that I experience it during physical activity, then one would think that I have arteriosclerosis... which I do not! It can come at any time. But there is no category to capture that. Then it would easily be misinterpreted if I state that I experience abnormal heartbeats during physical activity –which is when the heart is at work – because that would typically indicate problems with stiffening of the arteries."*

Design researcher: *"I see. And when you so confidently state that it's not arteriosclerosis, it's because you somehow know and you therefore don't want to indicate it?"* (audio transcription, Mary's home, October 8, 2010)

To this, Mary explains how she has been suffering from abnormal heartbeats for a long time, and how she went through an extensive examination a couple of years back, which explicitly concluded no problems with her arteries. And as she states, *"If I then indicate it, the treatment will be different."* Mary finishes the preparation by selecting the option, 'during no physical activity'.

#### MULTIPLE BECOMINGS OF HEALTHCARE

As the intervention teaches us the patient explicitly refrains from indicating a specific nuance of an important symptom, whereby she actually ends up concealing information from the cardiologist. Mary's decision is based on her anticipation of what they will probably conclude again, which she knows is incorrect based on her earlier examinations. She specifically engages in the process of making her situation manageable for the cardiologist, but interestingly by taking steps to avoid the consultation from going in a, for her, worthless direction.

As regards to constructive insights for design, we come to understand that the symptom component should be redesigned to allow patients to briefly describe the situation in which they experience a particular symptom. Fixed symptom categories do not always enable the patient to provide sufficient diagnostic information, as we have also learned from Bowker and Star (1999). Most importantly though, with the intervention and Mary's use of myRecord, she starts to manage her physician by performing herself as an essential and guiding part of the diagnostic work, possibly to increase the manageability of her own case.

## CASE II: BRIDGING INTERINSTITUTIONAL CARE

When treatment and care is distributed between institutions, as is the case in our study, the patient often becomes an even more central actor in managing and ensuring continuity of care. As argued by Unruh and Pratt (2008) one key task for such patients becomes to *bridge interinstitutional care*, whereby patients work to manage and bring together information from different sources in the distributed network of care institutions. Unruh and Pratt show how this type of work transforms the patient into an *information courier* “shuttling medical information from one institution to another.” (2008, p.38) Having encountered similar situations numerous times during the interventions, we wanted to explore the phenomenon of bridging interinstitutional care further, in a more performative mode. Through several smaller workshops we, and the web developer, sketched and implemented a personal digital document archive (pBox) in myRecord to enable patients to easilier become information couriers. pBox enables patients and health professionals to archive and share documents easily. By storing documents in their pBox, patients ensure health professionals’ contionous access to their documents. To illustrate the use of the intervention to explore ‘bridging interinstitutional care’ by co-enactment, consider the case of Fred who, through the intervention and myRecord, succesfully interrelates the diagnostic work between two heart clinics at different hospitals.

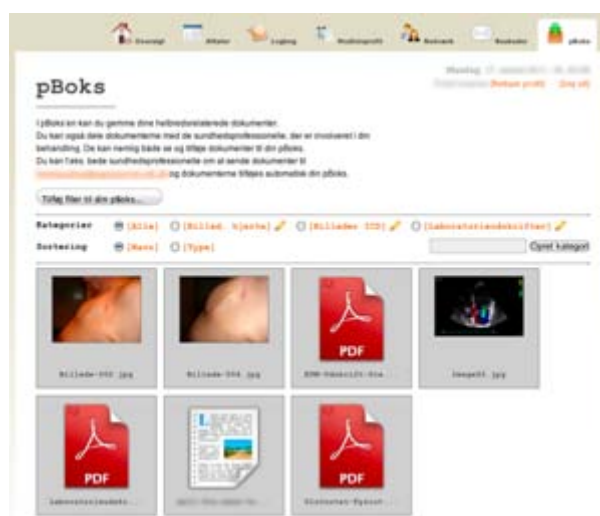
### DESIGN INTERVENTION

A week prior to the consultation the design researcher, (Jonas, aged 30), is visiting Fred (aged 57) in his home to promote and encourage him to use myRecord’s pBox (picture 2) to prepare for the upcoming check-up with his nurse. Fred’s wife has joined the conversation and the chat goes on for close to an hour. The design researcher asks Fred if there is anything in particular he would like to discuss with his nurse. While they talk the design researcher pays particular attention to questions or issues that myRecord could support Fred in querying further into. At one point, Fred raises an issue in which he is confused with having received contradictory feedback on two identical scans of his heart done at two different clinics. The two statements report on the state of his heart and its strength, and are both based on echocardiographical scans of his heart. One statement reports he is doing well, in that his ‘heart capacity’ has increased from 10 to 25 per cent. However, the other statement concludes that his heart is enlarged to compensate for the non-functioning area. “*What am I to make of this? How can they be so different, when it’s the same (type of) scan?*” Fred says slightly disillusioned. “*Am I doing progress or not?*”

The design researcher suggests that Fred upload the scan and statement from the other clinic and then use myRecord to raise his question. With help from the design researcher they formulate the questions for the nurse and upload the echocardiographic scan to his pBox together with the e-mail from the other heart

clinic stating the conclusion about the enlarged heart area.

An hour prior to the consultation the design researcher meets with the nurse to explain the setup and hand her printouts of Fred’s preparation and the uploaded images to simulate that myRecord is an integrated part of her daily routine. Half an hour into the consultation the nurse looks at Fred’s preparation, including his questions. They reach his third question, where he correlates the statements from the two clinics, which reads: “*[Name of cardiologist] has scanned my heart and tells me that the well functioning area is enlarged, because it compensates to make up for the non-functioning areas. How does that fit with your recent statement that my capacity has improved from 10 to 25 per cent? (please, see the attached e-mail in my pBox).*” (myRecord transcription, November 2010)



Picture 2: A screenshot of Fred’s pBox in myRecord

After having consulted Fred’s documents, the nurse agrees about the peculiarity of the two different conclusions on the same type of scan. But as she explains, she is legally hindered in obtaining information from the other heart clinic. She therefore asks Fred to obtain the information and then upload it to his pBox, where she is able to access it. Fred shakes his head indicating that he finds the situation a bit peculiar, but agrees to do it.

### MULTIPLE BECOMINGS OF HEALTHCARE

With the intervention as arena, prepared by the design researcher’s practical alignment of various actors including the pBox in myRecord, Fred enacts a connection between the two institutions. The new connection, where one clinical facility is confronted with another’s different reading of ‘the same’ scan, concretely come to exist through his performance with myRecord. With the pBox in particular, he establishes relations that did not exist before by bridging two institutions that were not able to communicate. In this way he performs a *diagnostic agent*, as he takes part in carrying out this essential, but often invisible work of aligning and reorganizing interinstitutional information



(Oudshoorn, 2008, p.276). The intervention evolves from the initial inquiry into pBox as a tool to support the enactment of the patient as information courier to an exploration of the patient's role in detecting, preventing and recovering from ambiguous medical situations (Unruh and Pratt, 2007). In this sense the case becomes a concrete example of how responsibility is delegated to the patient. To continue the process of 'finding an answer' to Fred's diagnostic question, Fred not only has to act as a courier "shuttling medical information from one institution to another", but has to do more work to connect the two health professionals (institutions) in order to enable collaborative diagnostic work. Moreover, the case also brings us concrete design insights in how to enhance the pBox as a tool for health professionals. Through the situation, we learn that the pBox needs to support subscriptions to and the ability to classify content from a single health professional or institution.

### CASE III: PATIENT HOMEWORK

This third case recalls a design intervention in a cardiatric consultation at the Heart Centre between the heart patient, Karl (aged 68), his wife, a cardiologist and a design researcher (Tariq, aged 30). It is the elaborated case from the paper's introductory snippet. Herein, we illustrate how the theoretical concept of 'homework' is made and becomes generative in multiple ways.

Grøn et al. (2008) coin the notion 'homework' to critically accentuate implications of the political shift in the organization of healthcare. They refer to the work issued by the healthcare system, but practiced in patients' homes. Here, patients are increasingly expected to take on more responsibility, which in turn becomes more patient work (Oudshoorn, 2008) and often collides with their everyday lives and unstable health. Field studies and Grøn's argument drew Aarhus and her group (2009) to make it a design principle in their project – not to add to the amount of homework in the development of an 'eDiary' for diabetics. However, others argue that active patient involvement generate greater improvement in health and patient satisfaction (Street et al., 2005). Being aware of this discourse, we deliberately wanted to sketch and implement 'patient assignments' in myRecord to critically inquire into consequences of letting cardiologists give patients' assignments and open up the space for multiple interpretations of homework to be performed. It moreover engaged design inquiries such as; *which features in myRecord are necessary, what data, and which text fields and buttons should we include?*

#### DESIGN INTERVENTION

In the design intervention, the cardiatric consultation, Karl and a cardiologist are having an intense discussion on whether or not Karl should be re-hospitalized and go through a high risk operation. The day before the consultation, Karl used myRecord at home to prepare for the consultation and the cardiologist read it before they meet and uses it many times throughout the consultation. During 43 minutes they discuss how Karl

experiences shortness of breath and dizziness after the most recent operation. Their dialogue expresses their collective project of deciding on three optional moves, all based on Karl's interpretation of his health condition. After an intense conversation they still cannot make a decision and agree not to do anything, but let Karl stabilize and meet again in two weeks. When everybody stood up and were about to leave, the design researcher (Tariq, aged 30) intervenes and explains the idea of 'patient assignments' and asks if the cardiologist would give Karl a task to complete at home using myRecord.

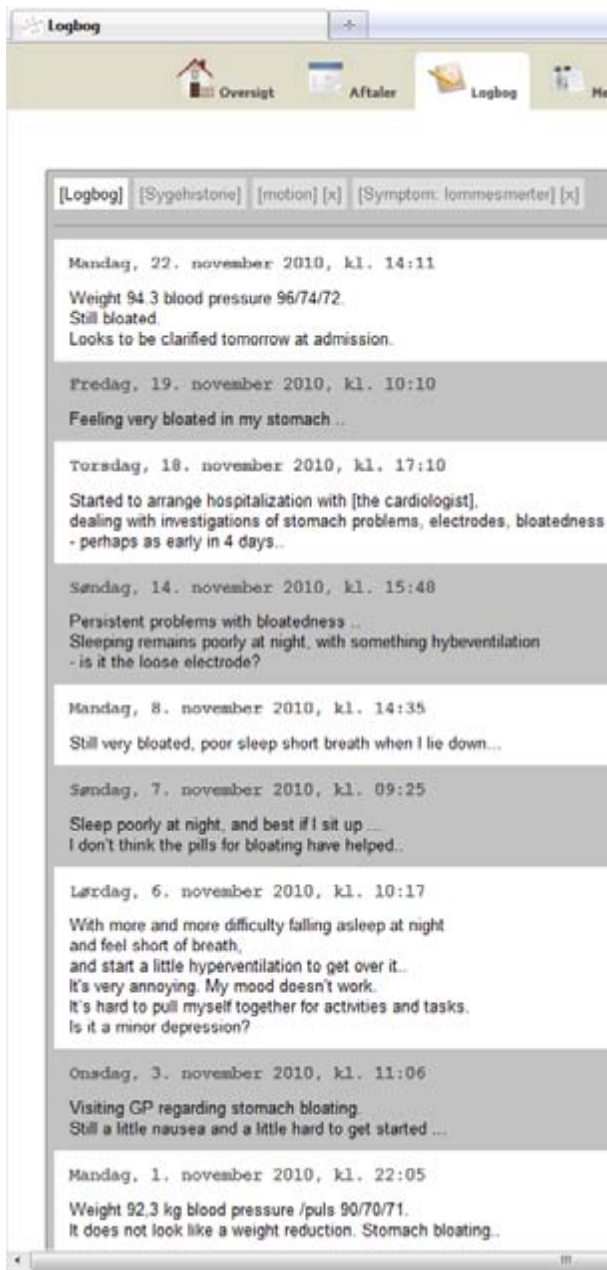
The cardiologist immediately says: "Oh – Yes, okay [...] Karl, we've talked about that you need to find out how your breath is. This means that you every day have to go out on the street and walk until you need a break. Then it'll say [in myRecord]; Monday 50 m., Tuesday 50 m., Wednesday 45 m., Thursday 70 m. – anything [...]"

"You see, it would be nice for me to have a very specific test, where you've gone out and seen how far you can walk - it need not be every day - let's say two times a week. But some tasks ... But then I want concrete answers to it that way. Walking distance, weight and blood pressure." (audio transcription, the Heart Centre, October 29, 2010)

Later that day, the design researcher enters the task into myRecord and almost daily, for more than three weeks, Karl writes his weight and blood pressure in the logbook (picture 3). However, he never writes about his achieved walking distance, but one time he mentions: "My mood doesn't work. It's hard to pull myself together for activities and tasks. Is it a minor depression?" Instead, Karl's logbook entries (picture 3) reveal that his stomach bloating increases and that he "started to arrange hospitalization". Despite the increased attention from health professionals, Karl was admitted to the hospital after twenty days and he immediately stopped using myRecord.

#### MULTIPLE BECOMINGS OF HEALTHCARE

When analysing Karl's symptom log, his writings throughout three weeks (picture 3) also mirror what the cardiologist emphasized as important diagnostic information decisive for operation. Yet another, very important, diagnostic information that Karl performs could be characterised 'non-use' (Oudshoorn and Pinch, 2003) or non-completion of the walking-distance task. As a patient his active use and enactment of homework was dependent on developments in his illness and, as the case illustrates, he could not begin the task of measuring walking-distance – apparently because of his stomach bloating and physical and psychological discomfort. As such, changes in his health condition conflicts with his ambitions of writing in his Logbook. Eventually, Karl becomes unable to carry out that part of the assignment. Also, as soon as he got re-hospitalized he stops all activities of myRecord use.



Picture 3: A screenshot of Karl's logbook entries in myRecord [Entries are shortened and translated from Danish]

The assignment in myRecord is still there but Karl is no longer able to engage the underlying logic of performing a responsible and cooperative patient. He is hospitalized and hence, patient 'non-work' or 'non-use' might be considered essential categories and made as concrete components of the socio-material conceptualization of patient homework? As of constructive insights for design, this case and other similar interventions suggest that patient homework might benefit from enabling patients to signal that they have become unable to carry out or 'hand-in' homework. Maybe homework and assignments are less fruitful notions when considering design for a socio-material reconfiguration of healthcare? Perhaps the concept of 'patient work' (Strauss and Fagerhaugh, 1997) does a better job when engaged in myRecord – and consequently enactments of another healthcare and different practices?

## DISCUSSION

One of the questions treated in this paper and particular to this discussion is *how one can study something that does not yet fully exist without relying entirely on speculation*, but retaining an open ethnographic curiosity towards what is evolving as important in the field under study. A basic challenge in much design research is how to move from a primarily documentary mode of descriptive knowledge generation to sketches and enactments of possible attractive future alternatives. Instead of focusing on this movement as a transfer or translation from one kind of documentary knowledge to a different kind of speculative knowledge, we draw on approaches from design research that seek to deconstruct this principal distinction: *"The central problem is that the challenge [...] is articulated as a gulf to be bridged between observations and interventions."* (Halse, 2008). Halse argues that this often articulated 'gulf' is an outcome, rather than a premise for design. Our empirical cases from healthcare fit this argument well, in the sense that they too work to destabilize some of the conventionally opposing categories of understanding and intervening.

The design interventions point to an ongoing controversy regarding the role of the experiment in design-oriented IT research. The case examples do not live up to the paradigm of purely empirical observational ethnographic research outlined for example by Hammersley and Atkinson (2007) or as practised within ethnomethodologically informed workplace studies (Luff et al., 2000; Crabtree et al., 2009). Nor do the examples live up to purely empirical experimental research where fixed and isolated variables are sought to ensure that the experiment can be reproduced with reasonably similar results. Instead the examples reveal the unsettled status of the experiment and show how the interventional assemblages enact quick shifts in the mode of inquiry: from suggesting and promoting myRecord as a relevant solution to a practical problem, to raising new questions about the socio-material complexities of healthcare.

The assemblage instantiates new practices that incorporate diverse agendas, without trying to purify categories of 'design' or 'research'. The notion of design intervention as we treat it here is meant to challenge a commonly held simplistic dichotomy between 'the existing' and 'the possible'. The intended goal of this project is as much to understand how cardiac health care may *become something else* by means of IT as it is to create an accurate account of how it really is, when new technologies are introduced. The setup in these examples is far from stabilized and the issues under inquiry are changing during the intervention itself: from testing the relevance to practice and usability of a particular design feature to exploring what might be gained from enacting a theoretical concept such as 'patient manageability' and 'homework'. The status of the prototype can change during the intervention itself, because it is so explicitly entangled in the unpredictable interventional

assemblage of e.g. patients (who may reject to use it), clinicians (who may feel challenged) and design researchers (who report to several distinct research communities); sometimes it seems as if the research questions serve the purpose of building a better prototype while at other times the prototype appears as a mere occasion for scrutinizing healthcare.

A terminological challenge to research-through-design is that it could imply that design is a passage, whereas research is what passes through to the other side. We do not wish to invoke this particular meaning according to which means and ends appear as pre-given distinctions. While it is not only very difficult to dissect the event and claim strong distinctions between 'existing practice' and 'projected future practice', or between 'observation' and 'experimentation' in the case examples, we find it more fruitful to avoid these dichotomies all together. The seemingly oppositional characters of *describing what is* and *intervening with new proposals* may appear commonsensical, but often become obstacles for integrating research and design efforts. (Sanders in Halse et al., 2010, p.116-120). Instead, the idea of time as emergent and open, (Pickering, 1995; Law and Hassard, 1999; Barad, 2003; Latour, 2004; Whitehead, 1979) allows us to expand the implications of *the present* as a moment of unsettled opportunities, a process of creative becoming.

Our claim is that myRecord as a prototype cannot be reduced to a methodological step towards discursive insights and conversely that our research insights about cardiatic health care cannot be evaluated without close reference to the embodied encounters with this particular working prototype. Because myRecord is fundamentally inseparable from the assemblage that enabled the particular kinds of interaction recounted in the examples of this paper. There are certain difficulties involved in employing design interventions as a design research strategy for exploratory questioning of a given topic rather than exclusively to test solutions. Long-standing ideals of accounting for the world 'as it is' and 'independently of the process of inquiry' are impossible to uphold with such blurred and changing distinctions between the subject, object and method of study. Above all, the interference with the subject matter by interests embodied and promoted by the individual design researcher makes this type of design intervention very hard to explain in the conventional scientific terms of validity and generalizability.

To practice this kind of design research requires researchers who are willing and able to make quick and improvised shifts in their attitude towards the research situation, rather than rely on rigorously defined methodological frameworks or step-by-step procedures. Making a daring move to present unfinished ideas to foreign project stakeholders must go hand-in-hand with humble and curious moments of listening and observing with an open mind in order to facilitate an authentic encounter between genuine concerns and projected possibilities. To appreciate the

unsettled role of the assemblage of the design intervention, it is necessary to pay close attention to the bodily presence of the design researcher and his or her often intuition-based interferences with the parameters of the design intervention: not as contamination of the situation nor an interference with the object under observation but as an intrinsic quality of the practice-based inquiry.

## CONCLUSION

With this paper we propose that the conventional approach to knowledge production within the fields of IT research in healthcare, such as PD, CSCW and IS, can be fruitfully complemented by a more interventionist approach. We suggest this as a *strategy of multiple becomings*. Furthermore, we advise that a constructivist stance towards 'being' as process will allow a reconciliation of understanding and intervention, present and future.

Through three cases of design interventions we have shown the mutual connections between design proposals and the more discursive space of 'understanding healthcare'. The argument has been based on a foundational unsettling of both the mode of inquiry (observational *and* interventionist) and the role of the prototype (a solution to be evaluated *and* a research tool to generate new questions). In this light, the intervention is a manifestation of a projected reality, where a partly imaginative prototype (yet very concretely present) meets a patient willing to project her concerns and aspirations onto the prototype, whereby the lived practice that unfolds during the event entails both enactments of the past and enactments of the future. Through the emphasis on embodied encounters, design interventions present a concrete opportunity to practice and explore possible alternative realities before they are fully realized. Rather than postponing the materialization of new opportunities until the requirements are specified, we suggest to begin by instantiating ideas and hypotheses, while they are still only vaguely defined.

The design intervention is a way to supplement well-proven methods for questioning, such as ethnographic fieldwork with enactments of more material articulations of hypotheses and questions. The design intervention is an experimental inquiry that positions itself in-between what is already there and what is emerging as a possible future. With the design intervention, the assemblage allows for the multiple becomings of healthcare.

## ACKNOWLEDGEMENTS

We are grateful for the valuable collaboration with the patients and health professionals at the Heart Centres at Copenhagen University Hospital, Bispebjerg and Hvidovre Hospital. We thank Jeanette Blomberg, Melissa Cefkin, Peter Danholt, Finn Kensing, and two anonymous reviewers who provided useful comments and pointed out essential literature. CITH is a 4-year project funded by the Danish Council for Strategic Research grant #2106-07-0017.



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# LIVING THE (CODESIGN) LAB

THOMAS BINDER (TBI@DKDS.DK)

EVA BRANDT (EBR@DKDS.DK)

JOACHIM HALSE (JHA@DKDS.DK)

MARIA FOVERSKOV (MFO@DKDS.DK)

SISSEL OLANDER (SOL@DKDS.DK)

THE DANISH DESIGN SCHOOL

SIGNE LOUISE YNDIGEGN

SIGNELOUISE@ITU.DK

IT UNIVERSITY OF COPENHAGEN

## ABSTRACT

Design research environments are becoming visible in many places, in universities, in design schools, in companies and in public organizations.

What most of them have in common is a commitment to the exploration of the possible rather than the factual.

In this paper we will discuss what define such design research environments. Looking back on how we have employed the concept of the design laboratory in the environment we have been part of, we will argue that a design research environment must adhere to programs and methodologies that reach beyond individual projects. Furthermore we suggest that the laboratories of design research must have a consistent portfolio yet design researchers still have to mobilize and join forces with the many “living labs” of the everyday.

## INTRODUCTION

Design research has evolved along different strands. Some environments borrowed from the lab tradition of human factors. Other environments leaned on anthropology and the social sciences to embrace use and users in the field and yet others revived concept design and show room by borrowing strategies from the arts. Even if this scaffolding on more established traditions is still visible in design research there are also strong indications that these different strands are converging

into what may be called constructive design research (Koskinen et al. 2008). This is design research that takes design proposals, prototyping and the use of design interventions as core elements in the research practice. How this is done differs from environment to environment. We have vivid environments working with the re-thinking of interactive products often in close collaboration with engineers and computer scientists (see for example Keller, 2005, Dalsgaard, 2009, Ludvigsen, 2007). Other environments employ critical design to research the relationships between things and everyday environments (see for example Mazé 2007, Wilkie & Ward 2009). Still other environments are like our own, expanding the realm for designerly inquiries, by engaging with such societal issues as ageing, sustainability and local community building (see for example Mattelmäki, 2006, Björgvinsson et al, 2010).

This indicates how widely and deeply design research is engaged in exploring the possible. What interests us here is however not the map of present day constructive design research. Instead we want to look into what may be formative for such design research environments. We will do this by looking at developments in our own environment and particularly by exposing and reflecting upon what we have called the design laboratory

## HOW THE DESIGN:LAB EMERGED

Like many other designers and design researchers we have over the last decades been asked to take part in concept design and user research that could help reveal new opportunities in what Sanders has called the fuzzy front end of innovation (Sanders, 2006). The commissioners have been private companies, public institutions and often also research councils or innovation schemes. What the commissions have in common is that they have demanded a high degree of collaboration not only with the commissioner but typically also with other stakeholders whatever these are potential users of new products or services or they are providers of complementary services.

We first came to talk about such collaborations as design laboratories when we were asked to conduct design research for what was called “the experimental office”. A large real estate company wanted to team up with IT service providers to create a configurable office facility that could enable their customers to try out in real life, new office solutions that matched the project organization of the day. We were asked to participate because we had a research interest in new office concepts, and because we had done research on co-design methods for several years. We had been conducting design workshops on several occasions where we along similar lines as for example Bødker and Buur (2000) and Westerlund (2009) had brought professional partners to sketch and explore design options in collaboration with potential users and we had been suggesting collaborative events as a useful backbone for product development with many participants (Brandt, 2001). In this case the challenge was to set up a collaborative process that the partners would embark on with an only sparsely defined specification of the outcome (as the outcome was precisely what the process should make room for negotiating).

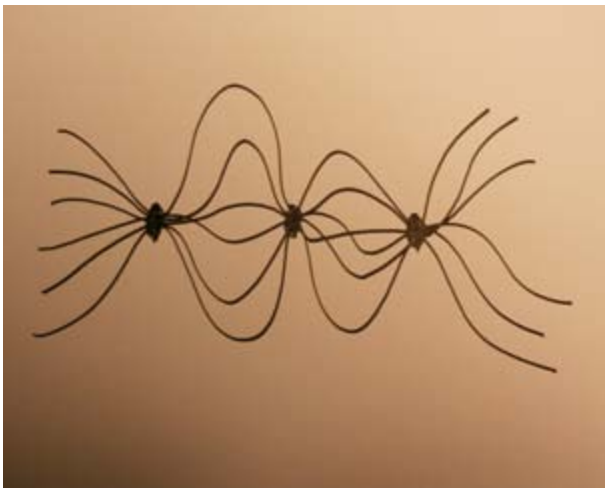


Fig. 1: The backbone of co-design laboratories is a series of collaborative events. Each event can be understood as a lens where participants with different expertise, interests and roles co-create new possible futures (Brandt, 2001).

To call this process a design laboratory seemed attractive for several reasons. The term laboratory indicates an emphasis on method rather than on outcome. The connotations to something slightly strange yet rigorous gave an opportunity to promote ways of working that were unfamiliar, and combining it with design gave a hint that what should be worked on were visions that could be grasped across professional boundaries. On a practical level the design laboratory that we negotiated with the partners became a mix of different activities kept together by a series of design workshops. We have written in more detail elsewhere

about the particular collaboration as well as about the over all process, which we at the time called partner engaged design (Johansson et al. 2002, Fröst 2004). For the purpose of this paper we will only briefly outline three guiding principles that became the foundation also for new design laboratories.

### THREE GUIDING PRINCIPLES

First of all we conceived of the laboratory as a mutual learning space in which participants could try out possibilities slightly protected from outside intrusions. We staged the encounters in the laboratory as dialogues where each participant was given formats to present their everyday practice. Through a process of estrangement and familiarization (Halse J, Johansson M, and Binder T 2005), new possibilities could be envisioned as the interplay between familiar practices became exposed in a new way. Here the design laboratory was inspired by learning theories of Argyris and Schön (1996) and of Wenger (1998) and there was also an obvious parallel to the change laboratory suggested by Engeström (2007).

Secondly we found that the porosity of the laboratory, where participants between encounters returned to their home setting and reiterated or expanded what had been collaboratively envisioned, contributed significantly to the strength of common suggestions. Employing a recursive process where proposals were successively staged, evoked and enacted enabled participants to reconfirm or adjust suggestions. Between events there could be a turn taking between participants in who would take suggestions further, and in each iteration the enactment of what was suggested became in itself a result that could be communicated to others.

Thirdly we learned that conducting the design laboratory call for more than facilitation. As design researchers we have an interest in methods and approaches, but we have to put more at stake in the laboratory by also participating as designers and committing to the results. In the “experimental office” we were both concept designers and hosts for the laboratory and even if we as design researchers also pursue our own research agenda it is through what we accomplish in the laboratory that our work can gain a following.

### THE LABORATORY AS A PLATFORM

The design laboratory turned out to be a robust format for collaboration that served us well in a number of new engagements with outside collaborators. In its standard version it consisted of three workshops with preparatory field work with the participants and follow up work in between where design suggestions were enacted on the site of envisioned use. Pivotal to how we understood the design:lab was the concept of the meeting of language games (Ehn, 1988). Working with design games that deliberately emulated Wittgensteinian language games and at the same time were indexing the everyday practice of participants, as this was revealed in

ethnographic fieldwork, gave us a toolbox that could be taken from one assignment to the next (Brandt, 2006; Brandt et al., 2008).

The design games thus became the nexus that made the design laboratory cross over from user research to design exploration. The games had a similarity to affinity diagrams and other diagramming methods usually associated with the analysis of field material. Bringing these games into a collaborative setting that included also the informants achieved the double purpose of both making the inquiry into existing practices participatory, and providing an entry point for an exploration of how these practices might be different.

The particular way of bridging between the exposure of everyday practice as it was revealed in encounters between us as researchers and the participants and the collaborative exploration of what is possible is making the evolving language game what Muller and Druin (2007) call a third space. We had already for some years been working with improvised scenarios (like also reported by Iaccuci et al, 2002), where future users enacted a possible future practice on site and with props that embodied a design proposal (Brandt and Grunnet, 2000). In the design laboratory the familiarity of the well known practices could be collaboratively transcended as the staging of sites of intervention could draw upon the episodic accounts of everyday practice and could be directly worked upon in such design games as the landscape game or the persona game (Brandt & Messeter, 2004; Brandt et al., 2008).

New opportunities promoted by other participants could be introduced as props that could evoke responses from those familiar with contexts of use as facilitated for example in the technology game. Others such as Dindler and Iversen (2007) have pushed the limits for what can be envisioned in such encounters, but in our approach the language for these responses would still be scenarios or small enacted episodes kept within the horizon set by the initial fieldwork. These improvised scenarios can be brought back to the context of use to be enacted on site with all the familiarity of the setting brought in to counter balance any overly enthusiastic creativity at the workshop.

#### LEARNING FROM SCIENCE STUDIES

As we got the opportunity to promote the design laboratory towards new collaborators we started to think more deeply about the laboratory metaphor and the status of the design:lab. Is the design:lab just a pragmatic formatting of the process of collaboration or are there more to the laboratory than just a particular arrangement of fieldwork and workshops? We had been reading sociological studies of laboratory work in the tradition of Science and Technology Studies and though these studies disclosed a much more complex reality of day to day scientific practice than what is found in standard science textbooks, they still added to the reputation of the laboratory as a potent vehicle for change (see for example Latour & Woolgar, 1979).



Box 1: In the Experimental Office Project the collaborative events were staged as design games. For instance both the Person Game (top), and the Landscape Game (bottom) were based on 'ethnographically inspired field material'. Short video snippets from field studies were represented by physical game pieces and became part of the game universes. Viewing the video snippets and using the game pieces to create and experiment with various configurations on the game boards as 'future visions' are examples of how the participants simultaneously engaged in analyzing existing practices and exploring possible futures.

Callons study (1986) of how marine biologists of northern France rallied and mobilized networks of

politicians, fishing men and scallops both in the labs and on sea had an immediate resonance to what we experienced on a micro level as our collaborators and we wrestled with such issues as decentralized control rooms or modular cell phones. Where the scientists struggle to manage the chain of translations from collected samples of marine species over laboratory growing of these species to design guidelines for full scale growing of scallops along the French coast, so did we have our hands involved with at least part of the same chain of mediators as we produced video accounts of operator work or family life and negotiated their translations into concept design for prototype devices that could bring hardware manufacturers, IT service providers and potential users in line for new product visions. The design:lab we brought with us provided a collection of relatively stable “instruments” that could be adapted to whatever particular issues the collaboration urged us to explore. The co-design activities could be seen as lab experiments. Each playing of a design game or each enactment of a scenario exploring what actors of the theatre call the “Magic if” (Stanislavskij, 1988) did not just come into being as the result of some technique of creativity, but are carefully negotiated and staged in a process that extends far and well beyond the individual workshop. As pointed out by Pedersen (2007) there is nothing innocent about these experiments. On the contrary they are powerful devices, which have the potential to establish a new reality in the network of collaborators.

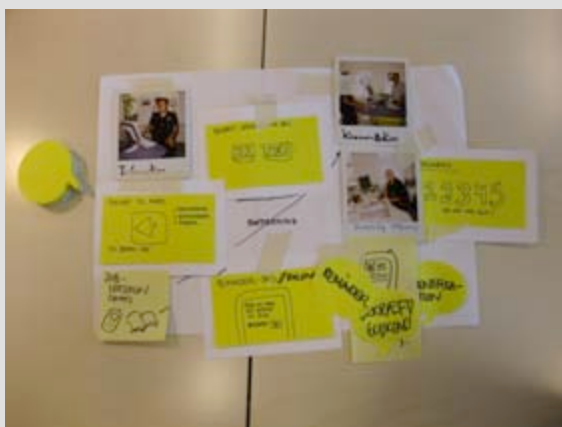
One could say that taking an STS perspective on the design laboratory threatened to do away with the laboratory as a particular site as these studies so eloquently show how the network of actors and the translation of representations always both penetrate and permeate any confined laboratory boundary. In many ways we could even see this in our own work and in the work of colleagues pursuing similar strategies of collaborative engagement. Björgvinsson and Hillgren (2004) have taken the lab approach into “the wild” by establishing long-term engagement in the workplace and in local communities. Brereton has argued that design researchers should only provide a setting with tools for potential users to explore and let new practices emerge out of these explorations (Brereton, 2009). In work that we have been engaged in we also began to see that we did not have to rely on workshops as the frame for experiments. The unity of time and place in collaborative encounters is often useful but not in any way mandatory to have a working laboratory. What defines the laboratory seemed more to be a particular mode of engagement embedded in the particular toolbox of “instruments” that was put into play: the design games and the crossing over from ethnographic accounts to the enactment of future practices. Still the concept of experimentation and the idea of a lab space cautiously sheltered from day-to-day realities continued to be useful in negotiating collaborations. In the literature on participatory design and action research it has always been a difficulty to delimit the envisioning

of new possibilities from full blown change and yet this difficulty again in an STS perspective may be said to be inherent in an understanding of change as networked and emergent, it seemed at odds with a more pragmatic consideration of possible collaborations not to be able to define some sort of gate between possibilities and implementation. In all this the laboratory metaphor continues to be attractive. One does not have to assume that the design laboratory is an ideally free space. On the contrary to establish a lab is to negotiate what possibilities to explore. When the laboratory is in place it is not the same as having committed fully to its outcome, but to the extent that the laboratory as a controlled environment is able to convincingly demonstrate scaleable new prototypical practices, change is brought within reach for the collaborators.

#### FROM EXPERIMENTS TO REHEARSALS

The design laboratory as a platform defines a particular way to become knowledgeable about future possibilities. Flexible in its particular ways of being performed, yet rigid in its underlying methodology the design:lab offers a framework in which envisioning new things and improvising new practices become closely intertwined. Prototyping in this framework is not merely to collaboratively sketch and evaluate new artifacts. What is performed as participants explore the experiences of possible use is just as much the prototypical enactment of a new practice (how much or how little this even deviates from the well-known everyday). But what does this mean and where does it take the design research that we conduct through the design laboratory? When we first wrote about the design laboratory we were influenced by ethno-methodologists such as Luff et al (2000), Crabtree (2001), and Suchman (1987). These authors gave us an understanding of everyday practice as situated interactions between people and things in a web that was continuously made sense of. There is very little we can assume a priori about this practice apart from the very important basic observation that these practices are meaningful and constantly in the making. For what we do this meant that we could see the transcendence from the present to the possible future staged in the laboratory as an only slightly forced or agitated extension of the practices that participants (with the help of our ethnographic snapshots) made visible in the lab. This seemed to be a good and simple approximation as long as what was at stake in the laboratory was relatively minor to the overall web of interactions that constituted the practices in question (like when considering a new kind of products), and these practices on the other hand were relatively stable (as for example skilled practices at work). If these conditions were met it would even be likely that what is demonstrated as viable in the laboratory could immediately be assumed to be similarly viable for others engaged in similar practices. What is missing is however to account for the particularities of the design proposals considered. They cannot come directly out of the practice studies as these





Box 2: FieldShop. Field observations and co-creation workshops are often deemed too time consuming for smaller projects. When collaborating with the design consultancy 1508 on a client assignment, we got an opportunity to challenge this claim. The FieldShop is a method to bring local practices, collaborative ideation and quick prototyping together in an intense half-day process in the concrete environment that is designed for. In one example the FieldShop is set up as an encounter between three designers/facilitators, a client representative, two unemployed citizens and a caseworker at a public unemployment center, in order to explore how new mobile technologies may enhance the experience of public services to the unemployed. The FieldShop consists of three distinct phases that resemble in miniature version, ethnographic fieldwork, co-creation workshop, and experience prototyping (Halse et al., 2010).

precisely show the coherence of everyday practice (and not some sort of cataloguing of problems). Instead design proposals as well as the over all staging of the laboratory remain externally motivated.

Three recent dissertations all relating to the novel field of design anthropology brought a radically different view to the design laboratory as they precisely made the organization of the laboratory the topic of their studies. Pedersen applied the approaches of actor network theory to a particular design laboratory and asked what was performed. He rejected, what he found to be a widespread practice in the literature on participatory design, only to report on fieldwork, workshops and other collaborative encounters. Instead he traced the yearlong negotiations that went on before and after a particular workshop. Here he showed that participation and users were performed not only as methodological devices that needed to be put to use, but also as emblematic figures that carried a direction for the design work. Broadly speaking Pedersen made the argument that the (participatory) design researchers were not in any way merely facilitating an open exploration, but rather pushed for and had to negotiate one design direction among others. In our context here one can say that Pedersen showed that design proposals were far from being external to the conducting of the design laboratory. Instead his work indicates that the design agenda live in the shadows of the participatory process (Pedersen, 2007).

Clark took a slightly different route in an anthropological study of a co-design project in which he had himself taken part. He turned to Victor Turner's concept of social drama (Turner, 1982), and showed how the project collaboration on a very concrete level could be seen as the stage for such a drama (Clark, 2008). What his study reveals is a surprisingly close resemblance between what is enacted in the interactions between project partners prior to the actual launch of the project and what is subsequently performed in the project.

Halse took the question of what is performed in the laboratory further by looking at the relationship between practice studies and design interventions. Where most authors had been focusing on practice studies as forming the base for design interventions, Halse asked how design proposals in the laboratory provided a particular kind of probing into the practices of the everyday. Like Pedersen he wanted to emphasize the agency of design researchers, and like Clark he wanted to consider the laboratory as a space of performances set aside from the ordinary. Going further into the performance studies literature he used not only Turner but also Schechner (1985) to point to how the liminal space evoked in the design laboratory makes both the present and the future become playfully explored (Halse, 2008).

These contributions sparked a reconsideration of how experimentation could be conceived. In a collaborative

project with several municipalities on sustainability and recycling in which Halse also took part, the design laboratory became the platform for researching new relationships between citizens and the professional waste and recycling industry. This time the issue was not primarily new products or services, but rather an exploration of how the many overlapping practices of everyday citizenry interact with the waste handling systems. These practices are volatile and fragile and shaped by a complex set of interactions with many professional systems. As Latour suggests we could try to provide an infra-language in which groups could form and ambiguous everyday experiences be voiced as when we organized a workshop on the fly in a local shopping mall, asking by-passers to tell stories of the precious trash (Latour, 2002). But revealing the mundane is not enough. With our primary collaborators (a large metropolitan incinerator) we negotiated a number of programmatic interventions. We asked, what if waste collectors were the heroes of recycling? and invited citizens and workers in waste collection to join in an exploration of what such a program would mean.

We got involved with tenants in a troubled high rise estate and asked them what it would mean if campaigning for recycling in the neighborhood was something they organized. We worked with local caretakers and shop owners in a suburban shopping centre and asked them, what it would mean if shops became hubs for recycling and urged them to rehearse what such a program could entail.

The ‘instruments’ were still largely the same. The careful documentation of everyday episodes, the design games where episodes were juxtaposed and re-configured, and the improvised enactment of situated action, playfully performed with props pointing to the program, both off and on site. What was conceptually new to us in this collaboration was the deliberate emphasis of the encounters on performance as the theatrical staging of what Schechner calls the subjunctive (Schechner, 1985). In each enacted scenario there is a stage, an audience and actors that carry through a performance in which the possible is brought to life and led to completion.



Box 3: In the DAIM project, we moved the design games out into public space. With a stand in a shopping mall we invited people passing by to roll a giant dice with statements and choose two related pictures. Both the statements and the pictures were from our earlier fieldwork. We asked people to tell us stories based on their choice thus bringing our research findings into dialogues with new people.

During the day a blog was updated live as a visible evidence of what happened on the day. The blog became a live transmission of the event, as much as a virtual place for people to come by afterwards. It created an extended space for thoughts, questions and discussions.

(Halse et al. 2010, Yndigejn 2010).



But also as we zoom out we can see the entire design laboratory as a play with performances or rather again using the terminology of Schechner of proto-performances in which the new is tentatively brought to life. These encounters may still be seen as experiments in the lab, but this may make us forget that the laboratory in itself is also an experiment that is only lived through the performance of these encounters. Thinking instead of laboratory work as the programmatic rehearsing of the future, brings the spectacle of the lab and the committed involvement of the design researcher on equal footing with the invited engagement of waste workers and local tenants (Halse et al, 2010).

#### (LIVING) LABS ARE EVERYWHERE

There is a legacy to practice studies of contradicting grandiose planning schemes and top-down change processes. We have subscribed to this legacy as we in the past argued with system designers and planners that they neglected or overlooked the potency of an emergent everyday practice (Binder, 2002). But what we have learned as we have been journeying with the design laboratory is that engagement with change is everywhere. The people we have worked with always have their agenda whatever they are product designers at large industrial companies, municipal officers or process operators. Much as we argued in debates with rationalistic planners these agendas does not form decision machines or a rigid apparatus of implementation. But they are in a certain sense also laboratories as they forge together intent and toolboxes into hybrid networks of evolving change. A last example may shed more light on what this means for the constructive design research environment.

In a recent project we have been invited to take part in the efforts of the Copenhagen Municipality to rethink the way they offer services to elderly citizens. The project initially targets a city district with more than 10.000 citizens potentially affected by these services. The Municipality has involved us because they believe that we can help them promote co-design and co-creation of services with the active involvement of older citizens. But where to start? By making ethnographic accounts of senior life? This does not seem very promising, as being elderly does not define any sort of coherent everyday. By inviting a representative sample of seniors and then subsequently scale up the process? This appear overwhelmingly exhaustive and even the concept of representation assumes that we know the group (which is only to be formed as the agenda of the project becomes tangible). Instead of pursuing these seemingly difficult roads we initiated the collaboration by (very tentatively) elaborating a program with strong statements about a new approach to service provision and co-creation. This program was turned into a workbook that similarly to a probing kit could be carried along as we commenced a tedious process of recruitment.

We traveled the networks of the municipality, we got introductions to social clubs and we visited community centers. Along the way we looked for movement, energy and agitation that could be the “soft spots” where heterogeneity and glitches between practices opened up for interactions with “our” agenda.



Box 4: The Senior Interaction project aims at introducing social media to senior citizens to promote activity based networks. We designed props for an initial concept of “Super Dots” to evoke enacted stories and embodied reflection. The props had the purpose of introducing and staging technological possibilities. The concept was presented in a simple narrated doll scenario, interweaved by more explanatory illustrations of the props. Props made of simple cardboard in the shape of ‘messenger’, ‘seeker’, and ‘screen’, as well as the colored super dots representing communities were introduced. In small groups participants developed a shared story by engaging with the props. In the end each group performed a two-minute video recorded doll scenario presenting specific situations where social media could augment the networking among seniors. (Yndigeegn & Foverskov, 2011)

Eventually we got ourselves teamed up with “living labs” that each in their own way were in a process of transformation. A local community of tenants in a compound of elderly homes had recently had internal quarrels over a ban on smoking in the common facilities and the tenant committee is working hard to bring new impulses to community living. Some members of the committee have been eager to bring in computers and social media to the compound and when we turned up there seemed to be a fit with our suggestions for networked services and co-creation. Another “living lab” revolves around a small company promoting physical exercise and play in public spaces. Here an enthusiastic sports coach and gymnastics teacher envisions municipal services that bring senior citizens to public parks and squares for collective work out and with our project he finds a new venue for his on-going activities. These “living labs” are recruited to our design laboratory, but in many ways we could just as well say that we were recruited to become part of their endeavors. In the light of what we have discussed above, the point is not to decide on who recruits who, but to acknowledge that what is performed in the collaboration is a lab of labs – the enactment of a merger of programs and toolboxes, that if successful enable participants to pursue the possible as it presents itself in this merger of perspectives.

#### LABORATORIES AFTER METHOD

So the design laboratory is no longer the very particular approach of our design research environment. Or rather: we have one very particular design laboratory ingrained with our programmatic agenda, but this is just one among many laboratories. What does this entail for other environments engaged similarly with constructive design research but pursuing different agendas?

In design and design research as in the sciences there has for long been an emphasis on method. Method has been seen as setting the standard for professional practice, but the relationship between method and outcome has often been neglected. Similarly researchers and scientist have favored to take a neutral position to what is being studied, downplaying the impact the research project may have as an intervention in the context of its collaborators. This drive towards distance and neutrality does not go well in hand with an exploration of the possible. The possible is always contingent and though research may convincingly provide arguments for certain possibilities both search and arguments have to be guided by programs that set a direction. There is an essential dialectic between program and experiments in design research (Binder & Redström, 2006) that enables the research environment to pursue certain trajectories in order to become knowledgeable. What we have tried to show in this paper is that the movement along such trajectories takes a *laboratory* that is consistent yet flexible in its methodology. The design researcher (as the social scientist) makes a world come within reach through

their engagement with people, things and the networks that they form, but this world is shaped by this engagement. Following the sociologist John Law in his book “After method” (2004), we will claim that there is no way to disentangle the knowledge produced by the researcher from the theories and methods that the researcher puts in motion to become knowledgeable.

This does not imply that (design) research is not valid, but it may make us aware that such research as all other research has what Law calls a *hinterland* of programs and methodologies that let certain possibilities emerge while others remain in the shadows.



Box 5: The design laboratory is currently being prototyped as a network laboratory, in three local cultural administration units in the municipality of Copenhagen. Public libraries and cultural centers want to explore the format of the lab, as an infrastructure for co-creation, that can open up a future space for doing cultural work *with* local networks, rather than providing services *for* local groups. The network laboratory will be prototyped both as an organizational tool, that must fit the daily routines of the cultural administration, and as a practice that can operate on the border between public administration and public space. The research program wants to explore the network laboratory as a framework for new ways of performing citizenship and democratization.

For the design researcher this has at least three important implications. First of all the design researcher must consider what program she is adhering to and what laboratory she is part of. In an engagement with a changing world we will claim that there is no place outside the laboratory, and for a design researcher not consistently pursuing a program in her own lab it will only be the inclusion in other labs and other programs that makes her part of knowledge production. Secondly to acknowledge that design research is laboratory work, and that the methodology of the lab carries with it particular ways of constructing the world that the design researcher engage mean that the design researcher (or rather the design research environment) must be accountable for what is produced in these engagements. Like the design studio has its portfolio so must also the design researcher expose and be accountable for the portfolio of the laboratory. And finally as laboratories in which the possible come into being are not the exclusive territory of design researchers, design research must in a genuine sense be participatory, mobilizing and joining forces with the many “living labs” of the everyday.

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# EXISTING PROTOTYPING PERSPECTIVES: CONSIDERATIONS FOR SERVICE DESIGN

JOHAN BLOMKVIST  
LINKÖPING UNIVERSITY  
JOHAN.BLOMKVIST@LIU.SE

STEFAN HOLMLID  
LINKÖPING UNIVERSITY  
STEFAN.HOLMLID@LIU.SE

## ABSTRACT

With new design disciplines that challenge the borders of design practice and inquiry comes new possibilities for prototyping techniques and approaches. The basis for such an evolution is a firm understanding of the existing knowledge generated in design and the challenges posed by new design disciplines, such as service design. This study identifies a framework of perspectives for prototyping to reveal what the existing toolbox of prototyping contains based on a literature overview. Going through published literature from the early 1980s and onward, the framework is constructed using the following perspectives; purpose, fidelity, audience, position in the process, technique, and representation. These perspectives make knowledge about prototyping explicit and summarise contemporary approaches. Based on current challenges and characteristic attributes of service design the framework is then reconstructed to better cater to design for services. The conclusions are that validity and author are two perspectives that complement the existing framework, and that prototyping so far does not support a holistic approach to prototyping services.

## INTRODUCTION

It is commonly believed that prototyping allows companies to arrive at better solutions that are more attuned to end-user needs and wants, to fail early (Coughlan et al., 2007) when the cost is not as big and that prototypes help facilitate communication (Schrage, 1996) within and across stakeholder groups in design. A large body of knowledge about prototyping – and how to make design practitioners benefit from prototyping – has been developed over the years, but design disciplines and the associated tools and methods are constantly changing and evolving. An overall trend in contemporary design is that more focus is put on experiences, contexts, and social interactions, as new disciplines emerge that challenge the borders and scope of design. Service design is one such discipline that attempt to increase the scope of design.

To form a basis for further studies on the prototyping of services, a literature study was conducted. The study took a paper by the organizing committee of the Working Conference on Prototyping, in the early 1980s (Floyd, 1984) as a starting point to define a number of perspectives from which prototyping have been discussed. The study is intended to make assumptions explicit about the benefits and boundaries of prototyping, by highlighting existing concepts and perspectives. A total of 30 sources were selected, mainly from Information Systems, Interaction Design and related fields, and were used to generate the framework of different perspectives on prototyping.

The resulting framework will be presented alongside a description of prototyping, to uncover strengths and weaknesses when adopting or transferring existing approaches, techniques and perspectives to existing or emerging disciplines. The argument will then be concluded with some implications for service design in particular and suggestions for new directions of prototype research in line with the progression of prototyping practices and new contexts brought by design disciplines. Two new additions to the framework will be highlighted, validity and author.



## PROTOTYPING VOCABULARY

When trying to make knowledge explicit, the conceptualisation and terminology is important. The word prototype roughly means a “first or primitive form” and comes from the Greek word *prototypos* which is a compound of the word *proto* “first” and *typos* “impression” (Harper, n.d.). Besides the more general meaning of the word as the most typical or representative instance of a category, it is also used in cognitive science and linguistics with a similar meaning to denote a graded categorisation mode.

Definitions of prototype and prototyping vary of course, not the least since it means different things in different design domains such as architecture, graphic design and fashion (Beaudouin-Lafon & Mackay, 2007). Some consensus can however be identified in a number of central constituents that recur in the literature. Most definitions, be they formal or informal, mention prototypes as representations, embodiments or manifestations. What they represent is commonly said to be ideas, described as hypotheses or assumptions about the future. A third element of most definitions is that it must be possible to test the ideas that the prototype represent, i.e. to evaluate the degree to which the prototype succeeds to meet specified criteria.

## A SHORT HISTORY OF PROTOTYPING IN INFORMATION SYSTEMS

In design, all prototypes are arguably part of a subset of representations, all of which are especially important in design fields that work with intangible objects, such as (partly) interaction design (Holmlid, 2007) and service design. Long before the term was used in software development, it was used in a design context in the shape of architectural models to provide early and inexpensive insights into the impression of a building’s structure and in product and graphic design (Wong, 1992), as noted by Holmquist; “representations in interaction design rest on a foundation of practice developed in fields such as product design and graphic design.” (2005, p. 50)

In software development, research into prototyping started as an academic idea (Budde & Züllighoven, 1992) that was later spread to practice. The origin can be traced back to 1977 where the technique was introduced in pedagogical terms: “[i]n the prototype strategy, an initial and usually highly simplified prototype version of the system is designed, implemented, tested and brought into operation. Based on the experience gained in the operation of the first prototype, a revised requirement is established, and a second prototype designed and implemented.” (Bally et al., 1977, p. 23).

In 1986 the ideas on prototyping had matured a bit. “During the past few years there has been an ever increasing awareness that a static paper description of a computer-based information system, however formally specified or rigorously defined, is far from adequate for

communicating the dynamics of the situation.” (Mayhew & Dearnley, 1986, p. 481). During the 1980s the research questions concerning prototyping was mainly conceptual, prototyping was researched from perspectives such as “How is prototyping related to more traditional approaches?“, “What are the types of prototyping?” and “How should one apply prototyping in different contexts?” (Ilvari & Karjalainen, 1989, p32).

Prototyping has gradually formalised itself into a well-known practice after a lot of initial classification and framing, not to mention questioning of its usefulness and benefits. In all though, knowledge about prototyping appears to have withstood both time and academic scrutiny (Alavi, 1984; Ilvari & Karjalainen, 1989). Also the practice and application of the knowledge has survived and is now firmly rooted in the approaches utilised by designers.

## PROTOTYPING SERVICES

Prototyping seems to be little known within the service sciences. In the book by Hollins and Hollins (1991), concerning the management of design in services, very little is mentioned about prototyping. In passing, prototyping is mentioned as part of the implementation stage. In an interview study with practicing service designers (Blomkvist & Holmlid, 2010) a number of challenges for prototyping services as opposed to products were mentioned. Those challenges were associated with *inconsistency* in service delivery, *authenticity* of behaviours and contexts, *validity* of the evaluation environment, *intangibility* of services as design material and the influence of *time* on the service experience.

For prototyping of services, the validity perspective is especially interesting and will be further developed here. Another study focussing on design practitioners (Blomkvist & Holmlid, 2011) highlighted the perspective of who *authors* service prototypes, which will also be elaborated on in later sections. The reported challenges are associated with specific attributes of services. One aspect of services is that they many times take place in physical locations that affect the service experience. Such places have been called servicescapes.

## SERVICESCAPES

Service experiences that occur across multiple stakeholders, and over time, are affected in numerous ways. The physical surroundings of a service have been called servicescapes, in which cognition, behaviour, and experiences are influenced (at least) by the following dimensions (Bitner, 1992);

- ambient conditions
- spatial layout and functionality
- signs, symbols, and artefacts
- service typology and environmental dimensions

*Ambient conditions* include factors that affect “perceptions of and human responses to the environment” (Bitner, 1992, p. 65). Examples include temperature, lighting, smells, noise and the like that effect the five senses. As such they are not always consciously registered by people but still affect them to a large extent. *Spatial layout and functionality* represent the physical artefacts, their placement and relation to other objects in the room, and how well they allow people to fulfil their goals or mediate their actions.

*Signs, symbols, and artefacts* are communication signals that direct the attention and inform users in the servicescape. The quality (material) of these communication labels and signs affect the overall impression of users. Also materials that are not explicitly meant to communicate a message, contain information that are interpreted by users. *Service typology and environmental dimensions* roughly concern the total configuration of the servicescape. Even small changes in the environment have implications for behaviours, such as changing the flow of transactions and supporting certain types of social behaviours. (Bitner, 1992)

One cannot always consider all of these aspects of servicescapes when designing a prototype, but some aspects might be more dangerous to overlook than others, and sometimes unforeseen details might mean the difference between a successful implementation and total failure. With this in mind, an existing framework of prototyping perspectives will be presented based on the literature study. This framework will reveal areas where prototyping needs to be enforced or changed to facilitate design disciplines such as service design.

## PROTOTYPE PERSPECTIVES

When it comes to prototypes, one of the most rigorous classifications has been made by Lim et al. (2008) using the metaphor of *filters* as one dimension and *manifestations of design ideas* as the other dimension of what they called the anatomy of prototypes. Figure 1 is a visualization of the components and the relations in the anatomy suggested by (Lim et al., 2008). In their conception of prototypes, parts of the whole “idea” are filtered through to allow different aspects of the design to manifest in the tangible prototype. Doing so allows for the different aspects to be explored or tested. This conception is a helpful expression of what makes prototypes important in design. It illustrates how, when you start building, the idea is refined, corrected and developed (or refused), based on how the manifestation talks back (Schön, 1983) at different levels. There are however different types of prototypes and varying purposes that accompany the different prototypes.

A categorisation of prototype perspectives in interactive systems can be found in Beaudouin-Lafon & Mackay (2007). Their proposed dimensions of prototypes were;

- *representation*, describing what kind of prototype and what form

- *precision*, referring to the level of detail in the prototype’s representation
- *interactivity*, describing the level of interactivity available to users, and
- *evolution*, that looks at the whole expected life cycle of the prototype.

Another way of classifying prototypes is to divide them according to what they, in their role as prototypes, represent (i.e. what prototypes prototype). Houde & Hill (1997) suggests that designers mainly use prototypes to address one of the three dimensions; look and feel, role, or implementation. In their model, integrated prototypes can also be utilized to explore a balance of aspects between all three dimensions. In the framework suggested by Lim et al. the look and feel dimension would be ordered under manifestations, while the two other dimensions – role and implementation – would correspond to filter properties.

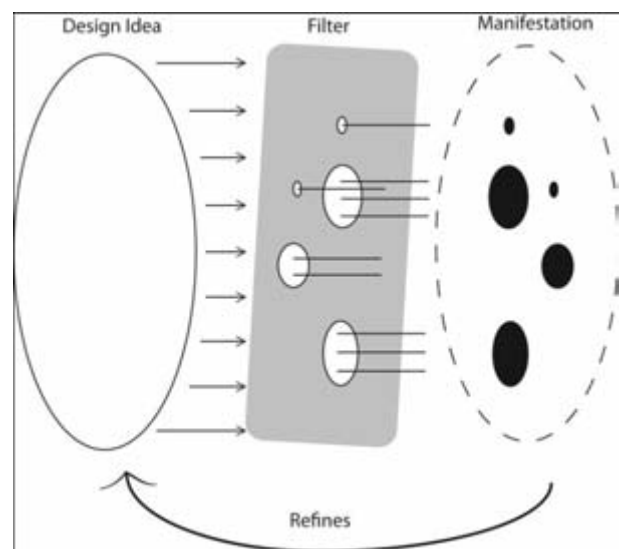


Figure 1: Prototype dimensions in relation to design idea (interpreted from Lim et al., 2008).

## PROTOTYPING FRAMEWORK

The constituents of the framework are the result of the literature study and the central themes that concern prototypes and the practice of prototyping that are repeated there. The framework will function as a context for the following sections where service attributes and service prototyping challenges are contrasted with the framework, followed by a discussion pointing to some interesting future areas of inquiry.

The perspectives are not mutually exclusive. Rather, they are interdependent and of different levels of importance to different practices of design. In practice, there are always constraints of different kinds such as budget, scope, and time, which influence the practical possibilities of prototyping and prototypes. The perspectives in the framework are; position in process, purpose, audience, technique, fidelity, and

representation. The parts of the framework will be discussed in detail in the following sections.

#### POSITION IN PROCESS

As stated earlier, prototyping is sometimes defined as the activities performed during a specific part of the design process (Floyd, 1984). In that sense, prototyping can be seen as an approach or mind-set rather than a set of tools or activities. It can also be interpreted as an event that happens at a particular time in the process, following a research phase and possibly a phase of idea generation, and preceding the implementation phase.

Most methods developed to represent and visualize in design can be used for prototyping. Sketching is one such method that in many ways resembles prototyping. What separates them have been said to be the position in the process (Buxton, 2007). Early on, sketching is a quick and inexpensive way to represent ideas and test them, but as projects go on, sketches are replaced by prototypes that are more detailed and elaborate. Some consider only very high fidelity prototypes as actual prototypes, while others conceive of prototypes more as “learning tools” that may exist on any level of resolution (Coughlan et al., 2007).

There seems to be a connection between purpose and position in process, in that early on, prototypes are used more to explore and evaluate, and later on to communicate ideas to an audience (Voss & Zomerdiijk, 2007). Rapid prototyping is part of IDEOs design philosophy and culture, which means that prototyping is part of the process from the beginning of projects (Thomke & Nimgade, 2000). This means that early on, prototypes must be really quick and rough, not to slow down the momentum of projects. The rapid prototyping approach is now widespread and sometimes means that prototyping is an on-going activity throughout the design process. The character of prototypes in such projects changes with time by becoming increasingly elaborate and detailed. There is research that suggests that single prototype approaches, such as traditional rapid prototyping, is inferior to using many parallel prototypes simultaneously, and that the result is rated higher and as more divergent (Dow et al., 2009).

#### PURPOSE

The purpose of prototyping is a perspective dealing with what aspects that are being prototyped. This is what Houde & Hill talked about when they said that designers need to be aware during every step of the prototyping process of what they are actually prototyping (Houde & Hill, 1997). Questioning the actual purpose of prototypes is commonly overlooked (Schneider, 1996). The purpose should nevertheless be a highly prioritized perspective, since it inevitably dictates the terms of how prototypes are constructed. The purpose also changes with design disciplines, i.e. motivations behind industrial design prototypes are presumably different from interaction design prototypes

and it also changes depending on what the prototyping culture looks like (Schrage, 1996).

Depending on background and current occupation, different purposes of prototyping are held forward as more prominent than others in the literature. Three main themes have occurred more often than others; *exploring, evaluating, and communicating*, (see e.g. Buchenau & Fulton Suri, 2000; Schneider, 1996; Smith & Dunckley, 2002; Voss & Zomerdiijk, 2007). When the purpose is to explore, ideas might only be hunches or intuitions that the designer wants to try out. Exploring prototypes are especially used in early stages and well-suited in rapid prototyping projects. If the purpose is to explore some aspects or ideas about concepts, prototyping must be adjusted to generate feedback, inspire, and reveal new information. Unlike exploring prototypes, evaluating prototypes are based on more elaborate design ideas, and generally envision a more explicit hypothesis, encompassed by assumptions about what it should achieve. This division is also relevant in relation to two other concepts that govern choices of purpose. Those are *process* prototypes, focusing on the development activity, such as generating ideas or knowledge, and *product* prototyping, which focus on the result of prototyping activities (Bäumer et al., 1996).

When prototypes mainly function as tools for communication, the purpose may be more tilted towards presentation and persuasion than evaluating or learning. The design idea is manifested, in this kind of prototype, to suggest new directions of projects, to make sure that all the stakeholders are talking about the same thing, or simply to receive input about improvements.

Returning once again to the framework of Houde & Hill (1997), which mainly concern prototypes and not prototyping, it is important to be clear about the purpose of the prototype to make evaluation possible. If the prototype mainly explores the artefact's role in a context, then the successfulness of the prototype should be measured based on the perceived quality of the role dimension. These dimensions are only useful as long as the prototype can be divided sensibly into any of the three dimensions. The research of Houde & Hill considered in this thesis, has concerned how the prototype is used and what it tests. Focussing on evaluating certain aspects of a prototype by disregarding some aspects that the designers are not interested in, allow them to evaluate only selected aspects of ideas, thus filtering out uninteresting aspects.

#### AUDIENCE

Prototypes can be designed as tools for the purpose of communication, as we have seen. As such, they appear as part of a performance. Benefits from consciously orchestrating such performances to satisfy target audiences have been proposed (Kelley, 2001; Arvola & Artman, 2007). In fact, not doing so might have a number of unwanted consequences (Bryan-Kinns & Hamilton, 2002).



It is recommended that the fidelity should be at par with the audience's ability to interpret and understand the prototype – its' role and purpose - while at the same time elicit feedback at a meaningful level (Bryan-Kinns & Hamilton, 2002; Samaliois, 2009; Markensten, 2005). The most likely audiences can be categorized as *clients, users/customers, and colleagues*. Each one can be broken down into smaller categories; colleagues for instance might be divided into designers with a variety of backgrounds, business strategists, brand consultants, usability experts, project- and business managers, and so on. When the audience is a client, the main aim is typically to sell an idea, support the client in an acquisition process, or convince the client to proceed with a project. Users and customers are usually involved to evaluate and test the prototypes, perhaps as part of the data collection before introducing changes and ideas to clients.

Understanding who the audience also helps understand the prototype itself and even when the audience is made up of other designers, perhaps designers that work together every day, differences of background, culture, or language might force them to consider how and what to communicate (Erickson, 1995; Blomkvist & Holmlid, 2009). Kelley (2001) has provided a number of examples of how prototypes have helped improve communication with clients, and says that they do so by taking on the role of “a spokesperson for a particular point of view” (p. 39). This enables all stakeholders to understand, and question, that viewpoint.

Schrage (1996) has argued that there is something fundamentally wrong with how requirements are generated and communicated in the average software project. To be successful in client interactions and prototyping, Schrage (1996) suggested the Prototyping Partnership Principle that 1) more emphasis is put on what people do than what they say, 2) a prototype is always brought to client meetings, and 3) prototyping is done with, not for, clients.

In the participatory design approach (Ehn & Kyng, 1991) as well as in work on usability procurement, see e.g. (Markensten, 2005) prototyping with clients and users is an assumed practice. Given that prototyping is a social situation, the kind of feedback given in a prototyping process will inherently be influenced by the relationship between the designer and the audience. This relationship has been examined in relation to prototyping in service design (Blomkvist & Holmlid, 2011).

#### TECHNIQUE

Another perspective in the framework is technique, many times also referred to as tool or method. Technique should be chosen with the other perspectives in mind; the purpose justifies the method, just as the required fidelity, the target audience, and position in process dictates what technique or tool should be used. It is ultimately up to the designers to choose what method to use, and the experience and skill of the

designers will to a large extent affect the successfulness of the method.

Techniques and tools encompass methodical frameworks (Buchenau & Fulton Suri, 2000; Mehlenbacher, 1993; Sato & Salvador, 1999). A suggested classification of techniques in software development (Floyd, 1984), outline design approaches relevant for prototyping; *modular design, dialogue design, and simulation*. The tools for prototyping in early software prototyping were mainly purpose-general, but the need for new purpose-specific tools has been made evident (Floyd, 1984). The development of tools, techniques and methods go hand-in-hand and follow the advances of design at large. Popular tools and techniques in interface design are e.g. sketches, mock-ups, paper prototypes, video prototypes, wizard of Oz and scenarios.

#### FIDELITY

Fidelity corresponds to what Beaudouin-Lafon & Mackay (2007) termed precision. Fidelity is the level of refinement or degree of detail displayed by a prototype. This “level” is a way to assess how closely the prototype resembles a finished product, (artefact or service) and how much of the information or interactivity it portrays. Parts that are low-fidelity are usually thought of as more open for discussion while high-fidelity is said to communicate that the element is already finished and decided, and thus not open for discussion. Low- and high-fidelity is sometimes seen as the most general way to distinguish between prototypes (Rudd et al., 1996), and attempts to expand the fidelity concept to include all possible kinds of prototypes have been made (McCurdy et al., 2006).

Some research has shown that simply dividing prototypes into low- versus high-fidelity can be problematic (Lim et al., 2008; McCurdy et al., 2006). The problem with only high- and low-fidelity is that the same prototype may be both high and low level at the same time - in diverse (or the same) aspects. For instance, a prototype may be partly crude and rudimentary in one aspect, and partly refined in other aspects to direct feedback to a certain area.

Prototypes can thus be of different fidelity in regard to different aspects such as graphics, weight, content, and so on. This prompted McCurdy et al. (2006) to suggest that “it is useful to conceive of prototypes along five orthogonal axes:

- level of visual refinement,
- depth of functionality,
- breadth of functionality,
- level of interactivity, and
- depth of data model.” (p. 1240)

This allows for a more nuanced way for designers to talk about and structure their prototypes, enabling them

to predict more precisely how to evaluate and what kind of feedback they will generate. Notice that what Beaudouin-Lafon & Mackay (2007) called the interactivity dimension in prototyping is included in this list. Different levels of interactivity can be said to be aspects of the fidelity of prototypes just as well as surface properties or amount of data represented. Beaudouin-Lafon & Mackay's concept of interactivity corresponds roughly to the feel (in Houde & Hill, 1997) of the system in this framework – what it feels like to use an artefact.

There seems to be somewhat of a consensus that resolution decides what kind of feedback you will get (Buxton, 2007; Wong, 1992), though the preferred level of detail is not necessarily agreed upon. For instance, Buxton (2007) promote low-tech (and low-fidelity) prototypes, while Holmquist (2005) suggests that to generate reliable information the representation must give a realistic impression. Bryan-Kinns & Hamiltons work (2002) also suggest that the match of fidelity of different aspects, such as graphic and interaction, is important and might benefit from some level of coherence.

Finally, to investigate how a new element relates to the larger context, or explore the context of use, *horizontal* prototypes can be constructed. The types that explore more deeply, selected elements of prototypes, or specific functionality, are called *vertical* prototypes (Floyd, 1984). Beaudouin-Lafon & Mackay (2007) also distinguish between horizontal, vertical, task-oriented and scenario-based prototypes under the prototyping strategies rubric. Horizontal and vertical prototypes are different types of prototypes in this framework, while task-oriented and scenario-based are prototyping approaches or purposes (that utilise prototypes), referring to the activity of prototyping.

#### REPRESENTATION

Finally, prototypes can be thought of from the perspective of how they are represented, what they actually look like and how they are materialised. Even complete artefacts that enable prototyping to be carried out are part of the representation perspective, as well as locations or situations. Representation is part of many conceptualisations of prototyping. In Lim et al. (2008) representation is roughly the same as material, which is seen as one of the manifestation dimensions. In Beaudouin-Lafon & Mackay (2007) this dimension is referred to as "form".

Choices of how prototypes are manifested are in many ways based on economical judgments. Early in projects it is wise to choose cheap or already existing materials, that are easy to work with and adjustable. Cheaper materials allow for more testing, which in turn let designers try out more assumptions about design ideas. As the project progresses and the idea become more precise, more expensive materials can be chosen that more precisely convey the intended impression of the prototype. This perspective might be especially

interesting for design disciplines such as architecture, product design and graphic design (Beaudouin-Lafon & Mackay, 2007).

#### DISCUSSION

We have seen that a lot of knowledge has been generated about prototyping and many existing methods for prototyping are now being used in new contexts. This is an example of how prototyping is moving "away from the traditional design disciplines that are founded on the materiality of the artefact (graphic, product, space, software, architecture, etc.) and instead [organized] around human experience domains such as learning, creating, healing, living, working, playing, shopping, etc." (Sanders, 2006, p. 30). How well the existing knowledge about prototyping meets these new challenges is explored further here.

#### CHALLENGES

Five challenges that have been mentioned by service design practitioners was introduced earlier; inconsistency, authenticity, validity, intangibility and time. Some of these challenges can be directly addressed by existing prototyping approaches while others seem to be a little more problematic. Intangibility is addressed by the framework in the shape of techniques such as e.g. *experience prototyping* (Buchenau & Fulton Suri, 2000), various types of *role playing* (Sato & Salvador, 1999), *bodystorming* (Oulasvirta et al., 2003), and *design games* (Brandt, 2006). These techniques are not limited to physical objects or interfaces, but also concern human experiences and involve social relations and multiple stakeholders (Kurvinen et al., 2008).

Inconsistency and time are different parts of the same problem in a sense. They both are results of the dynamic and complex nature of services. To deal with these challenges, designers need to employ a holistic approach to service prototyping that involve many stakeholders and try to capture whole service experiences that take place over time and is distributed over a lot of different people. Knowledge about how to approach participatory prototyping (Brodersen et al., 2008) has also been generated recently.

To deal with the challenge of prototyping (in) servicescapes, a holistic approach is needed. In the framework, the perspective of representation deal with many of the aspects of servicescapes but in service design, knowledge about representation needs to be applied holistically, to represent complete service experiences. To deal with validity and authenticity on the other hand, a new perspective for the framework is suggested; validity.

#### VALIDITY

Working with authentic people and situations is important for service designers. Some choose not to use role-playing because it will not generate reliable responses and data. This is also why some refrain from

using personas – they feel it will stereotype people – a question raised also in an academic context recently (Turner & Turner, 2010).

The added perspective of validity is closely related to fidelity but concern the larger context of implementation, use, and location, as well as the use of real people. When it comes to new design contexts, such as services, it's important that aspects of the servicescape and the complex network of actors are consciously considered. The setting should approximate the intended implementation context as closely as possible. This improves the reliability of feedback during evaluation (Convertino et al., 2004) and potentially increases the usefulness of ideas generated based on the prototype.

The validity of prototypes depends on how similar the test and implementation contexts are. This means that ideally you want all the stakeholders present already during prototyping. This helps avoid the risk that: “prototyping may „oversell” the system by creating unrealistic expectations.” (Ilvari & Karjalainen, 1989, p. 42; see also Alavi, 1984). This also helps by training the front-line staff in delivering the service and by decreasing the risk of unforeseen problems associated with inconsistency and time.

Another aspect associated with the inclusion of stakeholders in prototyping services is who authors the prototype (Blomkvist & Holmlid, 2011), and what that means for the power relations. Author is the final suggested improvement to the existing prototyping framework.

#### AUTHOR

The creator, the author, of the prototype is not a prioritized perspective or consideration in the literature. There are three aspects of this potentially important perspective – one is what associations the evaluators of prototypes have in relation to the author of the prototype, the second is the possibility for users/customers to take part in the creation of prototypes, and the third is related to organizational matters such as design management, ownership and resources.

If the designer is associated with the company for which the prototype is constructed, users or other stakeholders that evaluate it might adjust their feedback depending on power relations, ill-will/good-will, personal gains, fears, and so on. In one case, a design team worked together with a service provider that managed some of their customer relations in an office. The designers put a machine in the office that allowed customers to carry out some of their errands. The front-line staff however, perceived the machine as a threat that might potentially replace them. To deal with the situation, the staff put signs on the machine during the prototype phase, saying that the machine was out of order. This example underlines the importance of the author perspective.

Since service design is cross-disciplinary and relies heavily on co-creation approaches, a lot of people need to be able to take part, evaluate, and understand the design process. A suggested way to tackle this problem is to make the service prototypes as transparent as possible: “it should be transparent to all actors during the design process. In service design, the prototype is more a glass box than a black box. Practitioners should make prototypes available to discussion and dialogue, both internally in relation to teamwork and externally in relation to clients.” (Saco & Goncalves, 2008, p. 18).

When it comes to ownership within an organization, traditionally designers has been functionally organized (Svengren, 1995). That is, graphic designers have been working at the PR-department, industrial designers at the product development department, etc. Prototypes and prototyping in consequence, have been an issue for a functional sub-unit in organizations. A service prototype, on the other hand, has no such functional home-ground. In service driven organizations the service offering, which is the object of the prototype, is a matter for the operative core of the organization as well as the strategic management, which calls for careful and deliberate holistic prototyping.

#### TOWARDS A SERVICE PROTOTYPING FRAMEWORK

The perspectives of validity and author are suggested as helpful additions to existing knowledge on prototyping. This results in a final framework that can be seen in Figure 2.

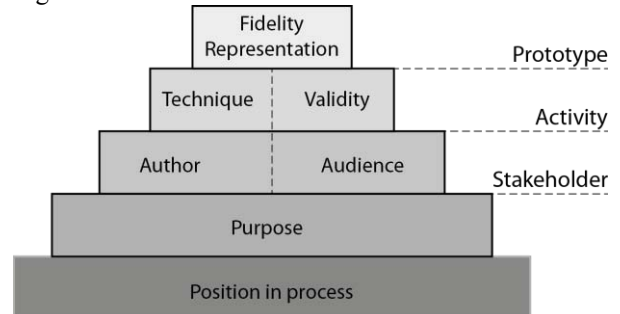


Figure 2: The framework of perspectives on prototyping and prototypes.

The top of the framework visualisation represents the prototype. It is governed by representation – what it actually looks like, what information it contains, and other perceivable aspects, and what roles are represented in it. All these aspects can also be represented in various levels of fidelity. Below the prototype level is the activity level, representing how the prototype is used and what prototyping technique is used. This level, in turn, is built on the stakeholder level, representing the different viewpoints that an audience can have. The audience of the prototype needs to understand the technique and the representation, thus influencing both the activity and prototype level. The audience will also change with both time and purpose. The purpose will be different depending on where in the process the prototyping activities takes place.

The additional perspectives are validity and author. Validity is placed on the activity level, to represent the context in which the prototype is used or evaluated. Validity is closely related to technique and depends on what the prototype is and what category of service is being prototyped. Technique is a choice about how the prototype should be used, while validity on the other hand, has to do with how it should be tested and evaluated, on the other end of the scale. On the next level we find the author perspective, on the same level as the audience. The author of the prototype influences what technique to use and how to represent the prototype. The author also has power to influence in what context the prototype should be tested or used, thus effecting the audience's perception of the prototype. This means that also the author and audience perspectives represent opposite sides of the same situation.

The position in the process is slightly different from the other perspectives, since it doesn't directly relate to human choices or activities, but rather at what time the prototyping occurs. It can be argued that the purpose and position in process should be at the same level of the framework, since choices affect when prototyping occurs. In service design, the top level, the prototype, might be represented only by people, doing things together, or whole service systems, like buildings and servicescapes. In these cases, the activity is much more important than the actual representation.

## CONCLUSION

This framework makes assumptions about prototyping explicit and helps us understand what it is that needs to be added to existing knowledge to support the prototyping of services. Dividing the perspectives into stakeholder, activity, and prototype and visualising them as increasingly higher up in a pyramid, suggests a way to approach prototyping. A basic assumption here is that service prototyping can be based on earlier approaches and knowledge generated in other fields, but needs to be redefined and complemented as a practice in its own right. The perspectives of validity and author are suggested as helpful additions to existing knowledge. Further research within both those areas is however needed to complement existing knowledge.

The perspectives can be used in design education to highlight different aspects of prototypes and prototyping. This is then a way for students to conceptualise and structure their knowledge and it offers a way to problematize the different areas. Different strategic design decisions can also be based on deliberations of the various aspects of the framework and in reference to certain levels of the pyramid. For researchers, the framework makes knowledge available and areas where the framework should be supported and complemented can be identified, thus supporting future research endeavours.

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# DESIGN AT THE FRONT

OTTO VON BUSCH

BUSINESS AND DESIGN LAB,  
SCHOOL OF DESIGN AND CRAFT,  
UNIVERSITY OF GOTHENBURG

OTTO.VON.BUSCH@HDK.GU.SE

## ABSTRACT

Over the last year, fierce discussions have raged about the trend of socially engaged design, where such projects have been scolded as new forms of “design imperialism” (cf. Nussbaum 2010; Pilloton 2010; Sinclair 2010). Resonating with this discussion, the latest US Army Field Manual has included “design” as a central feature in the core battle doctrine. Are we seeing the birth of a “social design doctrine” employed to wage war?

It is tempting to draw parallels between design and the developments of military thinking to reflect some of the issues at stake as design turns to address social, cultural and ethnic issues. As its point of departure this text examines how design and warfare strive for opening new “fronts” in conflicts, new dimensions to strike the enemy, and also use games to train and expand tactical thinking. Today, trans-disciplinary “Human Terrain Teams” of ethnographers, anthropologists and military personnel are engaged in counterinsurgency warfare. Similar to the latest doctrines of warfare, design explores the use of interfaces, fronts and conflict zones, and social design might soon be the next social “surrogate warfare”. As design goes social it urgently needs

ethical research and reflection.

## DESIGN AS A FRONT ENGAGEMENT

The connection between design and the military industrial complex has a long history and most designers know the history of Ferdinand Porsche’s design of German tanks in World War II as well as Hugo Boss’ design of Nazi uniforms. In a similar vein, today no Italian soldier today would enter war in anything else than a uniform designed by Giorgio Armani.

As highlighted by Adrian Forty in his celebrated book *Objects of Desire*, design has always run the errands of power, legitimizing power and the formation of human subjects by desire, force and influence (Forty 1986). Capital, in Forty’s case first exemplified by Wedgwood porcelain, used designers in an instrumental way to integrate fast and streamlined methods for mass production, often against the will of the workers, which satisfied the taste of the market (Forty 1986; 29ff).

Much of design consists of shaping surfaces, façades or interfaces. Design concerns the front. It is a front as in an outer shell, the look or interface, but it is also a front in the meaning of a conflict zone. Indeed, one could say that design is a weapon in an arms race where we designers are the warmongers. Let’s examine how.

The designed interface is a conflict, or perhaps even a battle zone. It is a territory split between two or more conflicting wills. Take for example clothes, the outer surface of our dressed body. My clothes are a battlefield, a conflict engaging my will of expression and the intentions of the designer, but also, as Dick Hebdige pointed out in his seminal *Subculture, the Meaning of Style*, the symbolic tactics of subculture (Hebdige 1979). As Hebdige points out, I am a victim, but also an irregular fighter, caught in the frontline in a war of codes and meaning.

I also encounter the fronts at the war of everyday undertakings as I struggle against “affordances”. I fight with getting the pram up the stairs. I fight with the sensor registering movement to open the automatic

doors. Especially interaction design provokes conflict: everyday I wrestle with Microsoft Word. And it really fights back. For example; I try to write some abstract Dadaist poetry, and Word counterattacks by correcting my spelling. I erase and rewrite. Word retaliates and underlines my words in red, blood red.

This behaviour of Word is a typical counterinsurgency tactic created by interaction designers, and we can see it everywhere: the pre-programmed “correct behaviours” firing back at us innocent users. This unjust battle recruits honest users to become guerrilla fighters in an asymmetric war of interactions. Most of us only want peace, but the front calls us. We desperately seek a diplomatic solution in the preferences menu, trying to stop some corrective grammar function, but most often to no avail.

The struggle with Word is similar to what the influential military theorist Carl von Clausewitz called the “friction” of war; the complexity of battle as unpredictable events evolve and the “fog of war” increases. To Clausewitz “friction” is the “factors that distinguish real war from war on paper.” (Clausewitz 2008: 83) Due to friction “the light of reason is refracted in a manner quite different from that which is normal in academic speculation.” (77) The struggle for military command is to make sense of the information from the battlefield and make wise moves. In a similar vain, designers try to reduce the “friction” of use, by “user-friendliness” or “form-follows-function”.

## A BRIEF GEOMETRIC HISTORY OF THE FRONT

With a quick look at the history of warfare we can easily draw parallels the evolution of design. It seems like war, just like design, is always fighting for new dimensions to open new fronts. The different geometries and dimensions do not follow a strict historical evolution, as they reach different intensities at different times, but a rough generalization can be made to highlight the “abstract thinking” of each war era. To use Deleuzoguattarian terminology, the battlefields were “smooth” or “striated” at various points in time and in different dimensions (Deleuze & Guattari 2004). The opposing “war machines” tried to open new smooth dimensions to cut decisive blows into the enemy’s striated defences.

Primitive battles were non-dimensional, it is the zero-degree of battle. Nomadic clans of hunter-gatherers move around in a smooth space and wage battle when accidentally set against a foe. But with specialization war could be waged more accurately and deadly.

Battles in classical and medieval times were about points and specific battlefields. Generals assigned places for battle, almost like duels, and forts or castles could be besieged. This was the one-dimensional war; combat was done at specific geometric points. However,

the tactics were linear and geometric, as the commander would manoeuvre various formations of soldiers into positions where the weapons would have the greatest effect on the enemy.

During World War I the points get extended into a second dimension and heavily defended and entrenched lines become drawn across the landscape. The aim of warfare was to seize and hold territory, preferably sacking the capital, or to destroy the opposing army through attrition. Especially at the western front, the war got pinned in two-dimensional contours dug into the soil, where armies had to conduct offensive operations on a single continuous front. This is the zenith of linear tactics.

For any success in a WWI offensive, it had to be meticulously organized and methodical as the advance of infantry depended the artillery fire. Creeping barrage, or rolling curtains of fire, preceded attacking infantry lines according to pre-established timetables. Even if an attack succeeded and sudden breakthrough was achieved in the first lines of trenches, the infantry could not advance further into enemy territory as moving on without artillery cover would be too costly. The problem was to move the heavy line of artillery through the landscape it, just moments before, so successfully had turned into a moon landscape of mud (Wiest & Barbier 2002).

In the WWI stalemate it required the invention of new dimensions of warfare; armed airplanes (to fly over the enemy trenches) and tunnel warfare (to dig and plant bombs under the enemy trenches). Thus to avoid the stagnated line the war became three-dimensional.

However, the WWI also saw the birth of infiltration tactics, especially associated by the “Hutier” tactics (after the German inventor, General Oscar Hutier) and the use of *Stosstruppen* (Storm troops). This approach tried to break the lines by concentrated fire, dodgy manoeuvres and combined arms. Hutier also made efforts to put command together with the infiltrating troops to better use the breakthroughs. Efforts like this formed the embryo for the German *Auftragstaktik*, or mission-oriented tactics, a keystone of the mechanized manoeuvre warfare actualized twenty years later. The Hutier tactics, while still using infantry troops and equipment, differed from the previous linear approach of mass assault,

Once located, the troops could use their own weaponry to achieve a breach in the line, with the goal of advancing to tactical depth. No longer was it necessary to attempt to overthrow the entire enemy defensive system utilizing the brute force of great numbers. The quickly advancing storm troops would attempt to disrupt the enemy defensive system by striking at supporting artillery and command centres. In many ways the style of warfare was *Blitzkrieg* without tanks. The enemy defences were now seen as a system. It was the job of the storm troops to



short-circuit the brain of the system rather than batter the body. (Wiest & Barbier 2002: 20)

As a form of appropriation the storm troopers “hacked” into the system of the enemy, used the dug infrastructure as a diagonal vector to cut deep into enemy territory and deployed forces. While still fighting on a two-dimensional surface, the Hutier tactics aimed at using the striated battlefield to their advantage.

By World War II the industrial paradigm of warfare reached its peak with technical warfare happening on land, at sea and in the air and in all three dimensions. This was the last great war between equally modern states and where the machines of mass production kept the war going until they finally broke down in a “total war”.

Today the ends in armed conflicts are often unclear, and the means are constantly changing. In most contemporary conflicts there is a multitude of political, economic and ethnic ingredients. Conflicts erupt at some places around the planet while the rest of the planet lives in a constant threat, of terrorism, bombs or other forms of violence. New frontiers and dimensions also open in new densities; nuclear war, cyber-war, bio-war, civilization-wars. The fronts dissolve into a continuous blur of constant insecurity and risk, as enemies seem to be everywhere and nowhere.

Except trying to outflank the opponent by new dimensions, war is a question of speed. Castles and bunkers are about digging down to stop time and petrify time and the opponent, to keep a status quo (Virilo 1995). Not too unlike copyrights or the blocking of access to Internet sites to strike down on protests (Kullenberg 2010). But new techniques are invented to fly over the fortifications, to increase the speed, to dig encrypted tunnels for dissident transmissions and circumvent the defences. Think of rockets, bitTorrent protocols for file-sharing, openDNS or cipher-hackers supporting protesting students in Iran or northern Africa.

Indeed, we can recognize the same patterns if we re-examine design, for example fashion design. Once the struggle was about the dominance of one frontline; the meaning exposed at the surface of the garment. The designer had an intention, a proposed meaning, and the user could choose to wear and identify with this meaning (Barthes 1983). But subcultures came to undermine this meaning. The denim jeans of the US miners were worn by artists and rebels and became ubiquitous fashion. Over the years some ethnic garments become guerrilla statements; some colours become loaded with explosive meaning (Barnard 1996).

Today fashion has so many fronts and meanings the voice of the designer is almost unheard among all magazines, blogs and forums. And not only meaning or identity; today the fashion fronts cut through ecological materials, ethical production, chemicals of various sorts, new fibres, composting and cradle to cradle product

service systems. Marketing gurus look for even more dimensions; every brand wants a break through. Fashion design seems impossible to overview, ends and means mixed, all styles coexist at the same time and only a fragment seems to be about the clothes themselves. How did we get here, and how did the military respond to the growing complexity of their battle operations?

## THE DEVELOPMENT OF MILITARY THINKING; FROM ENGINEERING TO COMPLEXITY

As elaborated on by theorist Antoine Bourquet, military development of doctrine follows overall scientific discoveries and discourse, affecting strategies and tactics as well as military theory in general (Bourquet 2009). The clockwork armies of Frederick the Great were later replaced by the thermodynamic order or industrial motor armies, striving for density, mobility and firepower, coming to the German *Blitzkrieg* of World War II. To reach maximum effect on the steel density of tank armies, control was moved to the front, as in the German *Auftragstaktik* (mission-oriented tactics) or, as discussed by military theorist and general Shimon Naveh, in the Soviet doctrine of “deep battle” (Naveh 2006).

To Naveh, the manoeuvre in industrial warfare follows certain engineering logics. The overall logic is of striking with force at the weak parts of the enemy; in the middle-lines, communications and vectors of movement, aiming at a deep breakthrough to eliminate the enemy force with high-density firepower and a density of mass. Such tactics, or fire and movement, following Euclidean geometry, works towards creating operational shock, preferably simultaneously throughout the enemy force. According to Naveh, this traditional manoeuvre paradigm saw its eclipse in the Soviet Operation *Bagration* in 1944, which led to the destruction of German army group centre and the final loss of German strategic advantage on the eastern front (Naveh 2006).

The current order of modern warfare, for example in the US and Swedish armies, called “Network Centric Warfare”, follows developments in information technology, computers, surveillance and satellite communication (cf Albers, Gerstka & Stein 1999). Using technology to reduce the “fog-of-war” on the battlefield this information driven warfare is designed to thrive on the chaos of war. However, these doctrines also resonates on a theoretical level the ideas of chaos and complexity theory.

As opposed to the industrial doctrines, Naveh proposes a nomadic “rhizomatic manoeuvre”, based on contemporary war experiences where a high-density army meets a dispersed and clouded enemy (2006). To Naveh, the rhizomatic manoeuvre is executed in a theatre of war with no clear borders or frontiers and evolves into complex fractal-like geometry rather than

tracing Euclidean lines. It defines as its space of praxis a self-regulating ecology or auto-poietic system which means that the aim is not to strike deep into enemy territory (as that has no meaning to the enemy) but instead to pursue potential, to build possible exploitation for actors in the environment and to reveal their form to the other combatants. Like fire ant colonies, it operates without hierarchy but a force being constantly present (Naveh 2006).

In today's complex conflict environments the engineering or surgical precision of smart bombs is complementary to the "swarming" tactics of ever-present drones and non-linear operations where the forces are spread out rather than concentrated (Edwards 2005).

The future of war is fraught with uncertainty. Among the few points that experts agree on is that the future battlefield will be relatively empty as military operations become more dispersed. This is due to the increasing lethality of weapons, in particular precision guided munitions (PGMs), which render concentrations of mass on the battlefield vulnerable. Long-range fires can now be delivered by a variety of means because of recent improvements in command and control and in sensor technologies. Even direct fire is now much more lethal. Warfare is becoming a hide-and-seek struggle where units must remain elusive in order to survive. (Edwards 2005: 1)

This dispersed battlefield is the opposite of the industrial paradigm, which could be summed up in German *Blitzkrieg* general Heinz Guderian's quote "Klotzen, nich Kleckern" ("boot'em, don't spatter 'em" or "strike concentrated, not dispersed") (Guderian 1996: 316).

Swarm tactics is a response due to the fact that the weapons of today are more accurate and deadly as well as a frequent asymmetric tactic by "insurgents" to counter the superiority of modern conventional forces. "Swarming involves the convergent action of several units that continue to attack by dispersing, manoeuvring, and reinitiating combat (pulsing)." (Edwards 2005: 68) Yet, swarming is not a classic guerrilla tactic as engaging and destroying the main field forces of a conventional army is usually unattainable by guerrilla tactics alone (Edwards 2005: 65). Likewise, guerrilla tactics usually aim at one attack to then disperse, while swarming uses "pulsing" behaviour, with repeated and reiterated pounding of enemy forces in a continuous flow. In contrast to the old uncoordinated swarms of the Mongols, who used the "Mangudai" technique with a simulated retreat of a weak centre, today's equivalents are networked and well informed, both high-tech US forces in Afghanistan as well as satellite telephone equipped pirates outside Somalia.

The networked swarms of today form emergent systems, similar to the Complex Adaptive Systems,

which is the use mass, iteration and technology to coordinate and harness complexity (Axelrod & Cohen 1999). This is the type of behaviour we see more common also in the civil world and especially design discourse. We see Complex Adaptive Systems in the use of "smart mobs" (Rheingold 2002), open-source programming (Raymond 1999), user-driven innovation (von Hippel 2005) and "crowdsourcing" (Howe 2006). But it is also common in the activist behaviours of the "multitude" (Hardt & Negri 2005) or "flash mobs" and "critical mass" bicycle protests.

The same type of abstract logic can be traced in the works of industrial designer Hella Jongerius in her works with porcelain producer Nymphenburg where she delegated design decisions to the painters who were "free to choose their own colours and images from the company's collection" (Jongerius 2004). Jongerius work is an excellent example of manoeuvre warfare, moving control to the front line, and using rhizomatic manoeuvre to produce non-linear decorative results.

## DESIGNING THINKING AT THE FRONTLINE

Clausewitz' remark that "war is the continuation of politics with other means" has formed the basis for conventional war studies over the last century and is still deeply engraved into the "Clausewitzian culture" of military thinking (Christiansson 2007: 9). However, as politics is a many-folded field of practice and discourse and changes with time, so do the parameters of conflict and war.

In the "industrial war", as General Rupert Smith frames it, war was waged by military experts supported by complex technocratic systems. Such systems focused on mobilizing and commanding concentrations of speed and mass into decisive battles and this was the recurrent image of future warfare during the Cold War. However, as Smith points out, "war no longer exists" (Smith 2005: 1). War is no longer fought between two opposed state machines, but today we see "war amongst the people" become the *dominant* form of armed conflict. Such armed conflicts engage civilian and non-state agents and makes no mutual distinction between combatants as it was defined in the Geneva Convention.

Perhaps most importantly, Smith suggests, the armed conflicts common today has no possibility of reaching a final victory but must rather end in a tolerable "condition". The use of military force can no longer win by conquering and holding territory but can only produce the conditions in which acceptable outcomes can be produced by political and social means. As Smith points out, "once an intervention has occurred a main preoccupation is how to leave the territory rather than keep it." (Smith 2005: 272) This situation, which in many ways directly opposes the common lines of thought about military intervention, creates a lacuna of conceptual models to understand military action in contemporary conflict.

However, as noted by management researcher Roger Martin, today “design thinking” has become a vital part of the complex theatre of operations in armed conflict and is frequently discussed in military journals, for example *Military Review* (Martin 2010). One such design-imbued doctrine is the “operational art” of Shimon Naveh (2007) and the “systemic operational design” of Huba Wass de Czege (2009). The latest US Army Field Manual (FM 5-0) on operations process, which includes a lot of “design thinking” frames the problems of contemporary warfare,

As learned in recent conflicts, challenges facing the commander in operations often can be understood only in the context of other factors influencing the population. These other factors often include, but are not limited to, *economic development, governance, information, tribal influence, religion, history, and culture*. Full spectrum operations conducted among the population are effective only when commanders understand the issues in the context of the complex issues facing the population. Understanding context and then deciding how, *if*, and when to act is both a product of design and integral to the art of command. (FM 5-0: § 3-17, italics added)

The addition of design thinking into military doctrine is an attempt to reduce the impact of reductive and mechanistic thinking within operations planning, stemming from the industrial paradigm of warfare. The ultimately goal of design here is to create better military “conditions”. Military organizations have always been complicated, that is many part arranged in linear and predictable ways, but for today’s complex conflicts the armed forces need to adapt to new environment of multiple “soft” factors, like culture, tribal alliances, civil governance etc.

To underline some of the complexity of a battle today, a US commander’s checklist before a brigade-size counterattack in Afghanistan can today look like this:

- What infrastructure damage could the counterattack incur?
- How would that impact on the different actors and tribal groups in the region?
- Are we creating a disaffected minority by upsetting the power balance, risking a refugee crisis that would overwhelm the regional humanitarian capacity, or create other unintended consequences? [...]
- What is the logic of the guidance?
- What are the sources of legitimacy of the different power bases within the enemy’s social system? (Banach & Ryan 2009: 108)

For acting within such complex operational environment, Wass de Czege, now retired Brigade General and founder of the School of Advanced Military Studies (SAMS) at the U.S. Army War College, proposes more adaptive learning cycles. These

adaptive learning cycles, which must be networked into the interconnected operational environment, coordinates a wide variety of decisions and units (Wass de Czege 2009) and there is called upon an associative “art of design” (Banach & Ryan 2009; Hernández 2010).

In this type of complex environment it might not be of surprise to notice how Naveh and the Israeli Defence Forces has had Deleuze and Guattari’s *A Thousand Plateaus* as his references, and also other theorists;

We are like the Jesuit Order. We attempt to teach and train soldiers to think. [...] We read Christopher Alexander, can you imagine?; we read John Forester, and other architects. We are reading Gregory Bateson; we are reading Clifford Geertz. Not myself, but our soldiers, our generals are reflecting on these kinds of materials. We have established a school and developed a curriculum that trains “operational architects”. (Naveh cited in Weizman 2006)

More notably to the design community, distinguished theorist are also among the writers used for war today, with names like Buchanan, Krippendorf, Margolin, Simon, Thackara and Papanek, not to mention the Gothenburg-based management theorist Barbara Czarniawska (Naveh 2007).

What these theorists offer are new ways to conceptualize war, how to form doctrine, perhaps most importantly; were do disband doctrine to form new diagrams of thinking (Weizman 2006). Here the connection between design and warfare comes to its clearest; in ways to conceptualize the future in simulation, scenarios, prototypes and games for training.

## PROTOTYPING WAR FOR NEW TACTICAL DIMENSIONS

The Prussian king Frederick the Great was fascinated with automatons, representing his meticulously ordered clockwork armies, as Michel Foucault (1991) and Manuel DeLanda (1991) both elaborate on. But as they both highlight, he was also very fond of miniature war games. Later, during the reign of Fredrik William III, war games, or *Kriegsspiel*, were developed by the Prussian general staff into a ubiquitous tool for officer education and strategy, and such games also later became war games for the gentry. An example could be the popular game *Stratego*, launched in France in 1908 as “L’attaque” a strategy game building on the “fog-of-war”, as the opponents pieces are hidden for the players. (Deterling 2008: 100) One famous civil proponent of more figure-like and playful games was British science fiction writer H.G. Wells, wrote two epic books on the matter, *Floor Games* (1911) and *Little Wars* (1913), and is considered the “father of miniature war gaming” (Wells 1977: 91).

Also the protagonist of situationism, Guy Debord, was a devoted war gamer. During the foundation of the situationist movement he developed the game *Le Jeu de la Guerre* (Game of War), invented in 1965 but first published in 1987, which he later exemplified as his key study in the “logic of war” (Debord 2005: 55). Debord’s Game of War exposes certain diagrams of the strategic possibilities in Napoleonic warfare, but the game also acts as a bastard sibling to chess, perhaps the prime strategic war game. It is not a coincidence that Debord developed a strategic game. Giorgio Agamben said about Debord; “once, when I was tempted (as I still am) to consider Guy Debord a philosopher, he told me: ‘I’m not a philosopher, I’m a strategist.’ Debord saw his time as an incessant war, which engaged his entire life in a strategy.” (Agamben cited in Wark 2008: 28) Media theorist Wark continues in his analysis of Debord’s relation to the game;

The strategist is not the proprietor of a *field* of knowledge, but rather assesses the value of the forces aligned on any available territory. The strategist occupies, evacuates, or contests any territory on pursuit of advantage. (Wark 2008: 28)

Here, the game of Debord reveals perhaps not only a matter of war or armed conflict but of how conceptual thinking and prototyping comes to define patterns of logics or “abstract machines”.

Also art groups proposed games to cut the stalemate of rigid thinking, perhaps most vividly the Surrealists (Brotchie 1991). Marcel Duchamp gave up art, carved himself a chess set from wood, and spent the rest of his life concerned with chess. He later wrote a book about chess. Duchamp meant,

The chess pieces are the block alphabet which shapes thoughts; and these thoughts, although making a visual design on the chess-board, express their beauty abstractly, like a poem.... I have come to the personal conclusion that while all artists are not chess players, all chess players are artists. (Duchamp quoted in d’Harnoncourt & McShine 1973: 131)

The Bauhaus teacher Josef Hartwig produced a series of updated cubist chess sets between 1922-24 as prototypes of the rational thinking of the modern times envisioned at the Bauhaus. Also here, chess was a game to conceptualize deeper logics of society and the machine age. Fascinated by the robotic moves of the pieces (also reflected in Oscar Schlemmer’s Bauhaus theatre), Hartwig’s chess set “embodies a utopian quest for the new subject to be self-determining in ludic and linguistic culture.” (Buchloh 2009: 148)

In his renowned study of everyday life, Michel de Certeau also strives to reveal the logics behind the practices of the everyday through abstract logics he calls “strategies” and “tactics” (Certeau 1988; 1998). Certeau links strategies with institutions and structures of power which produce the environments of the everyday. On the other side he puts the tactics of individuals

consumers acting and “making do” in the environments defined by strategies, reverting and undermining them by creating own meanings. In his example of walking through the city, the pedestrian takes tactical shortcuts instead of following the strategic grid system. Indeed, to Certeau, the everyday is made up of tactical “social games” and the carnival, where spectators are actors at the same time, is a common tactic for reclaiming the everyday. (Certeau 1998: 33) Like the Hutier storm troopers, appropriating the enemy’s communication lines as scenes for battle, Certeau’s everyday people fight to misuse the strategic system in order to produce possible futures.

Certeau’s tactics, the *Kriegsspiele* of the general staff, and the civil games examined above are the equivalent of the scenarios and prototypes of designers. They propose “what-if” course of events and settings that are aimed at informing new practices and provoke new thinking about the possible *as well as* the impossible. As argued by design theorist John Wood, the scenarios of designers facilitate discussions and visualizes proposals about the possible, thus aiming to inspire and render new worlds attainable, or denounceable (Wood 2007). This “design for micro-utopias” is the tactical thinking of design, to prototype future scenarios and thinking the new. The designer’s training, to visualize and abstract the possible new, is a core element of the highly desirable “design thinking” which is now seeping into military operational planning. This is especially apparent in the operational parts which are dependent on the “tactics” of civilian intelligence and cooperation; counterinsurgency.

## COUNTERINSURGENCY AND SOCIALLY ENGAGED WARFARE

Breaking the moral of enemy units has always been an important part of warfare. From war painted faces to propaganda, and from whistling arrows to sirens at dive-bombers. Psychological Operations, Psy-ops, have strived at affecting military personnel as well as civilians.

In recent years, as the US Army has been engaged in complex overseas missions of counterinsurgency, there has been a call for the education of more “culturally literate soldiers” to further the building of trust with local inhabitants (McFarland 2005). As a quick response to this urge, the US has created a system of embedded anthropologists in their combat units to better understand the “human terrain” of the conflicts. The teams are multi-disciplinary research groups of two anthropologists and three military personnel and are trained to gather cultural intelligence from the theatre of operations. Starting in 2006, the teams go through a short military training at the Human Terrain System centre in the US before being deployed in combat theatres in Afghanistan and Iraq. Such teams of academics from the social sciences are supposed to be

similar to police community outreach programs, mediating in conflicts, enabling the development of governance and supporting the goals of the military engagement.

The Human Terrain System uses empirical socio-cultural research and analysis to fill a large operational decision-making support gap. This research provides current, accurate, and reliable data generated by on-the-ground research on the specific social groups in the supported unit's operating environment. This human terrain knowledge provides a socio-cultural foundation for the staff's support to the Commander's Military Decision Making Process. (Human Terrain System)

The US Army now has "Human Terrain Teams" in each of its deployed 26 combat brigades in Iraq and Afghanistan to help provide commanders with a sense of cultural understanding when making decisions.

Critics have questioned the ethical practices of embedded civilians for research and called this development "mercenary anthropology" that exploits social science for political gain by means of violence (cf Rodhe 2007, Gonzalez 2009, Lucas 2009).

Anthropologists have been sceptical of the ethical responsibilities of researchers, questions of secrecy, voluntary informed consent, adequate training and misuse of data. Resistance is also met from inside the military, where the teams are seen as merely a quick fix that obstructs the repair of a wider gap of cultural terrain training (Connable 2009). Others, like David Kilcullen, an Australian anthropologist focused on counterinsurgency and architect of the Human Terrain Teams strategy, calls the program positively "armed social work." Kilcullen further argues,

Conflict ethnography is key; to borrow a literary term, there is no substitute for a "close reading" of the environment. But it is a reading that resides in no book, but around you; in the terrain, the people, their social and cultural institutions, the way they act and think. You have to be a participant observer. (Kilcullen 2007)

The argumentations in this critical crossfire sound much like the discussions surrounding participatory design in the 80s and especially the current "design doctrine" of social design. Where Kilcullen argues that current wars are "population-centric", and the military thus needs to control the people, it may seem like to design for "the other 90%" (Smith 2007) or "like you give a damn" (Sinclair 2006) might be some of the best tactics to wage war with the "soft power" favoured by president Barack Obama.

One critique of the Human Terrain Teams is that they are not hired by the Army *per se*, but through subcontractors like BAE Systems and thus managed in military-commercial settings (Gonzalez 2008). Similarly, social design might become a new "surrogate warfare", where hired locals become engaged in

military operations, paid by external interests which might not share the same ethical values. Beyond the hype of "socially engaged practices" the design field taking on outspoken social issues in complex human terrain is doomed to step into imperialist footsteps, as commented by Bruce Nussbaum in his article which triggered the hot debate in summer 2010: "Are designers the new anthropologists or missionaries, come to poke into village life, "understand" it and make it better--their "modern" way?" (Nussbaum 2010). In Pilloton's response to Nussbaum she highlights local connectedness as a key component of success, not too dissimilar to what the Human Terrain teams are after, or the tactics of "surrogate warfare". However, to save the day, Pilloton enthusiastically lifts forward the social salvation of creativity;

This is the power of humanitarian design: When it's not about design anymore, it's about an educational process that produces creative capital where it did not exist before, in beautiful ways, by underestimated individuals. (Pilloton 2010)

As earlier highlighted by Forty, design has a tacit tradition of politicized capital, control through standardization, and commercialization through modernist utopianism (Forty 1986). Today, perhaps the greatest imperialist endeavour of design is to fuel the arms race through the "creative imperative" and tacit complicity with creative capital, as this is considered essential for survival in the current labour, attentiveness and relations markets in service of the creative industries (von Osten 2002). Likewise, "social innovation", facilitated by flown in designers or local educators, might have its merits, but it also an effective tool at hand for the surrogate warfare of creative capital.

## CONCLUSION AND SUGGESTED FURTHER RESEARCH

Design and warfare has been intertwined as long as man has made weapons. Just like the ethical discussions that have lately concerned anthropologists about the Human Terrain System, design needs to examine the ethics, methods, tools and consequences of socially engaged practices. What ethical principles should be employed when discussing social design, and what role does guidelines from, for example, the UN play?

Further research could take as point of departure the discussions concerning the Human Terrain Teams, as well as discussions from development studies, and reflect onto some case studies of social design projects. However, avoiding cynicism can a tough task in the design world, as imperialism, power, creative capital, cognitive globalization and design blur into each other.

Just like *civil* engineers set out to differentiate from *military* engineers about a century ago, we might one day need to start considering to make demarcations

between *civil social design* as distinct from *military social design*. But is this where we want to go?

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# DESIGN AND POSSIBILITY

MADS NYGAARD FOLKMANN

UNIVERSITY OF SOUTHERN DENMARK

MNF@LITCUL.SDU.DK

## ABSTRACT

A central element in design is the search for the new and not-yet-existing. Thus, design is a matter of the possible, of which kind of products and meanings can be made possible through design. The paper attempts to propose a way of theorizing the field of the possible in design. The ability to deal with, mediate and evoke new possibilities and thereby creatively explore new territories of use, meaning and impact is seen as a defining factor of design. Using a phenomenological framework and stating the imagination and the imaginary as central concepts, the paper aims at pointing in new directions for conceptualizing the possible in design. The paper differentiates between two different models of possibility in design, 1) the dimension of possibility in the design process, that is, before the finalized design, and 2) the generation of possibilities through the design object. The contribution of the paper to design research lies in asking fundamental questions of how design, epistemologically and ontologically, operates through the possible.

## INTRODUCTION

*What makes a chair possible?* This sentence can be interpreted in more than one way. It can mean: (i) What are the factors that make the chair possible? That is, which conditions enable the possibility of the chair? Or, if we rephrase the sentence and see the chair as the subject of the sentence – what *does* the chair make possible? – it can mean (ii): A chair makes *what*

possible? That is, which are the possibilities that are created or achieved by the chair? To illustrate, the famous *Panton* chair (1960, Figure 1), made in one single form in injection-molded plastic by Verner Panton, is both the result of a struggle to make the chair possible and, when completed and marketed as a piece of design, an enabler of new possible ways of using, conceiving, and experiencing design. So, on the one hand, the chair is the result of a design process, which took about ten years from the initial idea of a one-structure chair in modern materials to final realization. And on the other hand, in its final iconic presence, which balances modernist ambitions and swooping organic curves, the chair irreversibly changed the space of cultural possibilities for chairs. As a design object without precedent, the Panton chair set new standards for what design is, and what it can look like.



Figure 1: Panton chair (1960), by Verner Panton, manufactured by Vitra

The possible in design can be very elusive. It is, by and large, defined by the individual design case; thus, there are as many *possibles* in design as there are design objects. Each design object has its own story of



*becoming* in the design process and in its specific impact. As a type of design, for example, a tangible, manifest piece of design such as a chair undergoes different process of being designed and entering the cultural stage than a technological product, where most of the design in the form of pervasive computing is hidden from the eye of the spectator/consumer. Still, as a central aspect of the formative dynamics of design, whether in its phase of becoming or being a design object, it is relevant to move from the level of concrete stories to a general, generative level of the possible in design: analyzing the role of the possible as a leading factor in initiating, structuring, and enabling design processes and processes of attributing meaning to design objects. A design process may take its point of departure in an idea, while it is the cultural context that ultimately determines the meaning of the design object, but it is the object that gives the idea its tangible expression, and it is through the object that the context is affected and perhaps transformed. Thus, we should examine, first, the role of the possible in the becoming of design objects, and, secondly, how design objects, though their constitution, give rise to new spaces of possibilities.

#### DESIGN MEDIATING POSSIBILITY

Design is a passage to the new. Design is a not only a term for describing certain categories of objects or solutions, it is also a medium for envisioning something new. This is a process that takes place in the intersection of function, aesthetics, actuality, and possibility. Thus, design deals with the *possible*. To further sharpen the thesis: The ability to *address, mediate, and evoke* new possibilities and thereby creatively exploring new territories of use, meaning, and impact is a defining feature of design. It is what constitutes design and makes it special: Design is capable of transforming the possible into actual, tangible and useful objects that, in turn, can have a huge impact on human life and behavior (with widely distributed products) or on widespread notions of what objects are or mean (in experimental design).

In the phase of becoming, that is, in the design process, design converts and transforms the possible into forms and appearances. Accordingly, in the phase of finalized objects, some aspects of the possible remain as a structure of meaning contained in the objects. Thus, another central thesis is that *the possible is not only to be found before and after the realization of the design object but is also contained within it*. This concept of design – design as a medium that enables the possible – touches upon our understanding of design, how it is conceived as a discipline, and what is understood by design.

Design is both an old and a new discipline. It is a new discipline in the sense that it is only within the last 250 years that design has established itself as a professional

discipline operating in relation to industry and modern mass-production as a deliberate approach to affect our physical surroundings. As a scientific discipline, design is even younger, as research has been contributing to our knowledge about design for about 50 years, and efforts to create a research discipline are still ongoing, as demonstrated in the anthology *Design Research Now* (Michel 2007). Conversely, a comprehensive “design turn” is taking place within the humanities, engineering, and the natural sciences, where design as a discipline connecting theory and practice in objects of synthesis places itself at the center of the production of knowledge (Schäffner 2010). During the same period, the concept of design has expanded from being associated with products and graphics to being associated with areas such as communication, environments, identities, systems, contexts and futures (Heskett 2002). Further, modern technology is a more integral part of design than ever before, shaping the concrete objects of design from within. Design has been associated with a culture of the artificial (Simon 1969) and seen as an art of technology (Buchanan 1995), but on the concrete level of design objects too, technology plays a growing role in both the material and immaterial culture of today’s design objects through the use of miniaturized microchips and pervasive computing. Design as a medium for envisioning the new is ever changing, both in terms of the culture of objects and in terms of professional disciplines. In the latter domain, lately the term *design thinking* has been devised to describe the ability to use design tools and design methods in relation to business strategies (cf. Borja de Mozota 2003) with processes oscillating between problem formulation and solution generation, and with the formulation and generation of abstract concepts in the materiality of actual design solutions (e.g. Stolterman 2007; Brown 2008, 2009; Rylander 2010). Design thinking is a way of thinking and acting through and with the concreteness of design.

Design is, in turn, also one of the oldest genuinely human capacities. The very concept of design thinking, which in its strategic approach to designing might use new and refined tools, defines a basic competence in design: the connection of conceptual (what do we want from the design?) and concrete materiality (how does this come into being?). Many books on design open by stating that design is both a noun (*the design, meaning outcome*) as well as a verb (*to design, meaning a process*). On a fundamental level, design can be seen as the general ability to conceive and carry out plans as well as designating and thus giving meaning to these plans (implied in the Latin root *designare*): Design is a way for people to interact with their surroundings with a conscious intention and through material objects full of immaterial meaning; in this sense, we can speak of a world created, constructed, and structured by design. Thus, design can be understood as the term for the

culture of both material and immaterial objects that are created by human beings based on a certain intention.

Any human creation is, however, always situated within a historical context, and what specifically defines design in contrast to, e.g., craft is its close connection with industry, where it has the potential to get widely distributed as a means of giving form, structure, and meaning to products. The attachment to industrial mass-production is often the criterion of demarcation for design histories that typically set the starting point of the history of modern design at the beginning of the industrial revolution in England (e.g. Forty 1986; Raizman 2010, Sparke 2009).

Design is, then, a central part of our interface with the modern world; we see, perceive, and understand contemporary culture through its design and its various material (visual, haptic, auditive, olfactory, and even gustatory impressions and impulses) and immaterial (conceptual, critical, systems-oriented) representations. Design can be said to be a 'Leitmedium' of modernity, in the sense that it creates meaning in an intersubjectively binding way (Hörisch 2009), which means that design is the unavoidable access point for our perception and understanding of the world in its cultural formations. Then, design is a way of imaginatively envisioning the new, conceiving and grasping possibilities of living and being engaged in the world. Thus, I will define *design as a means available to human being for envisioning and realizing new possibilities of creating meaning and experience, and for giving shape and structure to the world through material forms and immaterial effects with a potentially massive impact.*

The philosophical framework for my approach is phenomenological in the sense that phenomenology deals with conditions of experience, and my focus is on the relationship between design and experience. The point is to explore how design is a result of experiential structures, and how design objects themselves are capable of creating new structures of experience. In essence, design in its many forms designates the specific appearance(s) of the world of objects. As we sense and perceive the modern world through its tactile and visual surfaces, it becomes clear that these affect and structure our experience in particular ways. For example, there are huge differences between experiencing the world through the formal structures of functionalistic design and architecture or through Verner Panton's experimental, psychedelic roomscapes. My approach takes the cultural surroundings and socio-economic contexts into account, but my focus is primarily on the enabling of experience and dimensions of meaning on behalf of the objects rather than on the actual use and cultural contexts of design object. This kind of phenomenological approach is relatively new in design research, although there are exceptions, e.g.

Schön's studies of the phenomenology of the design situation (e.g. Schön 1983). This approach is also what sets this study apart from approaches to design creativity in psychology or cognitive science (see e.g. Yukari & Taura 2011) or in neuro-science (cf. Skov & Vartanian 2009).

## THE POSSIBLE IN DESIGN

Possibility evolves at the threshold to actuality. In one of the most powerful cultural expressions of the possible, the seminal novel *Der Mann ohne Eigenschaften* (1930/33; English: *The Man Without Qualities*, 1995) the Austrian author Robert Musil states how the sense of the actual, "Wirklichkeitssinn", must be complemented by a sense of the possible, "Möglichkeitssinn" (Musil 1978, I, 16). The important point in Musil's reflection is the simultaneously utopian and reality-bound nature of the possible. A person capable of conceiving the possible always thinks, "things might be different":

"So the sense of the possible could be defined as the ability to think of everything that also could be and, conversely, not to regard the given as more important as the non-given" (ibid., my translation).

In the context of Musil's novel, the sense of the possible leads the protagonist on a search for new possibilities of living: The utopian horizon is wide open, as the sense of the possible also leads in the radical direction of the "as yet un-awakened intentions of God" (ibid.). At the same time, though, the possible is connected to the actual, to the *possible actual*, as it is always the actual that provides the foundation for the possible. The possible is marked by immanence as well as transcendence. The sense of the possible is not just given but must be awakened. This, then, requires a specific mental setting in a paradoxical attachment to/detachment from reality.

This mental setting towards the possible actual (and the actual possible) is the setting that characterizes design and the designer. Musil speaks of having a "will to build and a conscious ambition to the utopian that does not abandon reality but treats it as task and invention" (ibid.). To conceive of the possible and utopian in a reinvention of reality is at the heart of design. At the same time, this is also an experimental task: Musil speaks poetically of dragging a line through the water without knowing whether it is baited (17). In most design, searching is hardly quite this open, but the key point here is that the means of searching for the possible can be hard to define. Working actively with design and design processes is, however, an attempt to specify the bait.

In a design context, the possible is the open space of the new and non-existing or rather the not-yet-existing. Addressing the possible in design means opening the discussion about what design is for, and asking how it

can be used as a form of meaning that shows us new directions. This is central to Herbert Simon's famous 1969 dictum that "[e]veryone designs who devises courses of action aimed at changing existing situations into preferred ones" (Simon 1996, 111). Simon's statement is loaded with Modernity's optimistic ideology of using design to create a better world, but even seen apart from its historical context, which relates, for example, to the discussion about the role of artificial intelligence, the statement still has something important to say: that design is a flexible tool that can take on a wide variety of shapes and expressions (encouraging "action"), and that it can be an active means of engaging with the surroundings (accomplishing "change"). Furthermore, possibility in design does not have much in common with the philosophical notion of "possible worlds" as counter-projections of reality (i.e. asking what would be possible if we had another world). Instead, possibility in design has to do with making possibilities of *this* world relevant and tangible. Design is a means of proposing *possible models* for being in, perceiving, and engaging with the world. The possible should not only be seen as something that comes into being before the actualization of the finalized design but rather as an *inherent structure of design*: As a tool for actively organizing the mode and appearance of reality in the modern world, design indicates what is possible, and what is not. Design provides models of how to perceive and filter reality; it enables what is not currently enabled (cf. Sloterdijk 2010).

Within the field of design and in design theory, the possible has been conceived in a variety of ways depending on design approach. Basically speaking, there are two different models of possibility in design, 1) the dimension of possibility in the design process, that is, *before* the finalized design, and the generation of possibilities *through* the design object.

The possible plays a prominent role within design epistemology, as the starting point of a design process is often a search for a solution that has to come into being. Here, the possible is a part of the early formation of the design object, before it is finalized as a solution with a physical aspect. In design epistemology, the debate revolved around such issues as generating ideas, enhancing creativity in the process of seeking new proposals, and promoting the creative leap in design when design is used as a device for creative processes of anticipating and grasping for something new and not-yet-existing. Further, it is exactly due to its ability to devise concrete proposals and solutions for something yet unknown – and this bridging the gap between unknown and known, possibility and actuality – that design often is seen as having a prerogative in comparison with disciplines that only describe characteristics of the world (e.g. sociology and humanities) and not necessarily projecting anything

new. From this perspective, then, design is a more *synthetic* than analytic discipline; it has a progressive, future-oriented and openly interpretive orientation: When we initiate a design process, we never know what the ultimate outcome will be.

With regard to the methodology and process of creating concrete design objects, the possible can, then, play a central role. Daniel Fällman has discussed the dimension of *design exploration* in the design process, as design is used critically to question what design is for. In this context, "design becomes a statement of what is possible, what would be desirable or ideal, or just to show alternatives and examples" (Fällman 2008, 7). Thus, design exploration can be used "to show what is possible", that is, to explore "a possible future by transcending (i.e., breaking down and going beyond) the boundaries of an existing design paradigm" (15). In an extension of this kind of reflection, Per Galle raises a series of fundamental, philosophically informed questions that must be faced regarding the act of reaching into the future with design: He asks what design predictions refer to, since design on this stage has not yet manifested itself in the form of objects. Therefore, the questions facing designers may be *ontological*, asking what the "subject area of design" can be, "given that it cannot be the actual artifacts themselves". This leads to the central *epistemological* question: "How can the designer *know* the truth of his predictions (or at least justify his faith in them)?" (Galle 2008, 279-80). Galle examines various theoretical or philosophical models or "world-views" that might help us understand the design process and its relationship with an object that does not yet exist, and he makes the general statement that designers need to be aware that all approaches to the design process (as described in design theory) have a conceptual foundation: "What threatens to disintegrate our body of design theory is not the worldviews *per se*, but our lack of awareness about them" (298). This is true, and as a consequence, we also need to be aware of the preconceptions implied in the current notion of possibility on the level of the design process: Central to my argument is that this kind of design thinking implies that we might *think* and *act* within a field of possibilities, but also that these possibilities often are thought to exist in the form of a large reservoir of latent design choices that disappear as the design process is condensed into a final product. In the design object, the sphere of possibilities is often conceived to be transient and eventually transformed into the actual. Seen from the perspective of the design process, then, the possible is virtually active as a force behind the process, but seen from the perspective of the design object, it eventually loses its relevance. The result of this process is the fundamental annihilation of the possible that disappears virtually without a trace. My point is, therefore, that this notion is challenged by the use of the concept of the imaginary.

Within design ontology and design phenomenology, the notion of the possible is engaged on another level, as the possibilities are created by and around the design object. Typically, the design object is conceived as static, which also is a notion to be challenged. Thus, the design object can generate new possibilities as design is regarded as a catalyst for generating cultural possibilities. Design can be a way of opening up a space of cultural meaning. In this vein, John Heskett states that “[c]ultural identity is not fixed, like a fly in amber, but is constantly evolving and mutating, and design is a primary element in stimulating the awareness of possibilities” (Heskett 2002, 133). The key question here is what implications this has for design and our understanding of design. On the one hand, Heskett’s statement contains an element of a one-way model, where the design object has a stable and secure ontology and points to an ever changing and unstable culture; on the other hand, however, it indicates an understanding of the relationship between design and culture with the design objects as the starting point. Thus, Heskett views design as integrated in a general anthropology; that is, in his perspective, design is a natural extension of man, dynamically responding to human nature and culture. In a statement on the same level of abstraction and ambition as Herbert Simon’s dictum, Heskett says that “design, stripped to its essence, can be defined as the human capacity to shape and make our environment in ways without precedent in nature, to serve our needs and give meaning to our lives” (7). Further, the notion of the generation of new possibilities through the design object is close to the notion of Critical Design, which implies that design critically could, and should, project productive counter images of a given reality, thus functioning as a critique of everyday habits and practices of creating and using design (cf. Dunne 1999, Dunne & Raby 2001). Since, on a fundamental level, design operates as “orientation” and communication between individuals and collectives (Schneider 2009, 197) design has the potential to indicate new directions. This approach may also be future-oriented in nature; we may “use design as a methodology to create examples of how the future *should* be” (Hjelm 2007, 120).

In a philosophical context, Peter Sloterdijk tightens the argument of opening up possibilities through design. He speaks of design in the paradoxical phrase of “the capacity of incapacity”, “Können des Nichtkönnens” (Sloterdijk 2010, 12). On the level of a phenomenology of use, design, according to Sloterdijk, has a ritual quality in simulating the kind of sovereignty that emerges when we are able to grasp of otherwise incomprehensible objects. When this occurs, users are fundamentally enabled and empowered. For example, in interface design, the hermetic “black box” of an otherwise incomprehensible product can become “useful” and develop an “unlocked exterior” through design devices; design can be seen to serve the “need

of competence for structurally incompetent users” (15-6). On the level of design ontology, however, Sloterdijk is more radical. He speaks of design as a reshaping of things, “Neuzeichnung von Dingen” (17), which by transcending the existing places design in an open space where it designates the new on the basis of the unstable condition of the exception:

“A designer can never understand himself as simply a curator of the existing. All design arises from anti-reverence; it begins with the decision to put the questions of form and function of things in a new way. Sovereign is the one who can decide over the permanent state of exception in questions of form. And design is the permanent state of exception in issues concerning the forms of things.” (19)

Furthermore, Sloterdijk speaks of design as strategy of renewing things whereby design objects become *comparative* objects; they are always dependent on previous objects and are “results of a forward-looking story of optimization” (20). As a consequence, in Sloterdijk’s perspective design objects can emerge at the intersection of actuality and possibility in two different ways. In a synchronic perspective, design objects can be mediums of new possibilities that are based on the capacity of incapacity and on the openness characterizing the permanent state of exception. In a diachronic perspective, this structure unfolds in the temporal process where new products realize possibilities that older products did not have and in the enabling of new possibilities in the design process.

#### THE IMAGINATION AND THE IMAGINARY

Thus, on the level of the design object the possible can be present as the stimulation of cultural possibilities (so Heskett) or as the not-yet-given-but-still-possible capacity of incapacity but-still-possible (to rephrase Sloterdijk). My point is that the possible can also be seen as an inherent structure in virtually all design objects. This stems from the role of the imaginary in design objects. The imaginary in design may be applied in theories describing the *inner dynamics of expanding the space of possibility in design*.

Thus, the concept of *imagination* is tightly related to the potentiality of the possible. Thus, a central entry to the discussion is the role and workings of the imagination. To be able to imagine is a central human capacity, not only for designers and in design, but for all human beings. Indeed, the idea that imagination is a part of designing is so obvious that it is perhaps redundant to speak of imagination in design: It lies at the heart of design. But as a concept, imagination is not obvious. In a historical perspective, imagination has been regarded ontologically as a *faculty*, almost a physical entity with a certain location in the human mind, or functionally as an *ability* to perform the task of imagining and create

imaginary meaning. Regardless of definition, the point about imagination in design is that imagination performs an operation of abstraction, negation, transformation, and envisioning of something new, and that this is an important condition for conceiving the open spaces of possibilities in design. In addition, in the design process imagination leaves its mark on the coding of the resulting design objects and solutions.

#### THE IMAGINARY AS ENABLING POSSIBILITY

This means that imagination may be viewed as structure that acts as a formative power in the process of designing, and which subsequently follows the design object as it is permeated by *imaginary* meaning. In this sense, the imaginary can inform the established knowledge of what happens in the cultural production of meaning in design products and solutions; it can reveal how design, with its structures of realized and imaginary meanings, engages with culture. Thus, the concept of the imaginary is the most crucial concept as it deals with dimensions of meaning in design, whereas an overly strong emphasis on the role of imagination may lead to an outdated celebration of creative genius of the (individual) designer. Thus, my ambition is to not fall back the assumption of an almost metaphysical belief in the designer's artistic creativity that was characteristic of the classic art historian approach to design history, cf. Pevnsner's focus on the designer's genius in his seminal 1936 work on the pioneers of modern design (Pevsner 1991).

Then, the exploration of the role of imagination, particularly the imaginary, offers an entry point that lets us discuss the possible in design. While design is capable of opening a space of possibility and, by giving form and structure to the possible, can itself be a medium of the possible (or, rather, a possibility that derives from the verge of actuality), exploring the concepts of imagination and the imaginary can reveal *how* the possible operates in design. This conceptualization in relation to design requires us to investigate the principle underlying the possible.

The imaginary also refers back to the designer's use of design as a medium for imagining something new and thus transforming creativity into innovation, that is, creativity put into a practical and concrete context of use. This connection should not, however, be seen as an attempt at finding the 'true' intention in the designer's mind (which would be a fallacy). Rather, by using the concept of the imaginary to conceptualize the complex relationship between a mental process of immaterial imagining on the one hand and the realization in a physical, concrete and material medium on the other, we are able to discuss how meaning, through the vehicle of the imaginary, can be transferred in a way that detaches it from the designer. This means looking closer at the nature of the imaginary.

The imaginary is invisible and non-present. As presence, it is structured by a negation that makes it

come into being: When we imagine, the object is not actually there (cf. Sartre 1940). The imagination is the catalyst in this *logic of negativity* whose product is the imaginary, and it is this negativity that opens up the space of what is possible.

The imaginary puts at stake what visibility is (as we cannot really see the imaginary), how the object imagined is in focus, and how – if at all – we can control it. The imaginary can be seen as a practice of representation: The imaginary stands always in a relation to an entity, it may be an object or a structure of meaning, that it is imagined from. This is, however, a special kind of representation. In short, the imaginary forms a kind of *blurred, distorted, or simulated* representation. Seen as a signifier, the imaginary points to a signified in the real; this relation is not only problematic (how does the imaginary represent the real?) but the signified in the real is not left unmarked, but ultimately altered or influenced by the signifier in the imaginary (as when we also understand the real through the ways we imagine it, i.e. the mirroring of the real in the imaginary). The ability – or non-ability – of the imaginary to represent the real is central in relation to the change of extension and content of meaning from the real to the imaginary, and thus to the degree of liberty of the imaginary. It is both tied to the real and attributed with the ability to transcend the real. The imaginary's relation to the real can be enlightened by looking at the imaginary as simulation and through the relation of known and unknown that often is at stake in design. This pinpoints how the imaginary in relation to the real not only contains known elements, but also reaches out for the realm of the unknown.

As a form of representation, the imaginary operates as a simulation of the real: It points to the real but at the same time instantiates a structure of meaning that erases the relation to the real. In this turn, the real loses its prevalence as the origin of meaning, and, roughly speaking, the imaginary takes over. In this reversal of meaning and erasure of the importance of origin in the real, the imaginary gets close to the role of simulation described within the context of a semiotic-cultural analysis by the French sociologist Jean Baudrillard. He develops a theory of perceptual organization of meaning in the late modern societies where the image, in his opinion, dominates the distribution of meaning. The images no longer just reflect reality; they take over and create what reality is, and in this movement produce simulated simulacra. Thus, Baudrillard states, "Simulation is no longer that of a territory, a referential being or a substance. It is the generation by models of a real without origin or reality: a hyperreal" (Baudrillard 1988: 166). Strictly speaking, the simulation cannot live without a link to the real (hence, for instance, the references of the Luxor hotel and casino in Las Vegas to the Egyptian pyramids), but what is interesting in Baudrillard's conception of simulation is that it, in its act of performing its own hyper-reality, evokes a break with the ontology of the real. Simulation has a starting

point in reality but also, at the same time, in its own act of simulating the power to create its own kind of ontology with new and open possibilities (in this way, the Luxor can engage in not only improving, but also superseding the pyramids in terms of function, structure and aesthetics: It can contain hotel rooms in the wall, employ a multitude of materials in the creation of a variety of tactilely and visually engaging surfaces promoting ambience, and it can be a temple of mundane pleasure for the masses (it is intended so) instead of just a monument for a single dead. When the imaginary simulates representation, it performs the same act: It creates its own space of representation.

Thus, in its power of being simulation, the imaginary can point to and even create new spaces of meaning. It may be instantiated in its relation to reality (as representation), but as a virtually new being and as a presence in its own right, it is saturated with the ability to transcend reality. I will relate this to the polarity of the known vs. the unknown. Establishing a relation to the unknown is much in line with obtaining a defocus in the design process: It has to do with not only focusing too sharply on what is given and known, and what knowledge can be acquired in order to inform the design process (this is, of course, also important), but has to do with a mental setting that can acknowledge and integrate emergent and becoming layers of meaning that we do not know yet. A mental setting that embraces an interface between known and unknown (cf. Folkmann 2010) may make it possible to let the inner space of imaginings develop into something new in the design process. Thus, when the formative phase of imagination itself is structured in the polarity of known and unknown, and the process of imagination to a certain degree is being liberated of being fixed to given knowledge, the product of the act of imagination, the imaginary, also gains in openness: The process of imagining in the intersection of known and unknown reaches out for a constitution of the imagined object or meaning where the transformative power of the imaginary is central: As marked by the unknown, the imagined object gains in being open-ended and operating as a catalyst for emergent meaning that was not known in advance. When lesser tied to being a representation of something given, the imaginary can change in new directions.

The possible directions of the imaginary do not mean that the movements of its changes are random or arbitrary. At the intersection of known and unknown, the imaginary is at one and the same time blurring the borders to the known in entering the realm of the unknown and tied, fixated, to the known. The imaginary can be closed structure of fixed meaning or containing an open principle of self-generating meaning. This is formulated by Jean-Jacques Wunenburger in his analysis of the products of the imaginary (Wunenburger 2003: 12-3). On the one hand, he sees the imaginary as a restrained, static content produced by the imagination. The imaginary can never step beyond the content that is

put into it by imagination as it is restrained by the limitation of perception. On the other hand, though, Wunenburger points to a kind of dynamic-expanding imagination, that “in integrating all sorts of activities of imagination, designate systematic groups of images while at the same time carrying on some kind of auto-organizing, auto-generating principle that without halt permits the opening of the imaginary towards the innovation, transformation, the new creation”. Thus, the imaginary can entail an openness in meaning and itself be a generative principle of meaning; it can give way to an auto-organization of ideas (Wunenburger 2003: 90) beyond its any originating imagination. Seen in this perspective, the imagination loses in importance as the origin of meaning.

My point in this context is that the product also itself generates a meaning that is not in an intentional control of the designer. Paradoxically, however, this ability to generate meaning has a link back to the mental setting initiating the imaginary meaning. With a degree of defocusing and a structural openness towards the new, unexpected and unknown, the potential of an “opening of the imaginary towards the innovation, transformation, the new creation” (to repeat Wunenburger’s quote) is encouraged, even if not secured. To follow this line of thought, designed products with an open-ended conception of incorporating the unknown, of entailing both “knowledge and not-knowledge in projecting” (cf. the title of Stephan 2010), may be more creative in the sense of evoking and enabling new meaning.

## IN CONCLUSION

My aim is, beyond this paper, to describe a *phenomenology of imagination* and to look at the implications that this process of imagining has for the constitution and ontology of the object and for the object’s way of “affording” possibilities, i.e. as a constraint on the possibility for specific actions that may be inherent in an object (cf. Gibson 1977, Norman 2002). This reflection can be productive on a cultural level by examining the potential of design objects to enable and create culturally circumscribed meaning. The concepts of possibility and the imaginary reveal that objects are always more than their mere materiality, that they are permeated by structures of meaning that are given in an interplay of negation and positioning, of absence and presence, and that this further opens up a space of possibility that lies hidden in the object but is latent in its structure.

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# DESIGN OF DESIGN TOOLS: THE CREATION OF TOOLS AS A PART OF A PERSONAL THEORY-BUILDING PROCESS

TERO HEIKKINEN, MA  
AALTO UNIVERSITY  
SCHOOL OF ART AND DESIGN  
HELSINKI, FINLAND  
TERO.J.HEIKKINEN@AALTO.FI

## ABSTRACT

This paper is a first-hand account of creating one's own design tools in an art and design context. This practice-led research project investigates the intertwining of a design drawing process and the making of a software artefact for sketching spatial form out of tiles. This approach is compared with other practice-led research into design tools. The premises of the software, which emerge from design drawing, are explained as a part of the author's process of building a personal theory of space. These premises become materialized in the design tool artefact, which again in turn brings new elements to the design drawing process. A concept of generative strategy explains the way material design tools play an important part in core design activity, and not just as assisting devices. To complement the study, other designers and artists made outcomes with variants of the tool. These are examined to further dissect the tool and find evidence of the strategies in play. The overall outcome is a demonstration of one way a designer

can develop understanding of computer-based and material design tools in design activity.

## INTRODUCTION: DESIGN TOOLS

This research seeks ways to approach computer-based tools from a more designer-led angle. The question is how designers could better build personal theory into tools and this way get more of the potential and variety that computer tools ought to offer.

The method is practice-led; the researching designer engages into design work, which is also a continuation of previous design activities. This work on design tools involves both engaging into traditional mediums and building new software tools. The context is the design of spaces and interiors. A design tool represents an idea or theory about space for the purpose of making proposals of spatial form.

Practice-led research has utilized creation of artworks (Mäkelä, 2003) and the exploration of specific material (Nimkulrat, 2009a) to produce knowledge in a research project. Design tools have also been studied by designing researchers, and the present research is positioned among work made in gestural design tools (Hummels, 2000) and the appropriation of existing software into creative mis-use strategies and hybrid processes (Sevaldson, 2005). This project adds to this growing body of knowledge of design tools emerging from design fields. Design tool as an artefact in a practice-led design research project is an angle that has been little explored.

Pen-and-paper perspective methods are used as an example of self created tools and knowledge created in the design field. The various drawing methods have been modified by designers to suit particular situations

and disseminated through manuals and education. Practice-led research on materials and tools is offered as a continuation of this process.

Design tools are used to work with forms and ideas independently from a specific material. The relation to drawings and models is also intimate and depends on personal beliefs. This paper examines design tools as a part of a personal theory-building process. As a theoretical framework, the paper revisits a concept of a *generative strategy*, a direction-establishing move in the early stages of design (Darke, 1984)(See also Lawson, 2006, 188-199).

## TOOLS AS GENERATIVE STRATEGIES

Darke saw the choice of a primary generator as an important, decisive moment in a design process. Establishing the primary generator is a move which sets the stage for further moves, making it a core design decision. In this it is closely related to a guiding idea, or a first idea of design. (Darke, 1984.)

Many studies of design processes have a notion of a pre-existing schema that guides design and simplify real-world situations. Christopher Alexander already discussed the schema as part of designer's learned world view. He was worried of imaginary and overtly geometrical schemas he saw perpetuated at that time in design education. (Alexander, 1964.) Herbert Simon discussed different styles of design as emerging from what he modelled as a generator-test cycle of design. In his given example, it is significant for a design outcome if a house is designed from the outside in or from inside out. Stylistic consistency in different schools of design might then emerge from this kind of differences in approach. (Simon, 1975)(See also Simon, 1996, 128-130.) A conjecture-analysis model of design by Hillier et al. (1984) also suggested that designer works by proposing solutions first. The argumentative evaluation and the revision of the propositions can begin only when something tentative has been made.

Both traditional and computational design tools can be examined as a source of significant creative design moves and not only as task-oriented devices. The generative strategy is useful in making sense of design and artistic activity without a particular problem setting.

For clarity, the generative strategy should be separated from purely computational approaches, such as the intentional use of generative and genetic algorithms to produce form. The view here is that any making of a trace is intrinsically generative act, and the strategy is related to how these acts are chosen and collected together. In this way a generative strategy is likely to be present in all normal design processes.

The generative strategies are linked to what could be called personal design philosophies. This means that a designer or artist has a persistent belief system that guides the realisation of individual pieces over time. This overall artistic personality becomes the starting

point for design outcome variations, and is also developed over time. Systems of harmonious proportions, classical orders of architecture or compositional rules are examples of *quasi-theoretical* (Hillier et al., 1984) ideas that have been developed, distributed and carried on, but are not a necessary part of a more general theory of design. An artistic credo and other personal belief systems work as bases for generative strategies and tool use. These are part of designers and artists repertoire (Schön, 1983, 138), from which tentative and partial outcomes can be drawn and tried on a situation.

Instead of dismissing the quasi-theory as undesirable, it is here promoted as an important part of developing a competence of design. This does not mean adopting outmoded ideas like the abovementioned classical orders, but a more appropriately scaled process of personal theory building and considerate tool use.

Originally, the concepts of the generative strategy and the primary generator were explanatory devices to show how designers reduce the "cognitive load" of a task. The concepts are here seen as useful without the link to cognitive explanations. The strategies are potential moves in the designers' or artists' palette of conceptual tools, without needing to ask what happens in the designers head. The tool as generative strategy does not just make things easier for the designer, but enables richer processes.

## THE PRACTICE-LED METHOD

This research uses a practice-led approach. This means the research is based on a practical design project, the creation of design tools. Different design tool artefacts have been made, and the new things that are learned through that process are explained in text.

Donald Schön gave outline for defining practitioner knowledge (Schön, 1991). He could suggest a number of ways a practitioner, with an insider view to the practice, could engage in research more systematically. The building of a repertoire forms part of such research. A designer has a repertoire which is his or her whole past experience and knowledge at that point. (*ibid*, 138) Distributable knowledge can be built out from a retrospective analysis of these experiences.

The building and study of artefacts is an important aspect of this process. Ceramic artist Maarit Mäkelä's work (2003) focused on exhibited artistic productions, and textile artist Nimkulrat (2009a) has discussed research through artefacts (2009b), engaging into a process of working with paper material and the way it shapes the creation.

Biggs (2002) demonstrated how artefacts alone do not work as a research contribution, and offered a rationale for combining text and artefacts as a fully formed research outcome. A central element in research is dissemination of knowledge. Objects alone would be subjected to wide interpretations depending on the

context they are placed in. Presenting the objects alongside a context then completes the artefacts as distributable knowledge. The researcher creates new design artefacts but also has the responsibility to explain them in text so as to “give them voice”. (Mäkelä, 2007.) As Mäkelä says, this can be facilitated by positioning the artefact into a suitable theoretical context.

In this research, the theoretical framework is built on the concept of the generative strategy as discussed above. This research has proceeded through making design tool artefacts, in part allowing these to lead the research project and the reading of theory. It has begun with exploratory design work, but has become more goal-oriented and analytical in later stages. The text is produced through looking back at the making of the tools and their underlying motives in light of the literature.

Perspective manuals are here offered as an example of a very visual artefact that is also accompanied by a complementing text. It would be difficult to explain the methods in just text, whereas the images alone would give misleading ideas about their purpose.

#### TOOLS AND PRACTITIONER KNOWLEDGE

Both material and computer tools intended for designers contain assumptions about what is practical and desirable for designers. The way software is interfaced shapes the understanding of the computer as a tool. (Manovich, 2002, 62) Similarly, drawing on paper is not neutral and has complex ties to the ways environments become built (Evans, 2000). Therefore each software program or a drawing method represents an idea about what is useful for design. In this way they are theory-like objects.

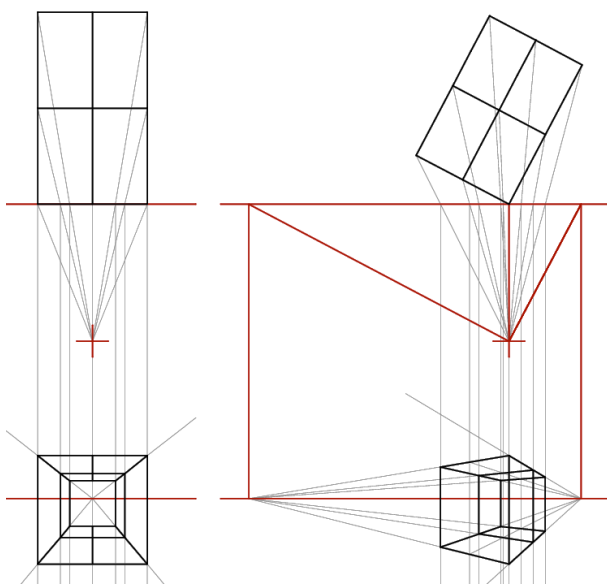


Figure 1: A perspective method converts the known dimensions of an object into a perspective view. The image is based on John Pile's (1985) simplified method intended for interior designers.

A rigid perspective method is used to transform a defined, already existing model into a perspective view of that model (Figure 1). At the other extreme it is possible to draw a quick sketch starting with a vanishing point. The outcome is based loosely on the idea of perspective without a previously existing model (Figure 2). The vanishing point is then not an auxiliary device, but the generative seed of the drawing.

This is reminiscent of how Paul Klee took a line “out for a walk”, aimlessly wandering for its own sake. (Klee 1961, 105) To Klee the lines are not just aesthetic possibilities on a canvas but contain generative potentials. Klee's perspectives (*ibid*, 140-145) are a result of lines playing each other on a surface instead of converting existing volumes into views. The vanishing point is not always even drawn but remains an idea.

Between these extremes, drawing on paper then offers large palette of choices for the designer. The rules that govern the drawing and also the drawing itself are made of the same “stuff”, lines on paper. The freedom is in being able to set the rules to limit ones freedom. The skilled sketcher can switch between different rules on a whim.

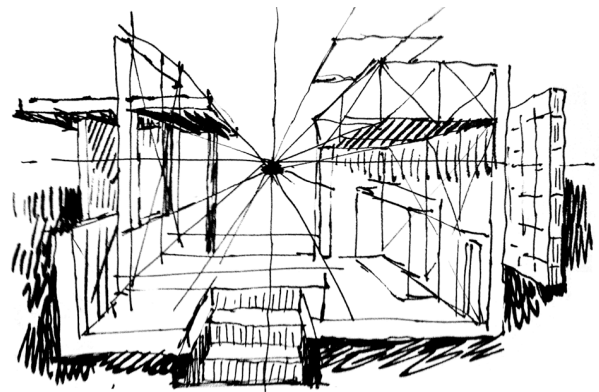


Figure 2: A spatial proposal sketch based on a vanishing point. The vanishing point acts as the generative seed of the drawing, and not just as an auxiliary device.

The sketching example shows how a vanishing point may be a starting point for generating spatial outcomes. Why it makes sense to call this a strategy is that actions stem from the choice of the approach, but the ensuing process is not chained to it. Instead, the drawing begins to accumulate organically from the first choice, much like Simon's hypothetical outcome of a house designed from inside-out as opposed to outside-in.

The perspective drawing both as a rigid method and a style of sketching is design knowledge originating from the practitioners themselves. Influential perspective manuals such as Jay Doblin's perspective (1956) and William Kirby Lockard's Design drawing (1970) stress that the rigid perspective drawing method should be seen as a stepping stone in learning to draw views directly in free hand sketching. Particularly Lockard promotes the idea that perspective drawings ought to be a direct way to work on design ideas. It is at this point

perspective drawing would become really a generative design tool and not just a mechanical device.

The perspective manuals present different methods, tricks of trade and rules of thumbs optimized to fit various situations and needs arising in different design practices. The manuals thus represent a practitioner-originated knowledge, part of a repertoire-building process much in the way that Schön suggested (Schön 1991, 315). Not simply a how-to explaining a procedure, the books contain opinion drawn from long experience, of how the designer could and should draw. This knowledge is transmitted by both images and text.

#### HAND AND THE EYE: COMPUTER-BASED TOOLS

The designer, just as she adopts an underlying theory in using perspective method on paper, also adopts the underlying assumptions in computer software. Apart from offering practically useful tools, building design tools into interactive software has good potential for distributing ideas about how to design. However, standard modelling software is not as flexible for changes as the perspective method on paper. The software medium also limits the ways a non-programmer can contribute and add to this knowledge, unlike in the age of paper-and-pen methods. Practice-led research into design tools is a way to go forward in identifying the ways designers would like to build their tools.

The present work is here positioned among two design thesis research projects on computer-based design tools, both emerging from a design field. Neither produced design tool artefacts directly as concrete outcomes.

Hummels (2000) emphasises tangible, bodily aspects of gestures as the primal acts of form generation in a social design context. She is concerned that there is lacking dynamism in design representations such as drawings. Bodily gestures are instead intrinsically based on motion. Designers' inability to draw can limit what can be proposed through sketching. Object shape can be suggested by a gesture of hand. Sculpting is close to the body and therefore contains the potential for capturing time-based dynamism, but computers tend to muddle the elegance of sculpting behind clumsy interfaces. If the subtlety and precision of computer drawing and sculpting could be improved, it would result in better computer tools.

Sevaldson (2005) considers the active eye of the designer as an important aspect of generative digital design techniques. The keen eye of the designer picks up what is interesting from a chaos of on-screen material. Any software that produces rich enough visual material can be appropriated by the designer, not just dedicated design software. The designer adjusts parameters and combines things, and the literal tool-building through programming is not important in this approach. The more general description of design tool re-use and mis-use strategy can serve a basis for many different personal design philosophies.

Sevaldson concludes his study noting that hybrid processes (*ibid*, 317) seem to hold most promise for creative computer use. Parallel use of traditional and digital media is one simple example of a hybrid process. His hybrid processes are fairly large scale; the continuation of this idea here is to describe one hybrid approach towards design tools as a part of a personal development process.

Both Hummels and Sevaldson convincingly cover their respective directions. Hummels' starting point was to interpret bodily gestures, whereas Sevaldson's approach seems to favour the eye and the artistic designer as a seeker of kind of digital "found objects". The directions differ due to the personal interests, beliefs and accumulated experience of the authors. They are rooted in design practice and driven by a strong artistic credo. Yet such projects are never so subjective that they would cease to be useful to others. Designers can use them as bases rather than apply them directly. As the accumulation of insider accounts grows it also helps generalise about tools.

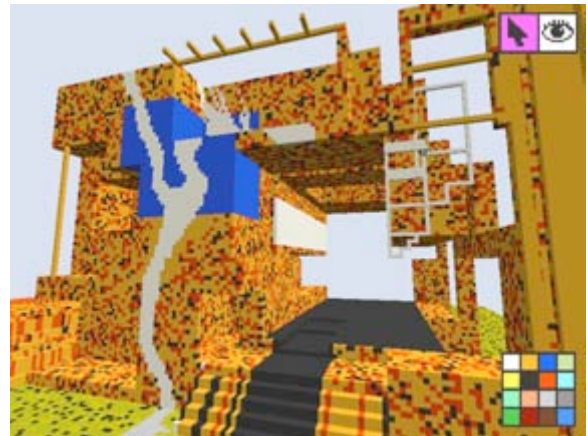


Figure 3: The matrix sandbox. The software allows shapes made out of differently coloured tiles. This example uses the more full spectrum of options available to the author.

The tools closer to bodily gestures are more intuitive and allow development of practical skill. There is no reason why this could not be built into design tools. Sevaldson's insights about visual thinking and "mis-use" should be appreciated. The outcome made with software is not a utilitarian object but matter for further inspiration.

Skilled drawing to me seems still to combine the best of both worlds. The power of drawing resides in the way it allows diverse ways for ad-hoc self-building of rules and tools. Even a simple drawing is an act of generation, and the active eye can do its work there too. I attempt to transfer qualities of drawing into a computer software and look at the results critically.

#### CASE: THE TILE SANDBOX TOOL

This software tool (Figure 3) was built as an extension of a sketching process. The software was written during



years 2008-2010, using C programming language and OpenGL graphics library.

The software offers a perspective view into an environment made out of little tiles. A ground of 255x255 tiles is given as a starting point. The full extent of the modelling space is 255x255x128 tiles, which can only be altered by modifying the program itself. The first person view is navigated with a combination of mouse and keyboard commands. Tiles can be selected and grown into six different directions (Figure 4). The tiles may be removed using similar commands, or they can be coloured using a fixed palette of sixteen colours.

Lack of contextualizing in software products makes them difficult to appreciate as design knowledge. Technical research often presents advancements in prototypes without much explanation of the creative motives behind them. Therefore I relate my processes to existing practitioner accounts in art and design context and not individual software tools as such.

It still can be noted that the interaction design has been influenced by the conventions in popular first-person video games, played with a combination of mouse and keyboard. Smoothness and fluidity of experience is also a video game quality I wished to achieve. This means that the view angle can be changed at the same time as the model is modified, if the person is able to manage both at the same time. The benchmark for intuitively simple modelling was Google Sketchup, but the component-based approach was to be avoided as not very drawing-like.

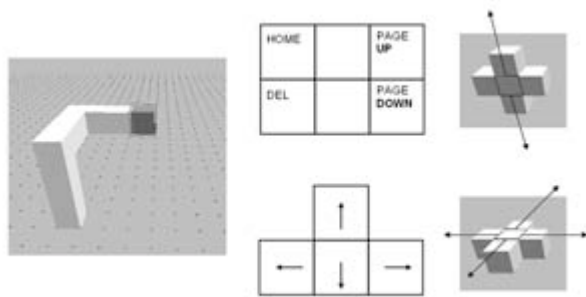


Figure 4: The basic interaction design of the software. A standard keyboard layout corresponds with movement of a cursor in space. (Left) A single key press moves the selected tile. All additions are incremental just as in drawing a line on paper.

#### BACKGROUND IN SKETCHING

In the following, the motivation for the design of the software is described in terms of identifying goals in my process of sketching space.

The most general goal for the software development was to bring together something of the flexibility of drawing to the modelling of spaces. This is a continuation of my personal process of drawing design sketches, which involves learning to draw spaces and environments (Figure 5).

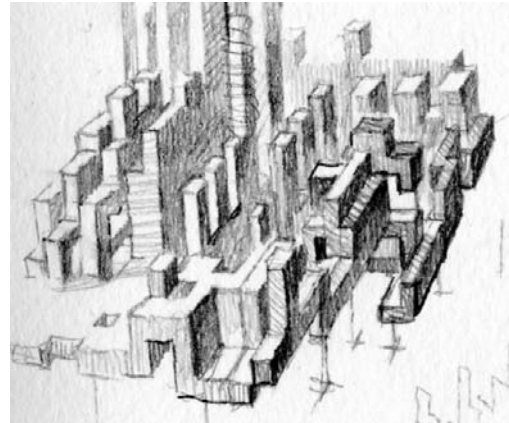


Figure 5: From author's sketchbook, 2004. The image shows initial interest in the use of numerous cubes as an organisation. This one-off example is very sculptural.

The sketches are a way of proposing or conjecturing about what could be. The talk-back of the sketch during drawing produces new ideas about the design, making it one possible medium for reflection-in-action, a virtual world. (Schön, 1983, 157.)

The spatial design context means the views are meant to convey space from an experiential angle, and not for example for solving structural or material questions. These are left as the more implicit content of the drawings.

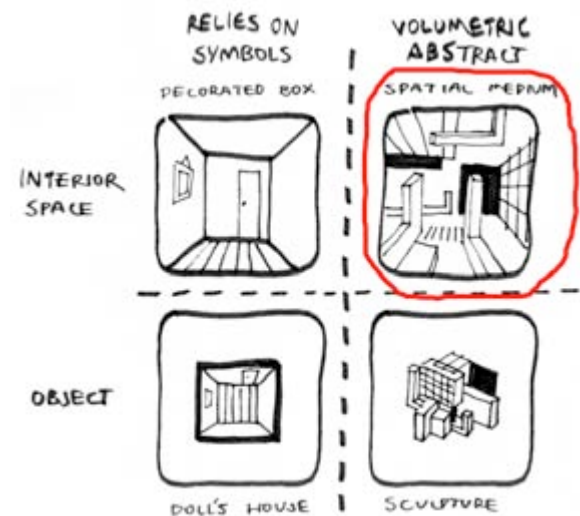


Figure 6: A map of tendencies in the author's sketching process and the development of a personal understanding of space. The desired goal was to achieve a volumetric, abstract understanding of space understood as interior, experienced space. (Top right corner)

The personal goal can be positioned along with some of the kind of drawings I have wished to avoid. The map of tendencies in my sketching is collected in Figure 6. The top left corner depicts a room in perspective, but the picture is not very spatial. It is a combination of symbolic depth and scale cues. In this way interiority can be suggested through the use of signs, but in the identified personal goal this would not be a satisfactory design tool.

There is nothing wrong in depicting space from the outside, as for example with axonometric perspective (Figure 6, bottom right corner). To concentrate on interior space I wanted to draw space “from the inside” as it might appear to a person traversing in it.

Showing the inside of a room does not always guarantee spatiality. The outcome might still seem like an object than a serial, continuous space. A doll house type picture is an example of this (Figure 6, bottom left). The symbolic way of presenting outside or inside in an image is very useful in illustration and painting art, but for personal purposes this effect was not desirable in the design drawings.

The goal of the learning process can now be retrospectively identified (Figure 6, top right corner). My intention was to be able to exercise ability in drawing space as an abstract, serial, homogeneous substance from an experiential view.

At an earlier point, the different goals were identified as shortcomings or mannerism that needed to be overcome. But in retrospect, all the goals appear as possibilities within a map, a toolbox of various directions. They are generative bases that can be summoned at will at various stages of even a single design sketch.

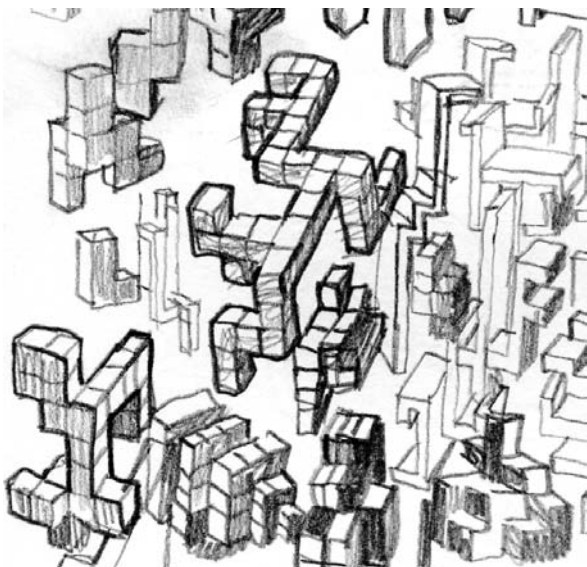


Figure 7: From author's sketchbook, early 2008. The making of the software begins to influence the sketching process consistently.

These aims are not presented as something all designers should strive for. Any other designer might choose precisely the opposite goals for his or her drawings, such as scenarios and person interactions.

#### BUILDING THE GOALS INTO SOFTWARE

The development of the software artefact was instrumental in addressing the goals in the sketching process. The intense interest into the software necessitated also drawing and sketching out desirable outcomes for the software (Figure 7).

Inclusion of these features was intended to assist in meeting the goals in the software:

- Additive and subtractive approaches are given equal weight. It should be just as easy to add and remove form.
- Rapid incremental modelling is meant to resemble drawing at least to some degree. Components, such as geometries and real material parts are avoided.
- Inside and outside views are neither favoured. It should be as easy to model form from inside as from the outside.
- The experiential view would facilitate a design approach towards interiors. Architectural and drafting conventions are avoided.

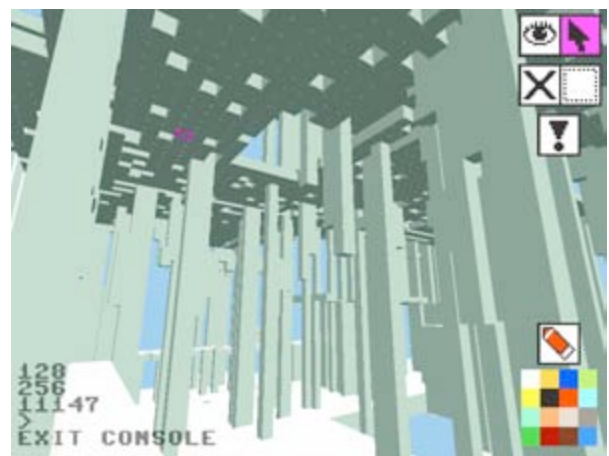


Figure 8: Semi-random shapes made with the program. Outcomes such as this in turn informed the later sketching process.

#### WORKING WITH OTHER DESIGNERS

Outcome models were collected from modelling sessions where others could also try out the software. The outcome material was complemented by the comments and notes made by the designers themselves. This completes the project of creating a design tool by making it available to other designers. This material is meant to deepen the understanding about design tool artefacts.


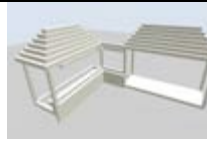



A modelling situation was arranged with design students enrolled in a master degree program in interior and furniture design and industrial design. At this first stage, few design researchers were included, still fresh in the doctoral program with background in design work. In this way the participants were not far in design experience to the author. It was meant that the situations were more like a designer showing a design tool to another designer, rather than a data collection session or a user study. In the first set the designers were given a task of building a snow fortress, with some 20-30 minutes maximum of time to produce it. In this stage, the on-screen activity was recorded with a video camera. They were assisted in using the program functions.

As the study focused on the choice of the generative strategy, it was not desirable to complicate the setting with long design processes. Therefore the outcomes represent design doodles and design sketches.

Another set of sessions took place later, and this time the outcomes were collected remotely. The participants were now more exclusively MA design students. A built-in logging was used to record the processes, and the logs were collected by e-mail. The logs were digital and small compared to video files and needed no setting up from the participants. Some changes were made to the program to facilitate easier camera views, to allow a more conventional way of rotating around central object. The program was supplied with a set of written instructions. All this aimed at removing the presence of the researcher, so people could concentrate on the task in the privacy own their chosen environment. The participants did the task themselves first, then sent the software and the task to another suitable person. In this way more material could be gathered, although this also resulted in some poorly documented material that had to be excluded from the study.

Overall, 24 unique authors provided works for all the tasks, some making more than one model. Participants were under 30, both male (11) and female (13).

Table 1: Outcomes from use of incremental version. First stage snow fortress task.


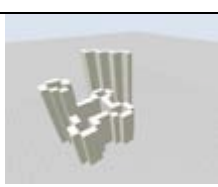


Tag	Thumbnail	Strategy interpretation:
I1		The idea of a narrative of a snow ball fight was realized by two shapes that fulfil the protective function in snow fight
I2		The fortress theme influenced the choice of subject matter, a recreation of oriental fort typology. (unfinished)
I3		The shapes fulfil the protective function in a snow fight.
I4		Accidental shapes were accepted as interior with slight modifications. "Igloo" feature on roof satisfies the outcome as a snow fort.
I5		Symbolic house was chosen as starting point. The tool was used to build up the model one wall at a time.

In both collections, two software versions were used that allowed slightly different ways of manipulating the modelling matter. The tile modelling medium was the same, only the available functions were different. This was made to see if changing the software even slightly would produce different results in respect to the designers' chosen generative strategies. The outcomes were inspected for evidence of different generative strategies towards a given task and the influence of the tile modelling in choosing the strategy.

#### VERSION A: SINGLE CURSOR INCREMENTAL (I)

The incremental variant (Tagged with "I" in the tables) uses a single moving cursor for all shape creation. This means only one tile can be selected at all times. The cursor is moved by using six movement keys, somewhat like the cursor in a word processor. As the cursor moves it leaves a trace of solid material behind it. A long, tall wall has to be built by moving the cursor through all the required positions. Existing tiles can be removed by selecting tiles one by one and pressing the delete key after each selection.

Table 2: Outcomes from use of paint selection version. First stage snow fortress task

Tag	Thumbnail	Strategy interpretation:
PS1		The tool suggested that as a 3d pixel tool it could be used to recreate organic form, an igloo.
PS2		The extrusion tool was used to quickly satisfy the task with an iconic fortress plan shape. A person would fit to use the structure as defensive structure.
PS3		The student displaced the snow fortress idea to a metaphor, making a snowflake shape plan through extrusion. Unfinished, ambiguous scale.
PS4		The extrusion was used extensively to create parts of this fortress, one tower at a time. Details such as arrow slits were carved in.

#### VERSION B: PAINT SELECTION (PS)

The other variant allows the designer to select a large amount of tiles by painting them with the mouse pointer. The movement keys are then used to move not only one tile but all the currently selected tiles into the desired direction. Then the whole selection leaves a trace. A wall can be created by selecting a row of tiles and then raising the tiles upwards until the desired


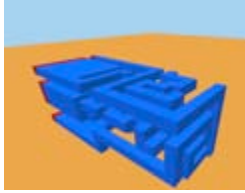
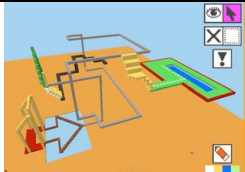
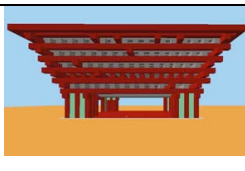



height. It is still possible to use only a single tile as a cursor.

#### LOOKING AT THE OUTCOMES

The first stage outcomes are collected into table 1 and 2. The second stage resulted in more outcomes, but some of these turned out to have less new approaches compared to the earlier stage. Only the more sophisticated second stage outcomes are collected to table 3. The tables contain thumbnail images and a short interpretation of the chosen strategy.

Table 3: Second stage open modelling task outcomes. These were made with both paint selection (PS) and incremental (I) version.

Tag	Thumbnail	Strategy interpretation:
PS20		Building footprints were drawn and then extruded to height. Balconies were also extruded.  Was used like a conventional modeller.
PS21		Single cursor was used to make snake form, even though this was the paint version of the software.  Tile properties were the origin of the aesthetic style of the object.
I22		Motion of cursor suggested motion as basis of the model. An association to TV contest maze then inspired to do the model.
I23		Existing building was copied through detailed modelling.  The choice of model was suggested by the tile properties.
I24		The tile properties suggested a connection to a type of oriental ornamentation, which was executed through detailed modelling work.

#### THE MODELLING TECHNIQUES

The models and processes of making were examined for the presence of different building techniques and the generative strategies. The building technique was important as the chosen technique could be a potential creative strategy.

Using the incremental version, the subjects were practically forced into making a “snake” type continuous form. Even then, this would result in different approaches. Some (I2, I4) would first build a two- or three-dimensional outer frame of the whole object, which was then filled afterwards. Others (I5) would accumulate one wall element and then proceed to the next, without creating an overall frame first. These crudely correspond to the way a pen-and-paper sketcher can rapidly produce shapes in different ways.

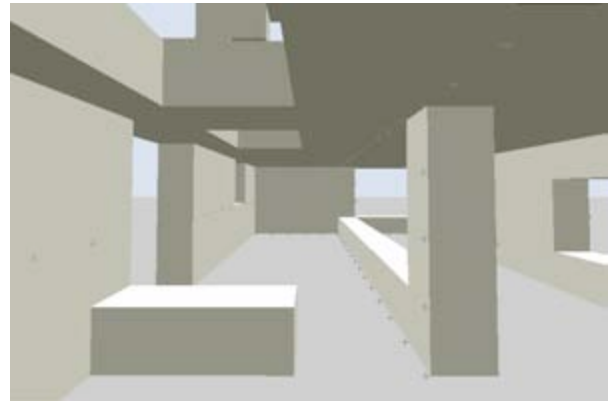


Figure 9: Making the interior of model I4, a partial accident resulting from the work made from outside.

Unlike the incremental version, the paint select version allowed the designers to select and extrude larger shapes. This would often influence the choice of technique. The users of the paint selection version would draw a footprint of a building and then raise it to a height, like they had learned to do in common modelling software. (PS2, PS3, PS4, PS20)

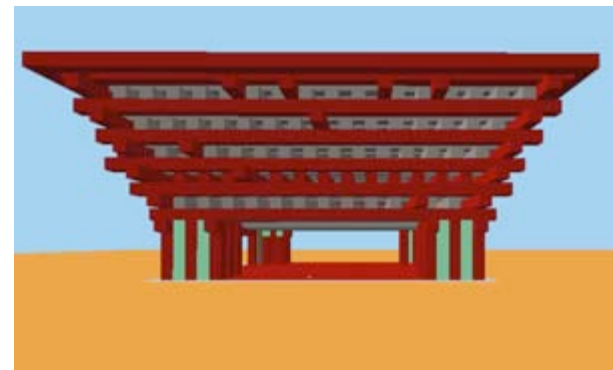


Figure 10: The Chinese expo 2010 pavilion shape recreated by a Chinese architecture student, using the incremental version.

#### THE GENERATIVE STRATEGIES IN PLAY

The dual role of the design strategy is a device to both help make the task more manageable, and set the stage for a creative outcome. It was apparent that some designers would try to get away from the task when they discovered an effective means to complete it (PS2). In the context of this study this was not undesirable, and the time constraint certainly gave a motivation to do so.

The interpretation of the given task was one source of ideas. The task of snow fortress provided different

starting points for the designers, interpreted as a protective function (I1, I3) or an iconic fortress (PS4, PS2). One outcome was a metaphoric snow flake form. (PS3) The second task set was made more open, the designers would have to decide what to do.

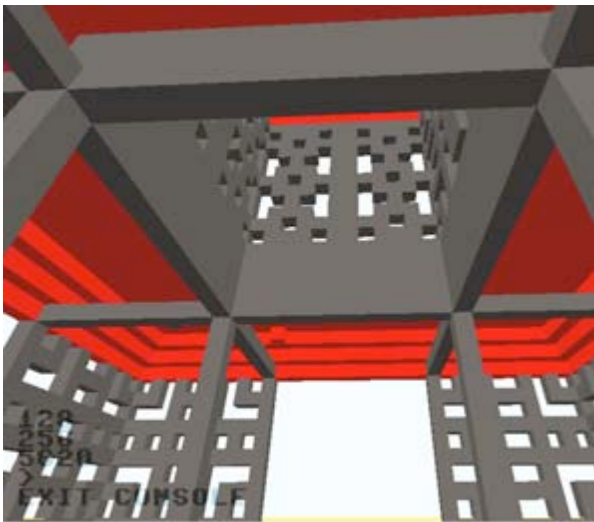


Figure 11: An interior with oriental influence. (I24)

Some designers accepted the tool properties as a starting point for their own ideas (PS21), whereas others would work on an idea that was already quite fixed when they began. (The Igloo in PS1) In the latter case, it was more a matter of modelling something that already existed as a clear idea. This can still be interesting from the generative strategy point of view, as the object to be modelled was chosen on the basis of the person's perception of what the program could do. An igloo and a Halloween pumpkin were chosen as a suitable object because the program was perceived to be able to handle free form.

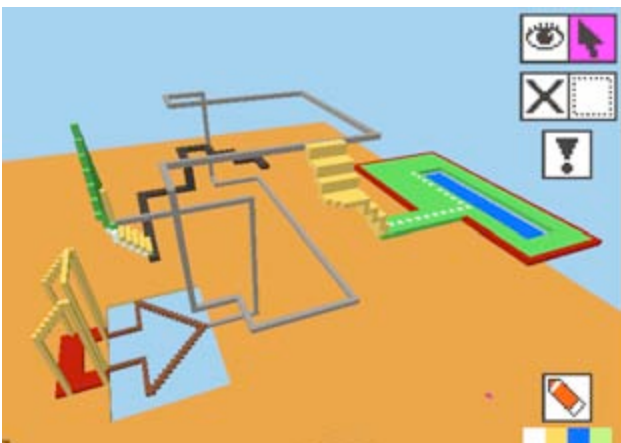


Figure 12: A three-dimensional maze influenced by the idea of a television game show. The incremental cursor was used as a snake that suggests form and directions as it goes along. (I22)

One chose to model an approximation of the China Pavilion in Expo 2010 (Figure 10), due to the apparent block-like visual identity of the original work. In fact, an oriental influence crept into a few of the works. In two cases (I2, I23) it also coincided with the designers'

cultural background, whereas one Finnish person also made oriental decorations suggested by the tile material (I24 in table 3, see also Figure 11).

Perhaps the most intriguing outcome was a model based on an idea of a television show where contestants have to negotiate a three dimensional maze. Here parts and three-dimensional paths float in space, ignoring laws of physics (Figure 12). This was suggested by the way the cursor snakes around the space three-dimensionally. The moving cursor of the tool suggested a theme strongly related to movement. Although the tool was used by many in a pen-like manner, in this outcome it is most apparent. Symbolic images and abstract paths are positioned with each other.

## DISCUSSION

The longer process of this research was based on identifying personal goals in a design drawing process and building these goals into computer software. This stimulated self-reflection on the personal theory of space. The different mediums informed the development of each other (Figure 13). The first-hand nature of this project is a condensed version of a process that otherwise could be difficult to capture, justifying the practice-led approach.

This is one way to use hybrid ways of design tools, between the tangible realm of drawings and models and the possibilities of computational design tools. Drawing of cubic sketches was informed by the rapid way the computer can produce such forms. Identifying the cubes as a generative strategy allowed me to see an underlying "computational" quality in also the paper-and-pen drawing process. Preserving this aspect of drawing, without actually making a pencil drawing program, was successful to the personal project but also had an effect on others' use of the tool.

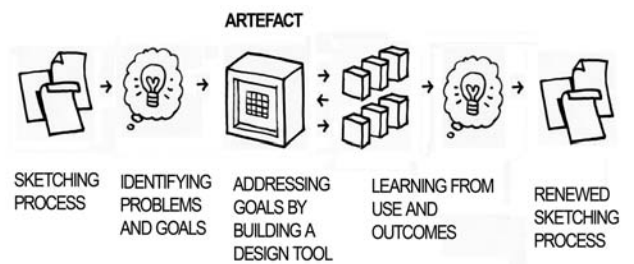


Figure 13: The phases in the process. The actual design tool artefact is marked.

The potential for a generative strategy in the software is completed by each designer's own. The idea of tiles as a more general basis for a drawing-like process appears validated by the variety of techniques it enabled the designers to choose from. The students also chose other angles than the one favoured by the author, for example drawing symbols and iconic models. Very few used it to design "from the inside". The convention of modelling space from the outside is quite strong and has also reasons. The software could have been made to push the

designers more to attempt this to give more material for inspecting this angle.

Engaging into a creation of design tools is a way to sharpen focus and understanding into one's own design processes and the tools itself. Building aspects of personal theory into a tool form is a way to incorporate ideas about how to and what is design in a material or digital form. The materials and tools of design, interpreted as generative strategies, are important part of practitioner knowledge. Design tools are also a way of distributing the ideas to others, either with or without a complementing text. They become building blocks for personal theories and strategies.

#### ACKNOWLEDGMENTS

I would like to express gratitude to the patience shown by the people who have tested the software during 2010 and especially the students who helped collect additional data.

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# BLIND AND FAKE – EXPLORING THE GEOGRAPHY OF THE EXPANDED BOOK

MARIA HELLSTRÖM REIMER  
MALMÖ UNIVERSITY, SCHOOL OF ARTS AND  
COMMUNICATION, SWEDEN  
MARIA.HELLSTROM.REIMER@MAH.SE

MILICA LAPČEVIĆ  
BELGRADE, SERBIA  
XTENDED.MIND@GMAIL.COM

LUCA SIMEONE  
SAPIENZA UNIVERSITY, ROME, ITALY  
ME@LUCA.SIMEONE.NAME

## ABSTRACT

It seems like we are now rapidly leaving the galaxy of printed matter. As screen-based media is making its entry into our everyday lives, it is pushing aside an object – the book - that has structured our forms of being together for almost six hundred years. This shift is not absolute but successive, and it raises a lot of questions. What kind of mediating practices are developing beyond printed media? And how do these practices structure and organize common spaces and publicities? Even though today, we are far into the electronic age, in a way we are still suspended in between modern individualized life and new, more floating societal formations. Therefore, rather than presupposing the disappearance of the book, this paper approaches the idea of the book as an expanded and inter-medial “boundary object” (Star and Griesemer 1989). In this respect, the point of departure is the expanded book project *Roma Europa Fake Factory* (REFF) (Henderson *et. al.*

2010) – a platform for global discussion and exchange concerning the management and governance of new public spheres in the electronic age. Playing out the visual authority of the printed text against the flickering of the net through the use of inter-mediating QR codes (Quick Response Codes) and fiducial markers, the project constituted a critical and artefactual intervention, remixing and mashing up the forcible means of the printed word with the intermediary potentials of electronic circuits. In the paper, we discuss the project through one of the contributions – *Blind Points of Transition* – a combined text- and video-based dialogue; on the one hand an exploration of the book and the net as different locations, and on the other hand a tentative mapping of the intermediary territory between two geographically separate places. Focusing on the transition of text through different media, the paper critically examines the spatial expansion and modifications of the book as it enters electronic circuits, thus proposing a ‘blind and fake’, or in other words a questioning form of *boundary modification*;



dislocating the critical focus from visuality to agency and from permanent property to intermediary production.

## INTRODUCTION

As Marshall McLuhan pointed out already fifty years ago in his reflections on what he described as the increasingly alienated *Gutenberg Galaxy* (McLuhan, 1964), any technology, any extension of the human senses tends to produce a specific human environment; a certain nebulous yet technologically articulated assemblage of values and meaning. Typography certainly did, generating among other things a clearly defined and localizable ‘public’ of liberally educated readers. Ubiquitous information technology is no exception, having so far resulted in an abundance of ‘new’ mediating forms – intermedia, multimedia, hypermedia – all of which self-evidently also have evoked the question of “what precisely accounts for the new” (Heinrich and Spielmann 2002:6). While the character of the ‘public’ created through the technologization of the word certainly presented a novelty, grounded as it was in the “intense and visually oriented self-consciousness” of the reading situation, constituting the subject through a visually grounded cognition (McLuhan 1962:prologue), electronic circuits do not in the same way privilege the visual or restrict the viewing subject to the role as passive receiver. It also results in new forms of mediating practices, inter-subjective exchange and social emergence. If the printed universe since Gutenberg unfolded according to a visual logic of continuity, uniformity and identity, its merger with the electronic sphere seems to allow for a wide variety spatio-aesthetic practices and movements, all with a shifting degree of ‘originality’ and visual coherence.

Today we might find ourselves much farther away from the Gutenberg Galaxy than McLuhan and his contemporaries. With high speed plunging forward through what is supposed to be the electronic age, we are still in a way hovering in between individualizing modernity and new, more reconfigurable societal formations. Printed matter is still around, and rather than presupposing the disappearance of the book as intermediary object, we should approach its ongoing transformations and trace its interference with emergent forms of spatial organization.

In the following, we will try to perform such rapprochement, taking as our point of departure the expanded book project *Roma Europa Fake Factory* (REFF) (Henderson *et.al.* 2010). The book was published in an Italian version in November 2010, and beside proposing a reading experience it provides a platform for transgressive exchange concerning issues of media transformation and intermediality. The book is of the hybrid kind, in one and the same project challenging both the visual authority of the printed text and the flickering presences afforded by the net. As

such, it also provides a critique of the attempts to manage and control the emergent public spheres of the electronic age.

The ‘expansion’ of the book is technologically staged through the use of inter-mediating Quick Response (QR) Codes and fiduciary markers, or markers offering instant yet trustworthy linking. Yet, besides reflecting on the “reinvention of reality through critical practices such as remix, mashup, recontextualization and reenactment” (Hendrickson *et al.* 2010), the book in itself functions as an artefactual intervention, remixing and mashing up the forcible means of the printed word with the intermediary potentials of electronic circuits – and vice versa. Rather than simply analyzing the project, the following investigation constitutes an attempt to approach the issues addressed in a similarly interventionist way. In the following, we discuss the REFF project through one of its interfering contributions – *Blind Points of Transition* – a combined text- and video-based work or an inter-locational dialogue developed through the expanded book. On the one hand, the piece investigated the book and the net as different locations, and on the other hand it cross-examined the expansion of the book as a text-based medium from the point of view of two geographically separate sites, one located in Malmö, Sweden, and the other in Belgrade, Serbia. A spatial or spatializing endeavor, it included several aspects of media transition, one of which concerned the interference between different media domains, and one of which concerned the differences unfolding in the process of localizing and materializing intermediation.



Figure. 1 Roma Europa Fake Factory, book cover. See also <http://www.romaeuropa.org/>.



Figure. 2. Blind Points of Transition. QR code from book interface which can be read using a smart phone or a webcam.

## THEORETICAL AND METHODOLOGICAL BACKGROUND – INTERMEDIALITY AND BOUNDARY OBJECTS

Before moving on to the actual account of the project and the spatial reconfigurations that it included, we would like to situate our discussion further, and this primarily in relation to two different discourses, firstly the discourse on intermediality and technological change and secondly the discourse on artistic and design-driven methods of investigation, more specifically the use of boundary practices and objects as material actualizations of social and political fields of forces.

Intermediality concerns acts of material translation as well as acts of spatial transition resulting from the use of different mediating technologies. In this sense, intermedial relationships imbue everyday life. From a semiotic perspective, we may say that intermediality actualizes the principle sustaining semiosis – the human ability to naturally translate sensuous experience from one mode to another; according to McLuhan something “we do every instance of our lives” (McLuhan 1962:5). The extension or technologization of this transitional ability therefore has significant consequences, not only in cognitive terms but also for our social existence. It involves a radical rummaging about and reconfiguring of the basic conditions for our being-together, for the better or the worse. Even the introduction of what from a contemporary perspective may seem like ‘simple’ technologies, such as that of pen and parchment, implies sweeping change, and Plato’s disbelief in this regard is well known. Writing, he meant, will only bring forgetfulness. People will neither need nor use their memories. “[T]hey will be hearers of many things but they will have heard nothing”. And socially, it will be as bad. The emergence of the written document will make people “tiresome company, having the show of wisdom without the reality” (Plato 2008).

It may be easy to dismiss such remarks as mere techno-skepticism, but what it reveals is the refractory or wicked power of inter-medial transition and the human dependency on arte-factual or technological transitions. As animals of mythos and logos, we, the human beings, never understand directly, but always through modifying, transformative practice, through language, which constitutes a technological dimension.

This also means that we stay with our artifacts and mechanisms only insofar as they represent modifiable forms or reconfigurable patterns; only insofar as they, as Ernst Cassirer expressed it in his psycho-linguistics, present “a plastic medium” (Cassirer 1946:10), only insofar as they allow for fusion of one thing with another, and for the transition from one context to another.

When discussing the ‘evolution’ of mediating technologies, a common view is that the emergence of intermediate or mixed states in the development of a medium builds upon the pre-existing media (Heinrich and Spielmann 2002). Yet, rather than a sign of evolutionary differentiation, the appearance of intermediate forms of communication may be seen as an indicator of the importance of plasticity and reciprocal action. Similarly, intermediality is not to be understood as an intermittent stage in the passing from one defined medium to another, but as the resonance or tension necessary for dialogic activity. As Heinrich and Spielmann have pointed out, this dynamic understanding to a large extent emanates from artistic practice, from Russian Formalist experiments with text-image relationships, from Coleridge’s notion of ‘intermedium’ and later, from Fluxus ideas of intermedia as ‘conceptual fusion’ (Heinrich and Spielmann 2002:6; Higgins 1965/2001). In this respect, the emergence and continuous development of new intermedia art forms such as ‘happenings’, ‘performances’ and ‘land art’ since the 1950s suggests that intermediality concerns agitated encounters and situations rather than cumulative development.

With the emergence of electronic circuits, this paradoxical tendency of restless fusion has become increasingly present, changing not only the conditions for intermediality but also the general media sensitivity, resulting in new concepts such as *hypertext* and *hypermedia* (Nelson 1965/1980). Distinct from the change expressed by the prefix *multi-*, the *hyper-* does not necessarily refer to a multiplication of forms, but to an intensification of action. *Hyper-* has a clear agency connotation, actualizing not only the merging of different media but also the surplus energy or friction that is its result; the stimulation, excitation or even irritation. In this sense, the prefix *hyper-* may bring into play also the refractory aspect of translations and shifts in modality. Ordinary language is full of them; transitions that do not necessarily produce meaning but which unfold as different forms of excitations, or linguistic disorders (Jakobson 1956/1971).

The 'hyped' is thus not only a matter of intensification 'on the spot', but a spatially aberrant force with a disseminating potential, which in written language may be subjugated or controlled, but which in daily linguistic practice is highly present, as a leaking or drifting effect. In ordinary small talk, the synergy between different media – gestures, facial expressions etc. – is important, not only as a reinforcement of meaning, but furthermore, as a profuse play with modalities and a 'spacing-out' of a situation. In his spatial rhetoric, Michel de Certeau refers to this play as a divertive acting from within as *la perruque*; a popular, casual, or informal quasi-practice, disguised as meaningful work. The person engaged in *la perruque*, whether writing personal letters during work hours or using office material for own purposes, may be faking work, yet, at the same time actually generating spatio-temporal clearances within the system, sequences that are "free, creative, and precisely not directed towards profit" (Certeau 1984:25). Accordingly, intermediality actualizes tactical or maneuvering practices unfolding from within a ruling regime. In this sense they may be described as "arts-de-faire" (Certeau 1980b); a handling or doing taking into consideration also minor or weak aspects; the ways in which weak modalities may interfere with strong; the means with which marginal displacements may affect major movements and meanings.

The above understanding of intermediality as intensified situated agency brings us to the methodological question of how to conduct research on inter-medial and inter-modal transformation. This is where *RomaEuropaFakeFactory* enters the picture. Instead of initiating an empirical study of a 'real' encounter between two or more defined mediating technologies, the project provided an interrogative situation based upon the idea that the 'real', understood as different working principles and fields of forces, including their social 'effects', will reveal itself only when interfered with, reinvented, remixed or reenacted. As 'method', this approach alludes to that proposed by McLuhan, who in his intermedial studies relied on 'the experiment'. While empirical observation consists in noting phenomena without disturbing them, the experiment rests on the idea of introducing a variation of disturbances into a certain setting. McLuhan's example was experimental medicine, where disturbance through the suppressing of certain functions is thought to produce a disturbance in the entire system, allowing for a potential deduction of missing or malfunctioning processes.

With a focus on problem-solving, clinical experimentation makes use of controlled disturbance as a useful means to an end. From a more creative point of view, however, disturbance may unfold as an end in itself, or in other words, as productive of new ends. In this respect, 'disturbance' is understood as an interactive or even provocative procedure, what Certeau called a

"*polemological analysis of culture*" (Certeau 1984:xvii, italics in original). A culture is not a laboratory but an assemblage of practices, which "develops in an atmosphere of tensions, and often of violence, for which it provides symbolic balances, contracts of compatibility and compromises, all more or less temporary" (Certeau 1984:xvii). If clinical experimentation concerns disturbances directed or authorized from a neutral position, cultural experimentation concerns the disturbance also of authority as such. Thus understood, cultural experimentation is the development of a situation where the researcher, as participant in the play, puts herself at risk.

The material staging of such experimentation requires certain interfering props or tactical devices that can adapt to changing circumstances and that can mediate between disturbance and experience or between friction and expression from within a certain situation. Such devices have been called *boundary objects*. When first introduced by Star and Griesemer in 1989, the concept was meant to address "the problem of common representation in diverse intersecting social worlds" (Star and Griesemer 1989:388), or in other words, the problem of lack of consensus between different actors in heterogeneous exploratory processes. Boundary objects were thought of as "objects which are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" (Star and Griesemer 1989:393). Boundary objects would allow actors to negotiate topics, to reframe contexts and to 'travel' in between perspectives and approaches, affording intermediary mobility, much like a relational and interactive map, applicable for use in different discursive terrains (Star and Griesemer 1989, Linde 2007:96).

#### FAKE EXPANSIONS AND EXPANSIVE FAKES

From a design research point of view, it is not difficult to conceive of the *RomaEuropaFakeFactory* project in terms of cultural experimentation or polemological analysis, and the publication as such in terms of boundary object. Rather than a strict comparison of distinct systems – the printed book and the electronic publication – the entire REFF project is based on the idea of intermediality and interference, drawing attention to the mediascape as an intensified and sprawling *hyper-scape*. Yet, what is a boundary object in such an expanded situation? How is it materially instantiated and affected? And what kind of dislocations does it afford?

These were questions that came to our minds when confronted with the imperatives of the REFF project. On the one hand, the project addressed the confusing relationship between 'old' and new media. On the other hand it challenged the 'where and what' of intermediality, the questions related to the spatial instantiation and materialization of mediating practice.



Embracing thirty-three text-based reflections and twenty-eight artistic works, and supported by over 80 partners counting universities, associations, artists, hackers, researchers, designers, journalists, politicians, magazines, activist networks and media entrepreneurs, the REFF publication constituted a disturbing intersection of art, design and new technologies. As a ‘glocally’ situated ‘fake factory’ the publication was conceived of as a fictionalizing machinery challenging ideas of a stable, factual or unambiguous delivery of meaning. Massimo Canevacci, one of the REFF participants, refers in his contribution to Orson Well's movie *F for Fake* (USA, 1975) arguing that this film “managed to anticipate a trend [...] related to a realistic critique”, a critique which, according to Canevacci, “instead of having an obsession with what is real, the death of what is real [...] introduced into the heart of the duality of that-which-is-fake/ that-which-is-real a hypothesis to go beyond, to surpass it” (Hendrickson et al. 2010:18). Canevacci sees the REFF project going in this direction, with ‘Fake’ as a distinctive trait through which to question the false / true dichotomy “now almost 19th century-style” (Hendrickson et al. 2010:18). The success criteria according to Canevacci, would not be the establishing of a new ‘order’; “a word that I dislike”; but the promoting of “an invasion of clusters of subjectivity which experience these mobile hybrids between digital technologies, mixed arts and new subjectivity” (Hendrickson et al. 2010:18).

Stephen Kovats, another contributor to the book, similarly the organizer of Berlin's *transmediale*, reflects upon the subjunctive character of a project like REFF, comparing it to the designing of festivals as “a kind of incomplete projects”, or as “processes that you enact but that you can’t really control 100%” (Hendrickson et al. 2010:174). Festivals should not only be reactive, animated and vital landscapes, but fields for temporal chaotic displacements that act as “an open source construct” (Hendrickson et al. 2010:174). Along the same lines, in his preface to the book, Bruce Sterling situates the REFF challenge in the realm of *maybe, might be* as well as at the crossroads of a multiplicity of shared spaces and times. “The best way to ‘expose the dynamics of the contemporary world’”, Sterling writes, “is to live in a way that is not of the contemporary world – to personify the transformations that time has in store for society.” His vision of such a way of living and acting is one of “dislocated, time-warped, multi-perspective, pervasive and ubiquitous narratives’, [n]arratives that are not novels, or artworks, or political manifestos, but episodes from a daily life as it does not exist” (Hendrickson et al. 2010:6). A vision that comes close to the differentiating polemology proposed by Certeau, it would indeed mean “[l]ife, but not life as we know it [...] [n]ot ‘real life’, but virtual, neo-real life [...] [a] fake life that aspires to become more real than the life that surrounds us” (Hendrickson et al. 2010:6).

The REFF project also originated as a polemical response to the opening of the “RomaEuropa

WebFactory”, a digital art competition launched in 2008 by the RomaEuropa Foundation (Fondazione RomaEuropa) and Telecom Italia. Operating with oppressive copyright conditions, such as the unilateral transfer of the rights of the works submitted and a ban on the use of techniques like mashup, cutup, and remix, the Foundation paradoxically granted to itself and Telecom Italia the unlimited right to remix the submitted works. The competition therefore inspired the creation of a fake parallel, an alternative initiative allowing for multi-disciplinary analysis of the possibilities excluded from the competition but offered by freely available knowledge platforms, contents and resources. As such, it presented a tactical reversal of the logic of the competition, actualizing its authorial exercise of power through strategies of isolation and border control.

Furthermore, the grand motto of the REFF project – “Remix the world! Reinvent Reality!” – echoes the situationist ambition to contest official media policies through *détournement*; through different forms of tactical tricks and ruses; different acts of diversions or rearrangements, including acts of a more confrontational kind, such as squatting or hijacking (Jorn 1959, Martos 1989). An ironic recycling or misappropriation practice, the *détournement* represents “the last usage possible of a fossilized culture” (Martos 1989:115). In the same vein, the REFF project aims to embezzle the ‘fossilized’ phenomenon of printed media, thus confronting its petrifying management of intellectual property rights and its territorializing and authorizing of experiencing and knowing.

## BLIND TRANSITIONS AS BOUNDARY MODIFICATION

As mentioned previously, the three co-authors of this article had different roles in the project. While one acted as initiator and coordinator of the overall scheme, the other two functioned as content providers. Yet, given the remixing ambition of the project, the relationships and responsibilities were not fixed. The contribution discussed in the following, *Blind Points of Transition*, was also a deliberate attempt not only to deliver content, but to reflect upon this constitutional unsettlement of the project as a whole.

From the very start, the contribution unfolded as a dialogue in between what in the ‘RomaEuropa’ perspective were two peripheral geographical locations. The idea was to actualize the ways in which ‘the margins’ were manifested within the project, ironically expressed in the very title. Yet, rather than simply transforming our intense e-mail conversations into a reflective article, we wanted to take advantage of the occasion to expand our intellectual exchange in order to practically explore the scope of the project. Hence, we decided to start out from our own geographical positions, and from there try to approach and

appropriate the public site of the expanded book.

The first step of our positioning endeavor consisted in describing our own contexts. We therefore pursued two simultaneous field observations on our respective locations. Far from Rome, the chosen sites were both peripheral public parks, the Swedish one situated in Malmö, Sweden, on the shores of the Öresund, the strait separating South Sweden and Denmark; and the Serbian one on the banks of the Danube and Sava rivers in Belgrade, Serbia. While the Swedish location formed part of a meticulously designed upmarket waterfront development called the Western Harbour, the Serbian location was of a more mundane character and embraced the northern, green and open “blocks” of the similarly planned but modernist Novi Beograd or New Belgrade; a post-World War II utopian development with large housing units and adjacent recreational spaces. Socially, the two edge areas were quite distinct. Despite its fancy situation and design, the posh Swedish waterfront counted relatively few visitors, at least this time of year, whereas the Serbian location, with its entirely disheveled atmosphere and to a certain extent neglected greenery constituted a more popular and populated space.



Fig. 3. Site I – The Scania Park, Malmö, Sweden, April 17, 2010.



Figure 4. Site II – Block 14, New Belgrade, Serbia, April 17, 2010.

The concurrent ‘inter-locational’ studies were conducted during one Saturday afternoon. For three hours, meticulous notes were taken on location about everything from temperature and architectural layout to temporary happenings and detailed findings. These observations were thereafter immediately copy-typed, exchanged, and organized into a combinatory time-line. When interlaced with each other, the detailed descriptions of the two sites resulted in a hybrid rather than comparative report; a reciprocal narrative, the transitions of which appeared as cross referential gaps or ‘blind points’.

Rather than ‘meaningful’, the gaps or blanks in between the two locations were experienced as unsettled spaces for potential movement. Having discussed back and forth what these breaches between locations and observational entries ‘meant’, we came to the conclusion that the best way to deal with them was in the form of questions. The questions that came to our mind in one or the other way concerned space – textual space, narrative space, urban space. “What are the circumstances?” “Who is this person coming towards me?” “What is there in the foreground?” Not only did the questions call into attention the two sites and their different urban and political contexts. They also agitated the text as site and the act of questioning. As the gaps were filled out with questions, the power of questioning was manifested, including its spatial significance as a directional and quite exigent form of address.

L'uomo con il cane nero più grande torna dal parcheggio. Si sta dirigendo verso di me, ma poi gira a destra e prosegue verso est.

QUAL E' LA CAUSA E QUAL E' L'EFFETTO?

12.40

Penso ai confini tra strade e sentieri a piedi e mi rendo conto che in questa zona non molto è stato fatto per rendere la vita facile ai pedoni. I percorsi stradali anche sono molto essenziali, senza soluzioni costruire appositamente. Ci sono solo i cartelli per il parcheggio, nessun altra informazione. La questione è quindi come orientarsi e decidere da che parte andare .... Io attraverso la piazza e raggiungo la parte del porto.

CONOSCI QUALCUNO CHE E' (MAI) STATO QUI?

12.42

Una donna con una giacca bianca e una coda di cavallo sta facendo jogging. Il vento continua ad aumentare e mi metto i guanti. Poi, le due ragazze con i pattini ritornano e proseguono verso sud.

DOVE' L'INIZIO (DELLA STORIA)?

Figure 5. Text page with time codes and inserted questions. REFF, 2010.

Once inserted into the text, the questions also exposed the chain of iterative action and the intermedial movements between text and site, calling for further transitional agency. We therefore decided to use the questions as a concrete pretext for revisiting the sites, now physically depositing the queries at the (blind) points of their appearance. As direct gestures of textual

feed-back, we felt it should be simple and plain, and we decided to use cheap plastic letters, print outs or other global products that could be obtained in most geographical location. As such, the questions could easily be materially translated into situated spatial objects, again reframing their ‘original’ contexts. Deprived of their textual neutrality, the questions were transformed into spatio-temporal elements, concurrently ‘taking place’ at the actual sites, where they developed into situations. These situations included everything from curious or suspicious glances, dialogues with passers-by, disputes with park rangers and concrete discussions about artistic practice and about the future of the locals in question, all of which constituted an abundant extra material, opening for many possible itineraries. Of all the possibilities, we chose to video-document the textual interventions and present them as short parallel sequences on the web. On the one hand, this transition resulted in the emergence of yet a new hybrid site the locations involved were re-connected with one another. On the other hand, new gaps appeared, new blind points, preventing the manifestation of generalized explanations or definite justifications.

In a ‘final’ iteration, the video-documented spatial interrogations were linked to the textual dialogue through the use of Quick Response codes inserted in the actual text. Through the use of a smart phone as decoder, the act of reading could be complemented and spatially expanded to include also the video-documented interventions on location, thus making it possible to trace the different iterations and reflect upon the material and spatial consequences of the different transitions, technologically, geographically and linguistically. While the technological expansion proposed quick or almost instant geographical response, the linguistic dynamic of questions and answers – printed or otherwise materialized – actualized the fact that this relationship is not always as quick or as straightforward. Materialized and situated, the questions did not call for speedy answers, but for mobilization. As such, the performative nature of questioning was actualized, the fact that the question belongs to a fundamentally social sphere of divergent meanings and misunderstandings, of positioning and agitation, and that it, when acted out or articulated, actually has the potential of destabilizing dominant discourses.



Figure 6. From Blind Points of Transition: Internet interface – Belgrade-Malmö.



Figure 7. From Blind Points of Transition: Internet interface – Malmö – Belgrade.

## DISCUSSION – BLIND AND FAKE DIGRESSIONS

Through their actualizing of ‘the knowledge object’, Star and Griesemer proposed an important epistemological shift. Dislocating the focus of knowing practice from the cognitive unveiling of inherent properties to the spatial and social “trading across unjoined world boundaries” (Star and Griesemer 1989:413), they also called into attention the importance of intermediality. Furthermore, the concept of ‘boundary object’ allowed them to do so without losing sight of the material instantiations of such trading. Later, Etienne Wenger has granted to the boundary object an even wider meaning as a materialization of abstract imaginaries and social relations. At the same time, it is important to point out that the object, besides potentiality, also executes a certain governing power, at times preventing a wider contextual understanding. Many critics have also expressed their concerns about what they have seen as the disarmament of the boundary object through the idealization of its situatedness and materiality (Björgvinsson 2007, Barrett and Oborn 2010). Boundary objects are not “magic bullets” delivering quick and smooth response. Instead, they provide discursive sites, “permeated with power” (Barrett and Oborn 2010:63). Non-finalized, questionable, engaging, ramified and potentially treacherous, they are objects calling for relational movement. In a recent reflection on the dissemination and use of the concept, Star also stresses this fundamental characteristic. Rather than developing guidelines as for what is and is not a boundary object, she develops further her original idea of boundary objects as arrangements that thanks to their material structure, scale and granularity allow different groups of actors to “work-play” together “without consensus” (Star 2010).

The intention throughout this article has been to explore the conditions for such intermediary and non-consensual “work-play” arrangements. In this respect, the *RomaEuropaFakeFactory* publication has constituted the contested boundary object through which this has been concretized and made possible. While sympathizing with an overall hybridizing intention, our aim has been to further trace the transitions fabricated,



and this at their extremities, at their outer limits, along the very fronts. By way of design intervention, we have tried to visit boundaries where total fusion never takes place, where meaning remains unsettled and where the knowable remains disclosed. This has entailed a spatial manifestation of transitional acts of dialogic, situated and iterative writing and re-writing, coding and recoding, contextualization and recontextualization. As such, our ambition has been to experimentally explore the idea of boundary object, with a special attention to its actualizing of ‘blind’ or questionable transitions and ‘fake’ or constructed unity.

Beside methodological and meta-critical aspects, our interventionist analysis of the expanded book also presents a critique of a similarly stretched public space. Through the establishing of a homology between the linguistic operations of the written text and the spatial modifications of urban publicity, the interrogative transitions and dislocations also provided a ‘content’ and produced possible arguments, first and foremost as concerns the intermediality between the book and the city as modern forms of spatial organization, both of which, within a digitized and globalized framework, are being fundamentally reconfigured. It is a reconfiguration that involves the distribution of power as well as the privilege of interpretation. Even though this urban aspect of the work to a certain extent falls outside the scope of this article, it constituted the framework, within which transitional intermediality would unfold as the dislocational dispositive, its gaps and blinds providing possibilities to social and spatial modification. In concrete terms, the iterations described above involved the questioning of ‘rights’ of access, the critique of authorship, the interrogating of intellectual and territorial property rights and the challenging of the privilege of interpretation.

Hence, intermediality should not simply be understood as “a formal category of change” (Heinrich and Spielmann 2002:6) or an intermittent stage in media evolution. Rather, intermediality is a trans- and performative quality inherent to mediation as such. A medium is not simply a carrier of messages, but a modal space, a space where conflicting modes of expression and exchange may be developed. Accordingly, we propose an understanding of the expanded book as an artifact affording modes rather than meanings, an intermedial but also spatially enabling object with divergent qualities. Similar to a map, it unfolds as a de- and re-territorializing ‘spread’, on the one hand ‘fake’ – contesting the idea of objective properties – and on the other hand ‘blind’ – breaking the visual authority of the printed text.

As an object questioning and materializing publicities, the expanded book does not necessarily provide new meaning. Instead, it has the potential to function as a ‘shifter’ or mobilizer, enabling transitions in between locations and scales. It actualizes the fact

that if and when a medium or a public space becomes ‘fossilized’ or only develops the functions of policing the “proper” use of its own terms, then playful questioning, metaphoric drift, and elliptical transitions – shortly, any form of boundary modification – is the only means to secure leeway. As much as the practice of asking, of traversing and introducing, requires a certain impulse or force, it can and will also lead astray, and for that reason, it may be seen as dangerous or objectionable. But, as Michel Serres and Bruno Latour have pointed out throughout their intermediary travelling – “we know of no other route to invention” (Serres and Latour 1995:66).



Figure 8. Still from Blind Points of Transition – Belgrade.



Figure 9. Still from Blind Points of Transition – Malmö.

#### ACKNOWLEDGEMENTS

We would like to thank Fake Press for the initiation of the REFF project and the support in the writing of this article. It has been a pleasure working with you and for us, it has been a great questioning experience.

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# POLITICAL ECONOMIES OF DESIGN ACTIVISM AND THE PUBLIC SECTOR

GUY JULIER

UNIVERSITY OF BRIGHTON/VICTORIA & ALBERT MUSEUM

G.JULIER@VAM.AC.UK

## ABSTRACT

Design activism has a long historical pedigree. From the declarations of William Morris through to the manifestos of the Italian radical design movement a hundred years later, it has been typified as standing in opposition to the corporatism of the capitalist world: a refusal to ‘obey the giant’. In recent years it has re-emerged in alliance with a number of global political issues including responses to Peak Oil, climate change, food shortages, social justice, the digital divide, demographic change, military conflict, sexual equality and orientation, financialisation and global economic recession.

The term implies a voluntarist, politically-motivated impetus: a desire for amelioration, to make a ‘better world’. In recent years, the economic arguments for adopting many activist practices has been increasingly made. In short, adopting ethical guidelines, sustainability, equality in the workplace, and so on, has been presented as making ‘good business sense’. For designers, orientating themselves to such issues engages a number of specific elements that gives them competitive advantage. Undertaking *pro bono* work, specialising in niche expertise such as ageing or ecology or even taking on particular

campaigns all provide opportunities for design consultants to differentiate themselves in a tight marketplace.

The growth of design work in the public sector also resonates with changes in the role and operations of a welfare state. The increased sub-contracting of public sector services to private firms, charities, voluntary groups and NGOs by many national and regional governments in the developed world has created a new raft of opportunities. Here, then, the activist designer can be engaged, for money, in fulfilling, or, at least, partially-fulfilling their concerns for social and environmental agency. In the United Kingdom, for example, the establishment of the notion of ‘big society’ by the Conservative-dominated government implies a downloading of previously held state responsibilities to the third sector and citizens. There is a broad compliance with these politics within discourses of service design. But, additionally, design activists find themselves, albeit sometimes uncomfortably, implicated in these processes.

What, then, is the notion of ‘value’ for the designer and client in such circumstances? There seems to be a shift in the measurement and calibration of

this notion. And, if so, how does the designer actually make a living? What other forms of value is the designer conspiring with? How do the economics of design activism lead to a different kind of practice?

This paper considers such questions through two lenses. One is the macro political economy shifts in public sector processes. The other draws on the micro experience of having been involved in an experimental inner-city, urban regeneration project as a design practitioner. Rather than make this latter practical and empirical work a core case study, around which general principles are generated, I draw from it as an example in a more speculative and suggestive way.

## INTRODUCTION

Design history tells us two things. One is that the design profession has always been shaped by economic, social, political and cultural forces. The other is that many designers and design educators are idealists. These two issues remain in conflict. The former suggests that design is a passive, pragmatic activity destined to respond to the ebbs and flows of local and global change. It is driven by service to wider interests. But designers are also interested in improving on what exists. Nonetheless, despite a history of reformists, from John Ruskin, Henry Cole and William Morris to Walter Gropius to Buckminster Fuller to Tomas Maldonado to Victor Papanek to the Italian radical movement advocated by such groups as Superstudio and Archizoom, designers continue to express consternation at the gap between their ideals and the reality of what is around them. They are, arguably, historical examples of design activism. This is perennially felt by graduating design students as they collide with the professional world of design. As Adrian Forty famously argued, 'both conditions [the idealistic and the realistic] invariably co-exist, however uncomfortably, in the work of design' (Forty 1986: 242).

Design activism as a form of contestation therefore has a long historical pedigree. From the declarations of William Morris through to the manifestos of the Italian radical design movement a hundred years later, it has been typified as standing in opposition to the corporatism of the capitalist world: a refusal to 'obey the giant'. Fuad-Luke (2009: 27) puts forward a definition of design activism as, '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'. It could be claimed that design activism has as long a pedigree as the profession itself. The emergent, modern conception of design in the latter half of the nineteenth century located it in terms of an 'added value' that was to temper a Kantian notion of endless production that filled out the later industrial revolution. Design was an ethical challenge that harnessed taste and control as against the rampant commercialism of modern production and consumer culture (Dutta 2009). Thus, as propogated by John Ruskin, William Morris, Christopher Dresser and their progenies, design was to be a moral filtering system. Since the early 1970s, design for social need and ecological concerns have been recurrent themes, as witnessed by the enduring success of Victor Papanek's seminal text *Design for the Real World* (1972), that became an international cult book for designers and non-designers alike.

The activist impulse amongst many designers has been given further impetus since 2000. This has re-emerged in alliance with a number of global political issues including responses to Peak Oil, climate change, food shortages, social justice, the digital divide, demographic change, military conflict, sexual equality and orientation, financialisation and global economic recession. Some of these themes are echoed in such books as *Massive Change: A Manifesto for the Future Global Design Culture* (Mau 2004) and *Design Like You Give a Damn: Architectural Responses to Humanitarian Crises* (Architecture for Humanity 2006). In these accounts, following in the footsteps of Papanek, the designer's work keys into globalist ambitions wherein expertise is lent to specific local challenges (such as fresh water or mobility) as part of a world view on responsibility. Here, creative solutions are largely technical before they are social.

There is another design activist approach that foregrounds social practices. This focuses on innovations that individuals or communities create for themselves, seeing that 'unofficial customization' of resources may be of significance. The designer's job is to recognise these, facilitate their development and possible up-scaling. Thus, for example, turning informal arrangements for lift-sharing into a neighbourhood scheme supported by internet booking may be a social innovation that the designer develops upon (Manzini and Jegou 2004). In this approach the emphasis is on the small-scale and local and on the analysis of the everyday ways by which people live and their capabilities. While this verve for localism maybe a starting point, it is accepted that cultures are not territorilized but exist in extended relational networks and flows. Thus, to borrow from Fraser and Wenginger (2008:1438) the design activist enters into these networks and becomes 'part of the dynamic that produces futures'.



This paper is mostly concerned with the latter of these activist approaches. Its interest is in systems of leveraging, wherein design is employed to identify and harness potentialities. This might exist in both design activist and public sector scenarios. More specifically, I should like to explore what happens when these two come together. What, then, is the notion of 'value' for the designer and client in such circumstances? There seems to be a shift in the measurement and calibration of this notion. And, if so, how does the designer actually make a living? What other forms of value is the designer conspiring with? How do the economics of design activism lead to a different kind of practice?

This paper draws from the experience of a real-life design activist consultancy project undertaken for regional governmental clients undertaken by the paper's presenter and an interdisciplinary research team. Within this, it identifies how the process and meaning of design might be re-orientated. Ultimately, it speculates that the notion of 'value' for design in the activist setting isn't, in fact, far from more mainstream commercial practices.

## UPLOADING TO THE PUBLIC SECTOR

In recent years, the economic arguments for adopting many activist practices has been increasingly made. In short, adopting ethical guidelines, sustainability, equality in the workplace, and so on, has been presented as making 'good business sense'. For designers, orientating themselves to such issues engages a number of specific elements that gives them competitive advantage. Undertaking *pro bono* work, specialising in niche expertise such as ageing or ecology or even taking on particular campaigns all provide opportunities for design consultants to differentiate themselves in a tight marketplace. Dorland (2009), for example, reports on how a Canadian graphic design consultancy values *pro bono* work in terms of its capacity to build profile for the agency while also providing an opportunity for in-house personal development – it works as a test-bed where creative ideas can be experimented. Undertaking work for free is more risk-free. Clients who are not paying are more likely to be grateful for than critical of the end result.

At the same time, designers have benefitted from an expansion of opportunities in the public sector that have opened doors for those with a more public service ethos. In the United Kingdom, the Design Council's (2005) *Business of Design* survey showed that 'public administration, health and education' make up 22 per cent of the total clients for design businesses, while the *British Design Industry Valuation Survey* shows a steady rise in the number of design businesses doing work for public sector or non-profit clients over the past few years: in 2000/01 (the first year of the survey), twenty-five per cent of agencies did this kind of work; by 2004/05 it was forty-nine per cent. (BDI 2003; BDI 2005). This might be viewed as part and parcel of a shift in the public sector wherein citizens become consumers of state services. Design is implicated into this

marketisation process, it playing a mediating role in shifting perceptions of public services from their being a state provision to a state service (see Moor 2009).

As part of this, design may be employed to help deliver 'best value' of services, to cut costs and therefore relieve the burden on governmental budgets and, ultimately, the tax payer. An example of this is the UK graphics company Corporate Document Services that provides print management services that helps local authorities reduce their costs and the efficiency of their publication processes (CDS 2008).

The marketisation of public services also creates a denser landscape of management and, indeed, design opportunities. Broadly, this has been the result of a shift in the public sector itself toward adopting more corporate work styles. During the past two past decades, local government across much of Europe, the USA and Australasia has engaged with the so-called New Public Management. In brief, this form of public sector organization includes a shift toward more entrepreneurial management, explicit standards and measurement of performance, an emphasis on output controls, decentralization of services, the promotion of competition, a stress on private sector styles of management and the disciplining of resource allocation (Osborne and McLaughlin 2002; Du Gay 2004).

The stereotypical era of large-scale, monolithic and mostly unchanging bureaucracies of local government – the public administration approach – may have ended in the 1980s. This does not, however, mean that it has been replaced by wholly light-touch, decentralised and flexible systems. In fact, according to Hoggett (1996), the New Public Management displays three interlocking layers of strategy that are, perhaps necessarily, in conflict. Firstly, operational output may be decentralised from national to local levels but also outwards from local authority level to subcontracted companies or groups – what Whitfield (2006) calls 'agentification' – while policy and strategy are increasingly centralised to the national government. Secondly, the introduction of competition running through this quasi-decentralisation process becomes the dominant model for coordinating it. Thirdly, performance management and audit have emerged as ways to measure and give accountability to the first two strategies. In all these cases, design opportunities abound. Publicity for the myriad of sub-contractees has to be created. For example, Whitfield shows how the management of a school that involved simply interacting with a local authority that previously provided all ancillary services to sub-contracting to a plethora of agencies including privatised school meal providers, buildings and facilities maintenance companies, after-school care voluntary groups, outsourced school transport, ICT and special educational needs resources and teacher supply agencies. This marketisation of services calls for a much greater number of relationships with external bodies and more frequent decision-making on the part of school

managers. It also creates evermore numbers of sub-contractee organisations that might represent themselves within this system: more logos, more corporate documents, more public sector orientated products, more relations. Within this marketisation of services, additionally, processes of competitive tendering and pitching require more desktop publishing input. Equally, the commissioning client, such as a local government authority or a public health body, requires quality control in order to ensure 'best value'. Thus reporting systems have to be structured and communicated.

If more opportunities for design are a fall-out of this process, then the *idea* of design, as an innovating and differentiating practice, has also become gradually embedded into governance. At the heart of much thinking behind this 'shake-up' of local authorities is the demand for a move toward greater innovation on the part of local government (and, indeed, all other aspects of state, including policing, healthcare and education). In Australia and the UK, this was clearly embedded into government thinking from the late 1990s (Considine and Lewis 2007). The UK Government's White Paper, 'Innovation Nation' (Dept. for Innovation, Skills and Universities 2008) lists climate change, the ageing population, globalisation and higher expectations of public sector users as drivers of the need for innovatory approaches to service delivery. Within this paper, the UK Design Council's 'Design of the Times' (henceforward referred to as Dott 07) programme of eight design and social innovation projects is cited as a best-practice case. Dott 07 prototyped, among many themes, new forms of welfare service delivery and energy consumption reduction strategies in north east England. This is a typical example of a central government's supporting 'best practice' examples of modernization ahead of legislation (Newman et al. 2001) – an entrepreneurial initiative is championed as a 'beacon of excellence' for other localities to follow, regardless of whether the infrastructural support for this exists elsewhere or not. More generally, the role of design and its contribution to a new culture of innovation in both private and public sectors is mentioned on just about every page of the 'Innovation Nation' document.

It would seem that designers might be well-poised to play a central role in this new culture of public sector innovation, uploading their expertise to governmental interests and activities. The extent to which their role may be termed as 'activist' is perhaps a moot point. Bluntly, designers may be exploiting opportunities within the public and third sectors for commercial gain. Equally, they may present a 'caring face' as part of their own brand building. However, on the other hand, the increasing awareness of the public sector – or indeed pressure on it – to adopt innovatory approaches to such issues as governance, climate change or demographic change suggest that something of an activist impulse on

the part of the designer becomes part of the package that may need to offer.

## DOWNLOADING FROM THE PUBLIC SECTOR

This last possibility for designers has implications for the way designers who are engaged with public sector project might work in the future. Let us return to the Design Council. In its role as a thinktank on new knowledge, it cultivated a particular approach to the processes and uses of design that keyed in with changes in public sector discourse. Between 2004 and 2006, the Design Council housed RED, a unit set up to tackle social and economic issues through design-led innovation. Spearheaded by its director, Hilary Cottam, RED developed co-creation approaches to the design of public services such as health, schools and prisons. Such projects foregrounded the intermediary role that design may play between citizens and the state. This way of thinking was set out in RED's document *Touching the State* (2004). It argued that,

Design, after all, is not just about producing effective and attractive objects.. Designers ... are trained to analyse and improve processes, exchanges and encounters – between customer and products, clients and services or, potentially, between citizens and States. They are, or should be, rehearsed at looking at the larger picture, and identifying where an object, or process, fits in the user's life ... government institutions don't for the most part look at civic encounters in this way. No one seems to be thinking about the citizen's journey through even a single encounter – from, say, the arrival of the first summons letter from the jury service, to the final goodbye – let alone through the course of a life.

This statement reflects the growing importance of service design as a specialism. Indeed, arch proponents of service design such as the agencies Engine and Live!Work had close relationships to many Design Council projects from 2000 onwards. Service design focuses on the user experience through a set of actions such as checking in at an airport, diagnosing and treating diabetes or undertaking jury service. It therefore involves the orchestration of multiple artefacts (eg. a combination of web, smart-card, products) and their positioning and sequencing. It is very much concerned with the *relations* and *exchanges* that go on between actors and artifacts within a system. The importance and value of one aspect of a one of these is thus highly dependent on others. Drawing on science and technology studies and practice theory, in design theoretical terms this might represent a turn from 'design thinking' to 'design-as-practice' (Julier 2007, Kimbell 2009).

Within service design, the notion that in order to get the best fit of user and service, delivery may have to be

highly personalised. Its design method may therefore involve deep user research in order to understand the variety of requirements and experiences that they engage. In addition notice may be taken of small scale innovations that users and producers of services create themselves, seeing that their 'unofficial customization' may be of significance and applicability that can be up-scaled.

Service design has been of particular interest to public sector thinking in the UK government. Strategy documents such as *Building on Progress: Public Services* (2007) lay important emphasis on the role of design in the creation of personalized public services in which users play a more participative role both in their configuration and their delivery. The pedigree of this thinking itself leads back to the influence Charles Leadbeater (himself an associate of RED) (Leadbeater 2000, Leadbeater 2008). Leadbeater's position that much can be made of the intrinsic creativity of citizens, 'empowered' through the free-flow of information, in turn means that solutions to complex challenges can also provide cost-effective innovations.

The downloading of action and responsibility to citizens in public services that is implicit in this thinking leads from and to the question of public sector budgets. The government commissioned *Cox Review of Creativity in Business* (Cox 2005) noted the rise of spending on health and education from £128b in 2002 to a projected £200b in 2008. None the less, given pressures such as an ageing population, it was also noted that there was a need to take a more innovative, strategic and holistic view on expenditure in order to deliver value for money. In 2008, the magazine of the Design Council ran a discussion entitled 'Can we deliver better public services for less money?' (Bichard 2008). In the context of post credit crunch rising national debt and foreseeing the squeezing of public sector spending, this debate was apposite. Tellingly, Ben Reason, director of Live!Work, remarks, 'we need to change our relationship with public services, from one where we just expect things to be there for us, to one where we're more engaged in ensuring we don't need them, or managing our way through them.' Avoiding 'unnecessary' use of and making judicious choices within them is therefore also a way of saving public money.

This attitude puts the onus on individual responsibility rather than the system itself (Perks 2008). As such it might be viewed as a downloading programme wherein citizens are expected to voluntarily take on the processes, and indeed of costs, of public sector service delivery. Design can be employed to ease and make reasonable that transition.

## DESIGN ACTIVISM AND CRISIS IN THE PUBLIC SECTOR

Let us now look more pointedly at the relationship of design to the sector. Shifts in policy approaches

discussed above coincide with a raft of crises that coarsen through governance. They deeply affect the way we think and act, in particularly in relation to the future of our cities. A number of stresses are being felt in cities. These include the continuing problems of poverty and inequality; environmental threats are mounting as the climate changes; and economic uncertainty and hardship have worsened as the speculative, free-market model exhibits a major crisis compounded by energy and other resource scarcities and associated price inflation (Girardet, 2008; Hopkins, 2008; Dorling, 2010). These stresses make it imperative to find new ways of creating city futures to respond to ecological overstretch, social friction and economic malaise.

There are two contexts working together, here. On the one hand, the state recognizes the palpable challenges it is faced with and its limitations in confronting them. On the other, the process of downloading invites or even coerces a wider range of participants in providing responses to them. Problem solving and governance are expected to be shared across a range of actors. The 'big society' notion that has been propagated within this discourse has come into play as part of the need to reduce public expenditure while drawing more fully on the creativity and ingenuity of citizens. We face the prospect that government urban renewal policies imply a systemic 'downloading' of welfare and development responsibilities from central government to local authorities and neighbourhoods (Aylett, 2010). Public sector spending was cut by £9bn in the 2009 UK Government budget and a minimum 10% cut in public spending in 2010 was instigated. Further 'downloading' of service delivery is undoubtedly anticipated given the size of the planned deficit reduction in the UK which will involve increased co-option of voluntary sector organisations, not-for-profit companies, charities and community groups. This new austerity regime has huge implications for already precarious and deprived communities and may herald a return to the survival of the fittest approach to area regeneration. A drastic further shift away from principles such as redistribution, social equality and justice have serious implications for the poorest in our cities. Maybe the UK government's talk of 'big society' can be turned into a workable option after the failure, in turn, of 'big government' and 'big market'? (see Blond, 2010)

Many community-based and, what might be identified as, design activist initiatives exist which have shown that it is possible to use innovative approaches to generate significant improvements. These include: the Goodwin Development Trust which was set up as a charitable organisation in 1994 by residents of the Thornton Estate in Hull to improve their quality of life and the services available on their estate; Glasgow 2020 Vision a project that developed a future vision for Glasgow that was not constrained by institutional interests; Imagine Chicago, a non-profit organization in existence since 1992 which aims to cultivate 'hope and civic engagement in a variety of cross cultural and

intergenerational initiatives, projects and programs' (Imagine Chicago website) and began by a city-wide Appreciative Enquiry process; Transition Towns, originating in Totnes, UK, which provides methods for building community resilience for a post-carbon future; the Eldonians in Liverpool who have turned a housing estate around using a housing co-operative model; Coin Street Community Builders founded in 1977 to resist a large-scale hotel and office development that would have had a major negative impact on this small London community; the BalanCity Project, an urban renewal project that works with Asset-Based Community Development (ABCD); Biz-Fizz, an approach developed jointly by New Economics Foundation (NEF) and the Civic Trust in 2001 to provide business support to people in communities experiencing economic disadvantage, and challenge the misconception that there is a lack of entrepreneurs and enterprising ideas in these communities. Many of these innovative experiments seem to have occurred in spite of the state rather than via its mechanisms.

*At this point it is worth sketching in my own activity as a design activist practitioner. The new landscape of peak oil, climate change and of the crisis of many financialisation and property initiatives, and with it of the naïve belief in continuous growth model, requires new understandings and an ability to think laterally and holistically (Bauman 2008). This condition gave rise to the emergence of a strong radical movement in the Leeds, UK, under the slogan of 'Leeds. Love It. Share It', a play on the official Leeds brand, 'Leeds Live It. Love It'. This initiative was made up of individuals and groups, networking creative practitioners, academics and activists, recognising the redundancy or, even, the absence of any strident city policies in the face of the three pressures of social inequality, environmental change and economic recession. Its steering group currently comprises Irena Bauman (Bauman Lyons Architects), Sue Ball (Media And Arts Partnerships), Rachael Unsworth and Paul Chatterton (School of Geography, Leeds University), Andy Edwards (independent graphic designer), Andy Goldring (Permaculture Association) and myself. As such it comprised an alliance of creative practitioners and members of the academic community.*

Leeds Love It Share It is now a Community Interest Company (a designation that makes it 'not for profit' while giving it company status, and thus the ability to undertake consultancy work). It has explored how inner cities can adapt and respond to these rapidly changing times in innovative new ways. Funded to the tune of about £80000 by the Regional Development Agency, Yorkshire Forward, and £10000 from the city council's Local Enterprise Generation Initiative, the project looked at how tools for resilience, adaptability and sustainability could be designed and implemented in inner suburban areas of Leeds.

The pilot study was the inner suburb of Richmond Hill, chosen because it is within the 'Rim' of Leeds where

baseline research has been undertaken. This established key findings and the potential for further detailed research. The area was also chosen as it contains communities that fell within the lowest 3% of Super Output Areas (SOAs) nationally (classification has since changed but it still acts as a good indicator). This demonstrates that these communities are relatively deprived and or in a state of transition.

*social institutions – eg. sporting or leisure clubs, faith groups, support groups;*

*green space use – eg. gardens, allotments, left-over spaces, derelict space;*

*grey economy – eg. informal childcare networks, vehicle repair activities.*

The primary focus was in one pilot study area to look at how a better understanding of each theme, and their inter-relationships, can contribute to more sustainable and ethical development.

*By doing this it was hoped that attention is drawn to the resources that are available but invariably overlooked in these areas and that provide important infrastructures for the sustainability of these communities. It brings this, largely shadow, rim back into the wider picture of the city. It also begins to counter the notion that urban regeneration can take place from the centre outwards by helping to develop resilience of localities. It is intended that this action is both scaled up and down. The city's Richmond Hill area provides a scenario to test mapping processes and its forms of representation. This prototyping will then contribute to a toolbox which can then be rolled out into other areas of the inner suburbs. At the same time, it is expected that this toolbox can be used and adapted by communities themselves, thus scaling the process down and allowing for greater participation and less concentration in the hands of 'experts'.*

Partners included:

Re'New (neighbourhood renewal agency)

Leeds Enterprise Generation Initiative

East and South East Leeds Regeneration

Leeds City Council (Director of Regeneration)

Yorkshire Forward (Economic Inclusion and Renaissance Units)

Here, then, within the 'Margins within the City' project, Leeds Love It Share It is engaged in a number of the features discussed in both the 'uploading' and 'downloading' elements of the relationship of design to the public sector. In the first instance, it engages with the fragmented, agentified qualities of public sector service delivery, acting as an interlocutor between them. It looks for ways of combining private, commercial, voluntary sector and citizen interests. In so doing it also seeks to capitalise on untapped resources and potential relationships.

## CONCLUSION

In all of the above cited examples, including the 'Margins within the City' project, there is a design element. Broadly, implied in them is a willingness to re- envision, to reconstitute social relations and experience through the planning and establishment of material and non-material community assets. Theoretically, at least, we might also point up the processual elements in these examples that resonate with design thinking in general and service design more specifically. In the first instance, close attention is paid to end-user needs and practice. Non-mainstream actions that provide innovations are identified. Solutions are prototyped and tested *in situ*. Experts and lay-people enter into a longer-term relationship where adjustments and maintenance interventions are made beyond the point of implementation.

To repeat, the design activist is working between the uploading and downloading dynamics. This is therefore distinct from the historical notion of the design activist as 'refusnik' of a larger state or corporate system. Instead, the design activist is, to varying levels, engaged *with* dominant ideological programmes by dint of working with public sector interests. In terms of uploading, then, s/he is acting as the broker between disparate entities. The context of agentification, as already indicated, gives way to a fragmentation of service-providers. We have already seen how this provides brut opportunities for commercial designers. But the design activist may be involved in piecing together various interests. In the case of 'Margins within the City' project, we worked between regional development agency strategists, city council planners, neighbourhood renewal teams as well as more 'on-the-ground' actors such as voluntary groups, businesses, neighbourhood fora, religious organisations and health promotion teams.

The kind of design activism that is central to this paper suggests an historical modification. All those historical examples cited – from William Morris to Superstudio – advocated a connection between the way that design was conceived and how this implied particular ways of thinking, doing and acting. The radical Italian groups of the 1970s most explicitly open up the notion of design as being concerned with networks and relationality. Their aspiration toward a frictionless environment wherein people are less encumbered by the materiality of consumer culture and instead, seek meaningful and productive social relationships points clearly in the direction of the more pragmatic theories and approaches developed by the likes of Ezio Manzini and John Thackara. However, those 1970s 'anti-designers' were wrapped up in the anti-state and anti-capitalist movements of their era.

Certain practices of design activism are, however, more closely implicated in the political economies of the public sector than their forebearers. Ultimately, designers have to make a living, no matter how humble.

The changes in public sector practices offer up new opportunities for those designers with an activist impetus. At base level, this may be in the forming of artefacts, in giving value to things. But they may also be engaged in looking for and articulating new sources of value. Various other sorts of capital may be investigated and demonstrated by the designer such as social capital, knowledge capital or land assets. While some historical examples of design activism might have tended toward garnering these and their relational fit to create an alternative society (eg. the Waldenesque hippy commune), the kind of design activism that is featured in this paper critically takes itself closer to systems of governance and economy.

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# ACCOUNTS OF A CRITICAL ARTEFACTS APPROACH TO DESIGN ANTHROPOLOGY

TAU ULV LENSJOLD  
THE DANISH DESIGN SCHOOL  
TUL@DKDS.DK

## ABSTRACT

This paper aims to contribute to a discussion of what design anthropology brings to the deployment of critical modes of engagement and artefacts in design. And, conversely, discuss how this specific framing of design anthropology may add to its disciplinary potential. I propose to do this by discussing how design provocations and critical artefacts, as transitional devices, and at different stages in a design process, can evoke a critical stance or render intrinsic controversies visible, while turning the artefacts into objects of mediation between heterogeneous assemblages of stakeholders, contexts and concerns.

By framing design anthropology within a distinctly critical approach to design, this paper furthermore brings into question the value of ethnographic inquiry as merely implications *for* design, and goes on to suggest a richer and more interventionist application of anthropology with specific relevance for the scaffolding and articulation of a critical stance *in* design.

## INTRODUCTION

The intension of this paper is to tread pathways through the emergent field of design anthropology to point out a position from which to launch a critical stance in design. Following Bruno Latour's seminal article: "Why has critique run out of steam?" I claim that the interstices between design and anthropology<sup>1</sup> produces a new territory for critical and speculative practices within design. For the time being this might be a 'terrain vague'<sup>2</sup> of potentially critical practices. Thus, it is the aim of this paper to delineate propositions on what might characterize such practices and how they might relate to other critical practices in design.

In keeping with the developing state of the field, a broad definition of design anthropology could be that suggested in the following quote:

Design anthropology tries to combine making sense of what is there with remaking what is there into something new (Sperschneider et. al 2001)

Design anthropology, in this understanding, is related to what Jacob Buur, following Christopher Frayling, has divided into anthropology *with* design as opposed to *of* or *for* design. A more fitting depiction of the relation between the two fields would be to describe it as a 'piecing together', or bricolage of its own

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1 The focus in this article is on design anthropology, as but one example of an articulated interest in design coming from the social sciences. It should however be pointed out, that this article also draws inspiration from other areas of the social sciences, most notably STS.

2 The idea of a 'terrain vague' denotes a vacant piece of lands in urban zones; abandoned areas, obsolete and unproductive pockets of space without specific functions or limits. The notion, here admittedly in a more metaphorical sense, contains both the lack of something as well as the potential for something new – in this case a different kind of criticism.



(Sperschneider et. al 2001). Thus emphasizing ‘a bringing together’ or mutual exchange of tools, theories and methodologies with respect to the uniqueness and complexities of a specific and dynamic situation, and the double perspective of making sense of and remaking what *is* into something new.

This definition of design anthropology also brings to mind a central schism in design between tradition and transcendence (Ehn 1988: 129). It is tempting to align ethnographic accounts solely with a more profound understanding of tradition and existing practices, while leaving the task of transcending in the sense of going beyond the present by exploring and giving form to possible futures to design. Inhere lies a risk of widening the gap by reifying stereotypical conceptions of the respective disciplines. But as design can be deployed to either sustain or break traditions, this paper suggests that ethnographical practices in a similar fashion can make a contribution to traversing existing boundaries by bringing issues of concern to light and pointing out alternative realities.

Central to the interest in design anthropology taken here, is that the most promising intersection between design and anthropology is to be found in the possibility of design as a *problem-setting* practice. (Halse 2008: 19).<sup>3</sup> It is arguably a limited area of design that concerns itself with problem-setting as opposed to finding optimal solutions to a priori articulated design problems. But it is, never the less, in this limited area that we find the most suitable grounds for the explorations of a critical stance in design.

The first part of the paper briefly outlines orientations within the field of design anthropology based on a conception of anthropology as an interventionist practice.

In the middle sections of the paper the specific implications for design understood as a critical practice is examined, by explicating and discussing different modes of critical engagement.

The third part of the paper contains an analysis of how the use of ethnographic accounts and data can function as design provocations and thus contribute to the insertion of a critical stance at different stages of a design process. This is exemplified by projects conducted by a team of design researchers from the SPIRE centre, University of Southern Denmark, described and analysed by Jacob Buur and Larisa Sitorus.

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<sup>3</sup> It is beyond the scope of this paper to attempt to draw up a full description of design anthropology as an emergent field. For a thorough a thought-provoking account of the issues that needs to be addressed to bring together design and anthropology see the dissertation by Joachim Halse: *Design Anthropology: Borderland Experiments with Participation, Performance and Situated Intervention* (2008).

Lastly, this perspective is further elaborated in relation to ‘a critical artefact methodology’ (Bowen: 2009) as an ample attempt to stratify the critical firmly within the bounds of a participatory design process.

## ORIENTATIONS WITHIN THE FIELD OF DESIGN ANTHROPOLOGY

It has been suggested that anthropology has something more to offer than ethnographic methods already widely utilized in design practices and research. That anthropological thinking provides means by which to “recast assumptions and processes through conceptual juxtapositions and ethnographic alternatives” (Leach 2010b). This proposition offers a notion of anthropology as a creative discipline that can actively move between positions of description and actions (Gunn 2010).

A case often cited to exemplify the qualities of fieldwork is the project done by anthropologist Susan Squiers on breakfast habits in American families. In contrary to initial marked analysis with focus groups where people spoke of the importance of eating breakfast, a subsequent field studies showed how people were not actually hungry and most families did not have time to sit down and eat breakfast. This ethnographic insight led to the development of a new type of product, ‘Go-Gurt’; a nutritious dairy-product in a tube, to be eaten on-the-go (Squires 2002). What I find peculiar about this example is two things: First, the apparent seriality of the process and how one insight about the eating habits, seemingly frictionless, is substituted by another and finally resolved in a product that fully answers the quest for the most profitable product. But what about the importance of social interaction and rituals associated with eating together as a family?

Second, I find it even more interesting that this example is brought to the fore as a successful example of anthropology in the service of design; an anthropology for design (Vangkilde & Jöhncke 2010).

What seems to be absent here is interpretations of the flow of social discourses and perhaps more importantly moments of critical reflections folded into the different layers of knowledge (marked analysis, field studies) and actions (design proposal). There is, as pointed out by Françoise Brun-Cottan, a “risk in helping industry commodity results of ethnographic studies into goods and services” (Françoise Brun-Cottan in Cefkin 2009: 159). The risk is evident in trying to accommodate a multitude of sometimes conflicting interests and agendas. The trustworthiness of the relationship with participants may be jeopardized by the way the recipients of ethnographic data (designers, companies, agencies) choose to make use of it. A crucial aspect of the ethnographers work thus becomes translations and co-constructions of corresponding frames of interpretation between different agents and conflicting interests and relations of power.

My interest in this paper is not as much with explicating the potential ethical risks in doing corporate or design

ethnography. In a somewhat more constructive vein, it is interesting to conceive of design anthropology as an interventionist practice. What if the anthropologist through field studies can make information available (Latour 2005, Leach 2010a) and offer interpretations that addresses not only the different actors individually, but collectively, and thus intervene directly into the collective social reality by making differences apparent and perhaps conjuring up new possibilities. In the last part of the paper we will return to an example of how ethnographic knowledge can produce difference when reinserted into the design process as provocations.

Suggesting to look at anthropology as an interventionist practice in relation to design, brings into question the affinity to a action oriented approach to design, which has influenced the early Scandinavian PD tradition. While action research more recently has been taking up by critical ethnography (Madison 2005) – the explicit political motivation is somewhat different from the ethos of the interventionist practice.

What is foregrounded here is rather the call made by proponents of what has been termed ‘the critic turn’ in anthropology “away from the slow reliance upon pre-existing explanatory models and towards a presentist orientation that emphasizes connections, nodes and experimentation” (Hunt in Clarke: 2010: 38). In this reorientation design present a significant challenge in that it is not only contemporary and present, but also directed towards the future. The contributions made by ethnographic engagement in this process, will thus have a direct effect on the design outcome – and can accordingly no longer claim to be merely preoccupied with the production of anthropological knowledge according to established categories

## DESIGN AS CRITICAL PRACTICE.

If we take design to be a modern enterprise in the cross field between technology and art (Flusser: 1993) and imbedded in systems of mass production and distribution between culture and capital (Mazé and Redström 2007), the following quote can be said to express a foundational difference between production design and related disciplines, such as architecture and art:

Because product design is thoroughly integrated in capitalist production, it is bereft of an independent critical tradition on which to base an alternative (Thackara, 1988: 21).

If this, essentially modernist, tradition of design still holds true in a vast majority of design practices today, critical cultures within design has developed in a number of different contexts since the 1960s. On of the most prevailing examples in the last decade is what is often labelled as *critical design*. More a position or attitude within design than a methodology, critical design uses speculative design proposal to challenges preconceptions and raise questions an debates about complicated issues (Dunne & Raby). Critical design

borrow heavily from art in terms of the strategies it employs. As a modus of design research this approach has been described as *Gallery* (Koskinen et. al 2009); a mode of design experimentation, opposed to the strategies based on, respectively the natural (Lab) and social (Field) sciences: “This format implies that the design experiment, be it a model, a prototype, or a performance, is the final presentation of the work and its process” (Koskinen et. al 2009: 16 (35)). According to Dunne, the design artefacts on display become a “form of social research to integrate aesthetic experience with everyday life through ‘conceptual products’” (Dunne 1999: 29). With a few exceptions, one of which I shall return to shortly, it could be contested, that critical design is engaged directly with the experiences of everyday use. And by the same token it should be questioned what practices of use is afforded by the critical artefacts and the highly controlled spaces in which they are displayed. The use of the products is tried out in the imagination of the visitor, or “conceptual consumers” (Dunne, 1999: 78). What is absent in this equation is the impact of complicated and dynamic real life situations and unpredictable flows of social discourse. The lack of situated interaction has substituted the messiness of the users own authentic life worlds with that of a forceful and thought-provoking statement in a form imitating the traditional artwork on display.

One exception to this formula is the project PLACEBO in which the conceptual design is taking beyond the Gallery by placing a series of designed artefacts in the homes of people as means to investigate the experiences of living amidst electromagnetic fields in their homes.



Figure 1: The “Placebo Project” (2001) consists of a series of eight prototypes devised to investigate peoples' attitudes to and experiences of electromagnetic fields in their homes. Made by Anthony Dunne and Riona Raby. Photo: Jason Evans.

The series of artefacts in project are not the end result of the investigation in it self, but rather means by which the design investigation is performed. Only in the encounter with real people in everyday life situations and places, is the speculative functionality of the objects realized to the full by questioning there relationship to the electromagnetic fields and making visible, that which has hitherto been invisible.

I will return to the question of what characterizes this type of design artefacts. For now it suffice to say, that these objects maintain openness for interpretations, beyond the control of the designer. In broader terms, this entails a type of design practice that “shifts from deciding on and communicating an interpretation to supporting and intervening in the processes of designer, system, user, and community meaning-making” (Sengers and Gaver in Redström 2008: 412).

As pointed out by Redström (2008: 416) “(...) acts of defining use through use (as opposed to the definition of use through design) essentially happens after design”, or as it is mostly the case in user-centred design, as instantiations of an iterative design process, bringing the design object successively closer to a finished product. The artefacts of the PLACEBO project differ in this respect, since they are finished, as ‘thing-design’ (Redström 2008: 412), at the very beginning of the process. Paradoxically, it is the fixed form but indeterminate function that makes the artefacts perform as instigators of interpretations and reflections among the users.

In lieu of the initial definition of design anthropology, combining sense making and remaking what is there into new things (Sperschneider et. al 2001), the PLACEBO project employs a sequential and linear approach, where the dual faculties, that of designer and ethnographer, can be distinguished and aligned with the different stages of the process<sup>4</sup>. What sets this project apart from the more general use of ethnography in design is the order and use of the different faculties. Instead of field studies utilized as a tool for data collection, it is the designed artefact that provides the means for an intervention into reality. The end result, apart from putting the project on display in terms of Gallery<sup>5</sup>, becomes that of the subsequent interviews with the people who had adopted and lived with the artefacts in the homes.

I will return to a number of strategies that utilize different forms of design provocations as an intrinsic critical stance in user-oriented design processes, but before doing so, the next section outlines a comparative categorization of different types of critical engagement in design.

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4 The distinction proposed here is not grounded in considerations of the disciplines involved in the actual design process, and merely an appraisal of the project as example. In fact Dunne and Raby, makes it quite clear that the project is not bound to any kind of academic disciplines and scientific rigor: “although aware of ethnographic and anthropological methodologies, we chose to develop a more informal process in this case” (Dunne and Raby, 2001: 75). It is sense this approach challenges clear disciplinary dichotomies, and thus can be seen as the designer becoming ethnographer. I will, however maintain that collected ethnographic data (interview with informants) is subjugated to anthropological interpretations.

5 The project is thoroughly described and documented in the book *Design Noir*, by Dunne & Raby. The notion of Gallery (Koskinen et. al 2009: 16), in this respect, is extended to the form of a book.

## MODES OF CRITICAL ENGAGEMENT

We have in the previous section discussed critical engagement as a specific design practice, and thus a position in design employing a specific set of designerly means. In a recent paper, Carl DiSalvo (2009) has devised a useful categorization of these means into two modes of engagement, namely *projection* and *tracing*. In the following I will extrapolate the notions of projection and *mapping* (closely related to DiSalvo’s notion of tracing)<sup>6</sup> as two distinctively different approaches to what the critical entails.

### PROJECTION

Projection refers to the “representation of a possible set of future consequences associated with an issue” (DiSalvo 52: 2009). Projections are based on knowledge propositions and give an indication of a possible direction and outcome of the future development of an event or issue. The form of projection in design is traditionally practiced through the use of scenarios. But what sets the critical use of scenarios apart is, that the interest lies with the possible consequences and not with the causes of actions with which the scenarios can become materialized (Ibid.) This difference can be summarized as the distinction between *predictive* and *prescriptive* scenarios (DiSalvo 2009, Margolin 2007). Where the prescriptive envisage scenarios that emphasize how to get to the desired future situations, predictive scenarios, on the other hand, make suggestions as to that might happen.

As a specific style of future predictions critical design scenarios, in the tradition of Dunne and Raby, are simultaneously extrapolating and projecting state of the art scientific research (DiSalvo 52: 2009) and embodying a certain mood best described as *Noir*<sup>7</sup>. In other word, the style of scenarios often, if not always, foretells a slightly disturbing, but for the same reason captivating, fiction – invoking what Dunne & Raby elsewhere has described as *complicated pleasures*<sup>8</sup>. To invoke a response critical design is utilizing highly elaborated design skills and formats (models, photos, video) in creating visually stunning representations, that

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<sup>6</sup> Though mapping and tracing might be seen as descriptions of quite similar activities – the use of mapping here, is due to its stronger emphasis of some or other form of representation. This is important, since it inserts a difference in the sense of a dichotomy between map and territory; simultaneously movement (tracing) of the unfolding events and representation of the same on a different strata (e.g. as map, account, mock-up etc.). It is through this ‘making differences in action’, that a space of resistance and reflection can be established.

<sup>7</sup> The notion *Noir* is described in the book *Design Noir* (2001) with a deliberate reference to the Film *Noir* genre that, according to Dunne and Raby, emphasizes the existential moments in life. The notion of *Design Noir* points to design objects that dramatize dilemmas and let us enjoy the wickedness of the embedded values (Dunne & Raby: 2001)

<sup>8</sup> *Complicated pleasures*, in a notion Dunne and Raby adapts from English novelist Martin Amis, to describe the confliction emotion brought to the fore by experience that are equally found to be repulsive and fascinating, e.g. genres as horror.

make the future depicted seem plausible precisely because the aesthetic (and stylistic) choices appeal to a contemporary sensitivity in design.

An example of this style of future projection is evident in the project by James Auger and Jimmy Loizeau entitled “Carnivorous Domestic Entertainment Robots” (see fig. 2). The project explores how a speculative rearrangement of robotic forms and functionality, in a domestic setting, can challenge our common perceptions of robots. The project consists of a series of five prototypes developed around an existing technology of biodegradable full cells and has deliberately been styled in a “contemporary fashionable design aesthetic”<sup>9</sup>.

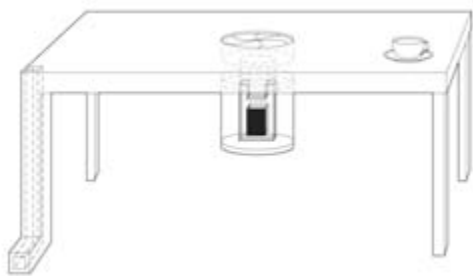


Figure 2: “Mousetrap coffee table robot” (2009). The prototype combines a microbial fuel cell that powers an iris through which to trap mice that have crawled onto the coffee through a hollow leg in search of food. It is one of five prototypes in the “Carnivorous Domestic Entertainment Robots” project made by James Auger and Jimmy Loizeau. Engineered by Alex Zivanovic.

In contrast to the exception described by the PLACEBO project, in the previous section, this project is not concerned with the real life experience of living with the robots it depicts or other kinds of mundane encounters. The focus is instead directed towards the dispersion through various media channels, in order to become noticed and generate debate. In this respect the project exemplifies the distribution of Gallery to various media platforms. But more importantly, the project points to the discursive nature of critical design as a prominent style of predictive projections that operates by differentiating its vision of the future from the mainstream, and thus obtaining a position from which to launch a critique.

## MAPPING

Where critical design, as we have just seen, can be seen as related to the hegemonic traditions of critical theory, where the subject matter of interest is subjugated to critique through analysis produced from a distanced and privileged position, others have argued that these forms of critique “are incapable of taking the complexity of real objects seriously” (Ward et al. 2009: 2). For Latour, and other proponents of STS, another critical position can be located in the empirical attention to issues of

concern amidst a world of complex and irreducible realities (Latour: 2004).

Mapping, as a mode of critical engagement, can be seen as a designerly way of articulating the matters of concern surrounding an issue, by drawing up an indiscriminating representation of the objects, people and events that influence the becoming of the issue over time. This implies a temporal difference in which mapping brings the past into the present, whereas projection brings visions of the future to life in the present.

Following the British design researcher Alex Wilkie, the mapping of controversies in and around an issue of concern, has a number of things to offer design: First, controversy can provide relevant, and perhaps previously concealed, topics of relevance for design. Second, controversies can open new perspectives on the people and things involved in a matter of concern. Third, the tracing of the different constituents of a controversial issue, can help to reveal how the paths to a future outcome is up for negotiation in the present, and thus still open to contestation and scrutiny through design proposals.

In regard to the initial, if brief, working definition of design anthropology, mapping (with an emphasis of mapping as the active process of map-making, i.e. the becoming of the map rather than the finished map in itself) constitutes a stage for *problem-setting*. The representations of problems and controversies surrounding an issue, in turn, produce new vantage points for subsequent design interventions.

As a concrete instantiation of mapping as critical engagement, Alex Wilkie has devised a workshop concept utilizing information collected from newspaper articles pertaining to a controversial issue.

In the fall of 2010 a workshop (see fig. 3) following this format was carried out as part of a course in design anthropology with students from The Danish Design School and Institute of Anthropology at the University of Copenhagen.



Figure 3: Beside newspapers, the mapping was carried out with conventional workshop means, e.g. drawings, text fragments and Post-It notes.

<sup>9</sup> The project has been exhibited at the Dublin Science Gallery, as part of the exhibition “What If ...” (2009). See also: <http://www.auger-loizeau.com/index.php?id=13>

The workshop yielded some interesting results in terms of new ideas for design interventions. But moreover the workshop protocol and limited time span forced the two groups of students into a constructive meddling of anthropological and designerly faculties.

What characterise the two above-mentioned modes of critical engagement is that they both operate at a discursive level, which give prominence to more or less abstracted representations of reality. In the following section we will take a look at how an ethnographic approaches, more firmly grounded in reality, can contribute to a critical stance in a design process.

## PROVOTYPING

As pointed out in the paper “Ethnography as Design Provocation” (Buur, et al. 2007), ethnography utilized as a tool for data collection and separated from the design process, limits the potential for challenging inherent assumptions in the conventional problem-solution causality of a design process (Anderson, in Buur, et al. 2007). In four design encounters (workshops) analyzed by Buur, et.al, ethnographic material based on field observations (video, transcripts of observed work practice, etc.) from two different projects were presented as different (but internally related) instantiations of design provocations:

### 1: ANALYSIS OF MEETING DIALOG

Recording and analyzing dialog from a meeting between groups of stakeholders in order to identify divergent temporal agendas, e.g. design requirements based on observation vs. future scenarios where technological advances makes experiences from a current practice redundant.

### 2: PRODUCT MOCK-UP

Building a product mock-up based on a design idea, in which the central concept specifically addresses the discrepancy identified in the previous step, and presenting the mock-up, along with other design concepts, for a mixed group of stakeholders. The mock-up provokes a discussion between groups of stakeholders, with the designers acting as facilitators.

### 3: USE OF ETHNOGRAPHIC VIDEO MATERIAL

Ethnographic material in the form of video is presented to the participants of a workshop with the intent of staging a provocation. In groups, the participants are asked to draw up a scenario that identifies possible problems and solutions pertaining to the general theme of the workshop. In the following plenary discussion the scenarios are used to stage different positions among the participants.

### 4: ON-SITE MANIPULATION OF MUCK-UP

Another example of using design mock-ups to challenge preconceptions is a workshop where end-users (technicians) are playing with a tangible object in order to test how a design concept adheres to their future

needs. The physical mock-up subsequently forces concept providers (engineers) to reconsider their software solutions in lieu of the technicians’ bodily experiences.

The four examples show a rich potential for making use of ethnographic material at various stages of a design process. The most noticeable distinction between different strategies at work here is firstly, the reification of the ethnographical material into ‘mock-ups as provocations’ (Buur, et al. 2007) as evident in example 2 and 4. And secondly, the intentional reworking of data into ethnographic objects (videos, storyboards) followed by the scripted narrative of using these objects to develop discrete positions among the workshop participants, and stabilizing the subsequent discussion by means of the shared objects, example 3.

The discrepancy encountered in example 1 is similar to competing agendas found in the distinction between the notions of *prototyping* and *provotyping* provided by Preben Mogensen (1992):

Prototypes are “directed towards the future” and provides few concepts and techniques for understanding and handling the collective aspects (...) of current practice” (Mogensen 1992: 6).

Provotyping, by contrast, is concerned as much with the design of a new practices as design of new solutions, by “provoking discrepancies in the concrete, everyday practice to call forth what is usually taken for granted” (Mogensen 1992: 22).

While I tend to agree with the (cautious) definition of example 2 and 4 as provotypes (Buur, et al. 2007), I am curious as to why the quite obvious difference in agendas demonstrated, for example, by comparing the difference between prototype and provotype, has not found more substantial bearings with designers. It seems that the ‘making visible’ of intrinsic power relations in a design process, has a blind spot when it comes to the agency with which designers themselves enters the scene.

In this section we have until now seen examples of how design provocations and provotypes can be put to use as an integral part of ethnographically informed design processes, and thus breaking away from the reduction of ethnography as a mere toolbox of methods for extracting data (Dourish 2006: 3).

## A CRITICAL ARTEFACT METHODOLOGY

Simon Bowen (2009) has, in a similar vein, suggested what he calls ‘a critical artefact methodology’. Based on the proposition of critical design, a critical artefact methodology supports a more instrumental use of critical artefacts in participatory design processes. As a concretization of critical theory in general, the function of critical artefacts is to ‘emancipate’ the designer as well as stakeholders by confronting them with a critique that lies outside their initial understanding and affords what Bowen calls a “synthetic social situation” (Bowen

2009: 80). This, in turn, provokes stakeholders to engage with the artefacts and “reflect on the limitations of their current understanding that consequently broadens their understanding” (Bowen 2009: 181).

In comparison to critical design as a mode of descriptive projection, this approach is more akin to a prescriptive projection understood as a means to a very specific end. That is; critical design operationalized as methodological component in a prolonged design process, rather than a discursive position from which to produce different interpretations and critical reflections. The end goal here is to design products better suited to the needs of the users.

A critical artefact methodology, shares an affinity with the ethnographical informed design provocations by focusing on the design encounter between designer and stakeholder and as part of a wider design process leading to improved design results. What sets the two approaches apart is that a critical artefact methodology put its emphasis on a ‘design-led’ process whereby the designer is observer, participant and instigator of the process, all at the same time:

The ‘social science’ approach implies a view that ‘better’ products are designed in response to an understanding of stakeholders’ existing needs. The ‘design-led’ approach extends this and recognizes that ‘better’ products might also be designed in response to stakeholders’ future or latent needs (Bowen 2009: 81)

This criticism of ethnographic methods is based on the notion that a social science approach, with a step-by-step process of accurate descriptions and analysis, may yield interesting accounts of existing conditions, but not necessarily of future ones. The data and analysis resulting from this work is made available as rich ‘implications’ for design (Dourish 2006), but does not bridge the gap between the present and the future.

To circumvent this stalemate Bowen instead proposes to substitute the linearity of the step-by-step approach by the introduction of (critical) artefacts through which to create synthetic social situation (for instance in a workshop setting) and provoke stakeholders to new insights.

While this approach undoubtedly holds great potential it also places the initiative exclusively on the designer as the one both participating in and observing the unfolding social situation and observer.

With regard to the focus on the intersection between design and anthropology taken in this paper, this approach does not leave much leeway for a reinsertion of ethnographic material in the unfolding design process. More over, it rejects the potential of a wider anthropological register of knowledge to inform the current as well the future situations, in favour of “designers’ visionary ability (...) to imagine (and

synthesise) solutions which stakeholders cannot (yet) recognise as relevant to their needs” (Bowen 2009: 31).

An underlying challenge encountered when attempting to bring together anthropology and design in novel ways is fundamentally related to different temporalities assigned to the two faculties, i.e. designers are preoccupied with the future, by ‘making existing situations into preferred ones’, to quote Herbert Simon, while anthropologists are studying the present in light of the past.

A crucial feat for design anthropology is to challenge this assumption, as it is eloquently done in the following excerpt from “Poor Theory - Notes towards a manifesto”<sup>10</sup>. I believe the description could apply aptly to design anthropology as well:

Poor theory is conditioned by reflexive imbrication with probable pasts and arguments with/about possible futures, and thus comes to see the present, too, as heterotemporal.

In summary, a number of provocative methods and concepts, as discussed in the previous sections, provide exemplars of ways to integrate ethnographical fieldwork and (to some extent) anthropological reflections as means of questioning that, which is taken for granted in a design process. This challenges a more traditional conception of ethnography in design as purely methodological, and only employed to substantiate ‘implications for design’ (Dourish 2006). By the same token designerly methods, such as the a critical artefact methodology, can be criticized for rejecting the analytical and interpretive potential anthropology has to offer in understanding the present as well as future social situations.

## CONCLUSION

In this paper I have suggested that critical artefacts, prototypes and other types of design provocations enable a mediation and reinsertion of ethnographic accounts and anthropological knowledge of a much broader scope into a design process. And furthermore, that critical design of this kind, deployed at different stages of the design process, would enable a transgression of the linearity by which ethnographical materials traditionally has been utilized as mere implications *for* design. As we have seen in the different strategies for making use of design provocations (Buur, et al.), ethnographic material, through which the provocations are staged, already incorporate layers of ethnographic analysis and ideology.

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<sup>10</sup> The notion of ‘Poor Theory’ is conceived as part of an ongoing research project at the “he Critical Theory Institute (CTI), University of California Irvine. It is difficult to give a concise definition of Poor Theory, as it is precisely the playful, open-ended and explorative nature of the ‘notes towards a manifesto’ to present a collection of , tentative descriptions, but avoiding a clear-cut definition.



What differentiates the discursive modes of critical engagement, principally distinguished as modes of projection and mapping, from the examples of provotypes and critical artefacts outlined above, can be conceptualized, respectively, as a slightly altered conception of the notions *outside-in* and *inside-out* proposed by Mazé and Redström (2007). Outside-in, is here understood as a position from where to raise questions and challenge inherent assumptions through critical design proposals, artefacts and scenarios.

Inside-out, by contrast, is a process firmly based in the midst of the continually unfolding encounters between design and anthropology and functioning as a mediator between the different practices, actors, knowledge regimes and realities involved in a design process.

As proposed with the notion of *heterotemporal*, an underlying concern with the further development of design anthropology is to elaborate a more profound understanding of the complex interweaving of temporalities at work when the disciplines mergers. With regards to the critical perspective taking in this paper, one can argue that a central outcome in this respect is the production of multiple and competing realities, that criss-crosses the boundaries between 'possible futures' and 'probable pasts' to make visible what is emerging in the present.

In short, the primary aim of this paper has been to seek out exemplars of the strategy her, provisionally labeled inside-out, that explicitly makes anthropological knowledge, i.e. theoretical apparatus, analytical methods, modes of critical interpretation and reflection, available for a collective dialog of the design process by means of various forms of critical design.

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# THREADS WITHOUT ENDS – A MOBILE SEWING CIRCLE

KRISTINA LINDSTRÖM  
SCHOOL OF ARTS AND COMMUNICATION  
MALMÖ UNIVERSITY  
KRISTINA.LINDSTROM@MAH.SE

ÅSA STÅHL  
SCHOOL OF ARTS AND COMMUNICATION  
MALMÖ UNIVERSITY  
ASA.STAHL@MAH.SE

## ABSTRACT

In this paper the exhibition *Threads – a Mobile Sewing Circle* is used as an example of a design that travels. To tell the story of how *Threads* travels we use the concepts of *immutable mobile* (Latour 1990) and *fluidity* (de Laet and Mol 2000) – concepts that invite us to think of standardisation and stability on one hand and changes and adaptability on the other. Since *Threads* is continuously assembled, disassembled and reassembled in different contexts and by different actors, we argue that *Threads* needs to be able to deal with changes and local conditions and cannot strive for stability in the sense of ‘no change’. On the contrary, *Threads* is dependent on local actors’ engagement, which partly is done through adding, replacing and altering parts and practices of *Threads* which also redraws its boundaries. We further argue that it is through what has been called *design-after-design* (Ehn 2008) that *Threads* can become entangled in the local setting and thereby matter. Through examples from *Threads* it is also shown that, what we call, a fluid designer role is helpful when making fluid designs travel.

## INTRODUCTION

*Threads – a Mobile Sewing Circle* is a travelling exhibition and workshop where participants are invited to gather for a day and to, among other things, embroider SMS, by hand and with an embroidery machine connected to a mobile phone. In this paper we will tell stories of *Threads* and how it travels. At each stop of this journey an assemblage of things, travelling in two boxes, offers the opportunity to become assembled into this *temporary assembly* (Lindström and Ståhl 2010) that we call *Threads*. In other words, this is a journey that includes not one piece of technology but various materials and technologies, as well as humans who engage in the process of assembling and thereby become part of the assembly.

The stories are situated within Science and Technology Studies (STS), which in various ways have dealt with the difficulties of moving or transferring technologies, as well as knowledge, from one site to another (see e.g. Law and Mol 2001). More specifically we will use the concept of *fluidity* proposed by de Laet and Mol (2000) in their article about the Zimbabwe Bush Pump. The Zimbabwe Bush Pump is a hand water pump, and might at first glance have little to do with *Threads*. We will however use the concept of *fluidity* since it offers a version of actorship, which allows us to move beyond a simple yes or no answer in relation to whether or not *Threads* succeeds or not on its journey. Compared with the *immutable mobile* (1990) proposed by Latour as a strong and stable configuration that is able to travel and at the same time keep its shape as a network (Law 2002), a fluid object or piece of technology is able to spread because of its adaptability – its ability to change and be adjusted to local circumstances. In other words, a fluid object is mobile and mutable.

*Fluidity* will here be seen in relation to the concept of *design-after-design* (Ehn 2008), which puts focus on the reconfiguration and reordering of things that goes on beyond and after *design-in-project* - when a design travels. This approach would then mean creating a “... larger space of possibilities for acts of defining use through use” (Redström 2008, p. 421) and thereby

blurring the division between designers and users.

Like any travelling technology, *Threads* faces several challenges on its journey. One is to make local actors engaged and caring in relation to *Threads* and to take part in the process of assembling. Compared with the Bush Pump that, among many other things, provides healthy water, *Threads* might not matter when it comes to survival. In this paper we will explore other ways of mattering.

*Threads* is a collaboration between Swedish Travelling Exhibitions, Malmö university, Vi Unga (a youth-led organization for leadership, democracy and entrepreneurship), the National Federation of Rural Community Centres, Studieförbundet Vuxenskolan (a national organisation arranging study circles).

#### THREADS – A MOBILE SEWING CIRCLE

Information and Communication Technologies (ICT) is becoming increasingly integrated and entangled in everyday communications, which implies that these technologies also matters to and concern more and more people. In parallel with this development we can see a new interest in traditional handicrafts that are being appropriated and brought into new contexts (Minahan and Wolfram Cox 2007).

*Threads – a Mobile Sewing Circle* is an exhibition, a workshop or more specifically a sewing circle in which participants are invited to gather for a day and to embroider SMS, by hand and with an embroidery machine connected to a mobile phone. This invitation, to engage with various materials, technologies, stories and practices, can also be seen as an invitation to share concerns, desires, and memories in relation to old and new as well as physical and digital means of communication. Put in a slightly different way, *Threads* is not designed to communicate a pre-set package of information in relation to everyday communication, but to engage the participants in its becoming. Usually the sewing circles are hosted by local actors in rural community centres or other semi-public spaces, and last between 10 am and 4 pm.



Figure 1: *Threads* in Järnboås, 2010.

In 2009 we, and the collaborating partners, conducted a pilot tour with *Threads* that visited three rural community centres in Sweden. Based on those experiences we have further developed *Threads*. Partly to make it more mobile – meaning being able to travel.

#### BECOMING THREADS

The process of further developing *Threads* has been one of negotiations and conversations on e-mails, meetings, workshops, phone calls, sketching, writing concept papers and contracts. Throughout this process various narratives of what *Threads* could or should be have been told and performed. Some of the main objectives have been to create a meeting place between and over generations. To inspire the participants' own creativity and to try new and old technologies as well as craft. To create space for reflection on five themes in relation to communication: ephemeral/long lasting, quick/slow, public/private, digital/physical and hand/machine.

As we are several collaborating partners there have also been more specific goals for each organisation such as recruiting new members as well as developing knowledge on how to design exhibitions that are based on participation and reaches beyond the big institutions.

All of the collaborating partners signed a contract stating that we will not arrange parallel exhibitions or events under the name *Threads*. All of us are however allowed to host gatherings in which we embroider SMS.

These conversations and negotiations can be described as a process of trying to find one storyline and thereby making the project more robust and stable as it sets out on its journey. Throughout the process of designing as well as travelling with *Threads* there has been an expressed desire from several of the collaborating partners to agree on *one* story – what *Threads* is. It is however still hard to find one master narrative, one main objective and one main outcome.

When it comes to making *Threads* travel we would however like to mention three additions or new part of *Threads*.

First of all we have designed two blue boxes, containing all the materials and technologies that are part of *Threads*. The boxes fit into a car and can thereby more easily be transported between the rural community centres.

Secondly, we have developed an educational sewing circle in which we hand over the role of being hosts to local actors. On the pilot tour we, and a representative from Swedish Travelling Exhibitions were the hosts. During the workshop the future hosts learn by doing and are given a manual, or what we call pattern, suggesting how to introduce *Threads*, how to handle time during the day as well as suggesting topics for conversations. After the educational sewing circle the two blue boxes are sent between community centres as well as other semi-public spaces in the region allowing the hosts to set up *Threads* in their local environment.

Thirdly, a website has been designed, partly to invite the participants to make self-documentation by uploading pictures of their embroidered SMS. The website is also a site for announcing when and where *Threads* will be assembled. One page of the site has a pattern for how to *do it yourself* aimed for those who cannot attend one of the official sewing circles hosted as part of *Threads*.

Before we move on to the issue of travelling technologies we will take a closer look at the technologies and materials that are travelling with *Threads* – the things that are fitted into the two blue boxes.

## TWO BLUE BOXES

The boxes contain threads and needles for hand embroidery. A mobile phone that can be connected to an embroidery machine, allowing the participants to forward a message to the phone and to have it embroidered by the machine. There are also five thematic file folders with textile pages to embroider traces of topical conversations on. Each file folder has a title with a pair of oppositions: ephemeral/long-lasting, quick/slow, public/private, digital/physical and hand/machine.



Figure 2: The two blue boxes.

To set the room there are several tablecloths to embroider on. Clotheslines are used to hang the embroidered messages on as well as other accompanying artworks chosen because of their relation to the theme of text and textile and clashes between old and new technologies and practices. There are also books and articles on the same themes.

During the day a smart phone can be used by the participants to upload images of their SMS-embroideries to the project website. The website can be accessed through a computer with wireless connection.

Separately most of these things are nothing out of the ordinary, they are off the shelves items and recognisable. It is the arrangement, combination and assembling of them that make it possible to focus on, contrast and align things that we are surrounded with in our everyday lives in novel ways.



Figure 3: Table set in Åsgarn.

## TRAVELLING TECHNOLOGIES

In this section we will look at two ways of understanding travelling technologies; the *immutable mobile* and *fluidity*.

The metaphor of the *immutable mobile* (Latour, 1990) describes networks that are able to travel and move without losing its shape. *Immutable mobile* is in that sense a metaphor that invites us to think about long distance control, which is possible as long as codes, information, soldiers, bankers, ships, scientific instruments, newspapers and money are able to keep their shape as stable network configurations as they travel around the world (Law and Singleton 2005). One example is how the new vessels and the new navigational technology developed in the 1400's were vital in for example how the Portuguese built up its colonial empire. Movement in this case is possible as long as the vessel keeps its shape as a network – as long as “the relations between it and its neighbouring entities” (Law 2002 p. 4) such as “Arab competitors, winds and currents, crew, stores, guns” (ibid) are kept in shape. In other words an *immutable mobile* refers to two different kinds of spatialities – network space and three-dimensional space – and it is the immutability in network space that makes movement in three-dimensional space possible (Law and Mol, 2001, p.4).

In an attempt to update the traditional notion of the actor in a network as well-bounded and with a stable identity, like in the case of the *immutable mobile*, de Laet and Mol tell a story of the Zimbabwe Bush Pump that has a “striking adaptability” (de Laet and Mol 2000, p. 226). The authors describe the Bush Pump as a hand water pump designed in Zimbabwe for villagers to maintain themselves. The reason for their attraction to the pump lays in its quality described as its *fluidity*.

At each village, in which the pump is assembled, it looks and works a little bit different from the next as some of its parts have been changed or altered and since the local conditions are different. “Good technologies, or so we submit after our encounter with the Bush Pump, may well be those which incorporate the

possibility of their own break-down, which have the flexibility to deploy alternative components, and which continue to work to some extent even if some bolt falls out or the user community changes” (2000, p.251). In comparison with the *immutable mobile* a fluid object like the Bush Pump is not able to spread and travel because it keeps its shape but because of its flexibility – its ability to change its shape and still work.

This does not mean that the Bush Pump is without boundaries or that it can be anything. As de Laet and Mol point out: it is not a bucket pump (p.237). What characterises “the mechanics of this fluid technology” is that its boundaries are vague and moving, rather than solid and sharp (de Laet and Mol 2000).

Throughout the text they show that the pump has several identities - a mechanical object, a hydraulic system, a device installed by the community, a health promoter and a nation-building apparatus - which all come with its own different boundaries. Whether or not the Bush Pump succeeds in its activities is not a binary matter since it is different for each of these identities. The Bush Pump “does all sorts of things”; it acts, despite the fact that it does not have clear-cut boundaries or a stable identity. In other words the Bush Pump, like other fluid entities, can be “fluid without losing their agency” (2000, p. 227).

As mentioned previously the *immutable mobile* is stable through keeping its shape and relations, which means that it cannot cope with missing parts or new actors to be included in the network. This idea of stability can however not handle or explain changes of the network, whereas the metaphor of *fluidity*, invites us to think of objects, technologies and perhaps also thoughts and knowledge that is able to move because of its ability to change.

We will now continue this exploration of fluidity and shift focus from designs into designers, from objects to subjects.

### ... AND THEIR (NON)INVENTORS

Like the Bush Pump in itself Morgan, who is the actor behind the pump, is also described by de Laet and Mol as fluid, as he refuses the position of the control-driven modern subject. He does not claim authorship and do not patent it, as he considers the Bush Pump to be a result of not one author or creator but “... a perfected version of a long-established and locally-developed technology that has always been part of, and belongs in, the public domain” (2000, p. 248). de Laet and Mol further suggest that perhaps it is precisely this kind of fluid non-modern subject that is needed to shape, reshape and implement a fluid object or piece of technology: “... non-modern subjects, willing to serve and observe, able to listen, not seeking control, but rather daring to give themselves over to circumstances” (2000, p. 253).

Law compares the modest role taken by Morgan with the position of Louis Pasteur and his laboratory. In late

19<sup>th</sup> Century France, products and procedures for saving cows from anthrax were accumulated in the laboratory of Louis Pasteur. “As a result the laboratory accumulated resources which further strengthened its pre-eminence” (Law 2002, p.100). Since its relations with other locations were fixed the institute became a ‘centre for accumulation’ (ibid). Morgan on the other hand is not seeking this control and there is no clear centre for accumulation. Law further argues that this does not mean that the Bush Pump is not a success. “But it is not a success that brings special rewards to one particular location. There is no strategic location where there is accumulation: there is no centre or periphery (Law 2002, p.101).”

de Laet and Mol describe Morgan as a fluid subject. A shift towards a more fluid designer role, although not expressed with these particular words, has been argued for and practiced by several designers and researchers. Within the tradition of participatory design there is a long history of engaging users in the design process and consequently the changes that the design might bring. These projects have usually been set in contexts such as work places (Ehn 1988) and organisations, in which the users and contexts of use have been more or less known. In other words, in contexts in which technologies or designs are not intended to travel far. It is however not uncommon that design has implications for others than the intended users and reaches beyond the intended design contexts (Ehn 2008).

When the user is not known and cannot be included in the design process Ehn argues for *design-after-design* which implies a shift from *design-in-project* to *design-in-use* (2008). In a similar manner Storni (2008) argues for an *increasingly delegated user*. He refers to design practices, such as *crowd sourcing*, *open sourcing* and *technological bricolage* in which the division between the designer and user to some extent are becoming obsolete. In a search for a new designer role that is adjusted to this new landscape he is arguing that designers need to make more profound delegations to the user. This would mean that designers should delegate design choices and design actions, instead of designing artefacts for use.

We argue that a shift towards *design-after-design* and an *increasingly delegated user* implies that there is no clear centre or periphery in the sense that there is no particular position from which all decisions can be made and there is not one particular actor that is in absolute control. This does not mean that there are no power relations or hierarchies. There will be centres, but they are most likely fluid in the sense that they are vague, moving, temporal and more than one.

### ASSEMBLING THREADS

When the things that are travelling with *Threads* are packed up in the two blue boxes they do little work. To paraphrase de Laet and Mol (2000): “If it is to work, it has to be assembled.” So, what does it mean to assemble *Threads*? What is required for *Threads* to work?



Before *Threads* travels to a region, the collaborating partners have meetings with the local community to introduce the project. This is one way of creating an emergent network of possible caretakers; fluid, unstable and yet vital in assuring that somebody has the competence to receive and be part of assembling *Threads*.

In addition to the things that are travelling in the two boxes the actors involved in assembling *Threads* are asked to contribute with several things. Prior to picking up the boxes, representatives from the rural community centres have received a document stating that they need to provide a place to host *Threads* in, tables, chairs, mobile phone reception and food for the participants. In the invitation, that can be found in the project website and on flyers, the participants of *Threads* are asked to bring fabrics as well as their mobile phone.

In this section we will give examples of how the local actors take part in assembling *Threads*. The examples are selected in order to show situations in which *Threads* could be said to stop working, or more specifically when some of the things that are part of *Threads* are missing or failing, as well as when new parts, partners and practices, beyond the invitation, are brought in and made part of *Threads*.

Our material is based on notes taken during participatory observations at sewing circles, the actions on the project's website, phone interviews as well as email conversations with participants and negotiations with the collaborating partners.

#### MISSING PARTS, PARTNERS AND PRACTICES

One of the things that the participants in *Threads* are asked to contribute with is to share and embroider an SMS. It is however not unusual that the participants do not have any text messages or even a mobile phone. In Järnboås Birgitta told us that she hardly had sent nor received SMS prior to hearing about *Threads*. To prepare, she sent a message to her son, daughter and husband saying: "Jag vill ha ett SMS före lördag" (I want an SMS before Saturday).

Her husband, who happened to be in the same room as her, was confused and asked her to explain her intentions. And so she did. He sent a message that said that she was the one, the best woman. She chose to embroider a shorter version. She suggested, that by only choosing a few of his words the message became stronger. She also stitched a heart and said that she would give it to him on their anniversary. This line of thought was also related to previous conversations where handwritten letters were compared to email and SMS. Handwritten letters and embroidery were suggested to share the slowness of production and distinct visibility of a hand as in style of handwriting.

The daughter's reply said: "Här kommer SMS:et före lördag" (Here's the SMS before Saturday). But while we were gathered in *Threads* the daughter sent yet another SMS saying: "SMS tycker jag är så opersonliga.

Kan vi inte ringa istället." (SMS are so impersonal. Can't we call each other and talk instead). Birgitta embroidered the second message with the machine. Later during the day the message was compared with another woman's message saying: "Vi kan ju börja med sms istället tycker jag." (I think we should start using SMS instead).

The messages that Birgitta embroidered were not selected out a long list of messages in her inbox, but sent to her because of the modest intervention done to prepare for participating in *Threads*. The messages became part of conversations in the sewing circle as well as between Birgitta and her family members.

In addition to the things that the participants bring and those that we have fitted into the blue boxes, *Threads* is dependent on local infrastructures such as access to electricity and mobile phone reception. During one sewing circle in Väskinde there was a power cut that altered *Threads* in the sense that there was no light, the embroidery machine no longer worked and stopped in the middle of the word *kärlek* (love). By using the mobile phones as a source of light the participants still managed to continue the sewing circle as they were able to embroider by hand. As a result of the power failure there were also a discussion on how dependent we are on electricity. A few days later several images, lit up by mobile phones, were posted on one of the websites connected to *Threads*.

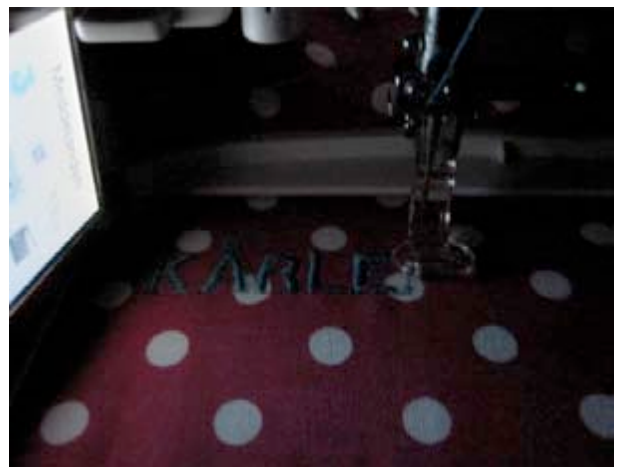


Figure 4: A power-failure in Väskinde 2010. Picture by Görel Robsarve from [www.facebook.com/mobilisyjunta](http://www.facebook.com/mobilisyjunta).

In another region, there were difficulties finding places that were willing to host *Threads*. To not have a fully booked schedule, missing places to host *Threads* in, surprised us as a positive aspect as we, by listening in on the opportunities at hand, found new avenues for *Threads*. A participating teacher of textiles, Maria, was talking about how there had been a debate in her school on whether mobile phones should be allowed or not. Together with a teacher in mathematics she had been talking about how they could make use of the mobile phones: regard it as an aid rather than a disturbing element. Since there was a gap in the tour schedule she

could bring the two boxes with her and incorporate it in her teaching for two weeks. At the end of the day, when we were lifting up the heavy blue boxes into the trunk of her car she said: I could never have dreamt that this would happen when I woke up this morning.

All of these examples show situations in which parts, partners and practices of *Threads* are missing. In the case of Birgitta she did not have any text messages in her inbox to share and embroider, which encouraged her to start sending messages to her close ones. When *Threads* did not have any locations for assembling, Maria made place for *Threads* at her work. In the case of the power failure some parts of *Threads* stopped working. Without electric power the machine simply does not work, and one could thereby argue that the machine in itself is not particularly fluid. On the other hand *Threads* did not completely stop working. With some help from the light in the mobile phones and hand embroidery *Threads* could continue.

#### ADDED PARTS, PARTNERS AND PRACTICES

As we have mentioned the hosts and participants of *Threads* are asked to contribute with things such as fabrics, SMS, tables and food each time *Threads* is assembled. In this section we will give examples of when parts, partners and practices beyond the invitation are added.

One such example is a woman in Väske who did not embroider SMS, but greetings to her friends and family on previously unused terry towels, and thereby created a queue to the embroidery machine. She was not actively taking part in discussions with the other participants but rather focused on the embroidery machine as if it was a production unit. At one point the host decided to let some of the newly arrived participants jump the queue. The woman with the terry towels did however have all of her greetings embroidered by the end of the day.



Figure 5: Collector's cards added by the host Susanne.

At Väske rural community centre Susanne was the host for the one week that *Threads* visited. As part of assembling she brought new non-human actors such as textile collector's cards and embroidered everyday use objects that she hung on the clotheslines. In the

beginning of the day she introduced *Threads* through the thing that she had brought herself. She was still addressing the themes that we had been stressing during the educational sewing circle and which could be found in the patterns. One such overt theme was communication. Susanne also picked up on a more implicit theme that is that in *Threads* nothing can be bought, just like the trading cards that she brought can never be bought, only exchanged.

In the same community centre one of the collaborating partners brought roll-ups, flyers for their organisation and a machine to make pins. All of these things were placed at one side of the room clearly separated from *Threads*, as a one-off thing. Compared to the things that Susanne brought these were not related to the themes of *Threads*. On a later occasion the messages on the flyers and roll-ups, aiming to recruit new members, were embroidered on clothes and were put onto the clotheslines physically in the space and digitally on the website. Later they were placed in one of the travelling boxes.

The two blue boxes are fitted very well to the amount and shape of material that *Threads* consisted of at the time of starting its travel. They are, however, not dimensioned to contain large chunks of added material. Therefore one host, for example, found a couple of plastic bags, standing next to the two blue boxes when she came to pick up *Threads*. She decided to treat the content of the plastic bags as less prioritised when assembling *Threads* in the community centre.

Some of the added parts stay only for a short while, whereas some stay to travel to the next place. There are embroideries on the tablecloth and in the file folders with textile pages that can be described as some kind of accumulation of stories. In addition to the accumulation of stories that travels with the boxes, there is also accumulation on the website where the participants upload images of their embroideries.

Kajsa, another participant in Järnboås, waved goodbye at the end of the day and said that she appreciated being part of something bigger. Her participation was enhanced by knowing that *Threads* already had been somewhere, and will continue touring. The connection was made by the traces left by other participants and the notion of knowing that what you yourself leave will meet others.

Of the added parts, partners and practices some have been done with an effort to adjust themselves to what they understood as *Threads*, whereas others such as the roll-up, the terry towels and the embroidered member-recruitment have challenged *Threads* and its boundaries.

#### DISCUSSION: THREADS WITHOUT ENDS?

In this paper we have shown how the collaborating partners were striving for stability through finding one strong narrative, which resembles the concept of *immutable mobiles*, although not expressed in those words. However, in writing what you have just read and



in living with *Threads* on tour, we suggest that *Threads* is better understood through multiple stories – as a fluid assembly with vague and moving boundaries.

Most of the things that are part of *Threads* are nothing out of the ordinary. They are off the shelf items and are also used by several of the participants outside of their engagement in *Threads*. One way of framing the many parts of *Threads* is that they are designs, materials and technologies that have travelled far from their intended context of use to become assembled into *Threads*.

The design of *Threads* can in that sense be described as a *design-after-design* – a reordering of things beyond and after *design-in-project*. This process of reordering, or so we argue, continues as *Threads* embarks on its journey and becomes assembled in different context and by different actors.

This continuous relational reordering of things is partly designed into *Threads* since the actors involved in its becoming are asked to add parts and practices - to contribute with a space to host *Threads* in, tables to gather around and text messages to share and embroider. This reordering of things is also done through adding, replacing and altering parts and practices beyond the invitation of *Threads* and thereby challenging the boundaries of *Threads*.

The challenge for the designer in the context of making a fluid design travel, allowing for *design-after-design*, is how to perform a more fluid designer role and not seek absolute control. In *Threads* this means to create an emerging network, which has the readiness to take on, assemble and perhaps also adjust *Threads* to local circumstances and desires. For us and the other collaborating partners this means to listen and to be attentive. It also means to tell and allow for multiple stories of what *Threads* can be and mean. Some of these stories are told by representatives from the collaborating partners prior to assembling, by us during the educational sewing circle, through the things that we have put into the boxes and by other participants for example on the project website.

The fluid process can at times be frustrating and stressful since it involves uncertainty. *Threads* is dependent on various parts and practices to be added by the participants, and it is not uncommon that parts are missing, such as a place to host *Threads* in, mobile phone reception as well as text messages to embroider.

As the designers of *Threads* we still argue that the fluid character is most of all a good thing, in our case. We argue that *Threads* is able to travel not despite of its vague and moving boundaries but because of its ability to be assembled in different ways and thereby become entangled and part of the local context. This is also how *Threads* becomes to matter in the everyday life of the local actors. To elaborate on this argument we would like to pose the questions: Where does *Threads* end? And, where can the boundaries of *Threads* be drawn?

There are many possible ways to answer these questions. One way to do so would be to refer to the schedule posted on the project website which says that *Threads* begins at 10 am and finishes by 4 pm on specific dates, which means that *Threads* only exists when there is an announced gathering and only for that limited time. Another way of answering would be to suggest that it has to do with the physical space that we are in: the room in which *Threads* is assembled. Yet another possible answer would be to argue that *Threads* is made up of the things that are fitted into the two blue boxes and the participants who have signed the attendance list. If we, for example, turn to the contract with the Swedish Travelling Exhibitions which all the collaborating partners signed, the answer from a legal perspective might be that it has to do with the name: *Threads - a mobile sewing circle*.

But if we take a look at the stories of how *Threads* travel, how it is assembled and disassembled, we can tell a richer story than the just proposed boundaries.

When Birgitta received the invitation she did not have any text messages in her phone. To prepare herself she decided to send text messages to her family asking for a message before Saturday. This modest intervention did in turn generate not only new messages to embroider during the sewing circle but also conversations in relation to everyday communication with her family members, who did not take part in *Threads* when it was assembled in the local rural community centre between 10 am and 4 pm. Time, space of *Threads* is more fluid than the formalities of schedule tells us. And the human actors of *Threads* are more fluid than the attendance list says.

In other cases new things, that are not travelling in the two boxes, are brought in and made part of *Threads*. One such example is the textile collector's cards brought by Susanne that she used in her introduction. Yet another is the roll-ups and flyers brought by one of the collaborating partners as well as the plastic bags next to the blue boxes that one of the new hosts had to deal with. In other words, *Threads* does not end with the things in the blue boxes, even though some of these added parts are only temporary and will not travel with *Threads* to the next place.

de Laet and Mol quotes Morgan who notes; “the designer knows when he has reached perfection, not when there is no longer anything to add, but when there is no longer anything to take away” (2000, p.236). In contrast, we would not claim that *Threads* would ever reach perfection or that there are no more things to be added or to be taken away. *Threads* consist of many parts. As seen in the above-mentioned examples new parts are added by the participants. In other cases some are missing. In Väske *Threads* was missing electricity and the embroidery machine stopped working. Such a break down does not necessarily mean that *Threads* stops working or ends. The participants were still embroidering text messages. In other cases the

missing parts are replaced or altered by the participants. When *Threads* did not have a place to be assembled in, Maria brought the two blue boxes to her school – adding the part that was missing.

It is hard to say if there are one or several parts that are more important than others. If there is such a thing as one essential part of *Threads* that cannot be missing, changed or altered. That is however not the point of this paper.

What we suggest is that through the process of adding, altering and changing parts and practices *Threads* become more closely entangled in the participants' everyday lives. The boundaries of *Threads* that could be described in terms of time, place, the content of the blue boxes, and the participants who have signed the attendance list seems to be more vague and moving than that. We argue that it is precisely through the entanglement in the local setting *Threads* becomes mattering. Sometimes this mattering is in line with the articulated goals of the collaborating partner and at other times it is not. But since there is no self-evident centre, no full control, neither a position in which all decisions can be made it becomes difficult for any storyline to completely overwrite the other storylines.

The concept of fluidity does not in particular help us talk about or deal with the contradictory storylines of *Threads*. It allows us to tell multiple storylines but not stories of tensions and contradictions. In the future we will consider other metaphors or ways of telling stories that might be better suited for that, such as flickering fire.

In the end of 2010 we received an email from the person in charge of textile courses at a branch of study circles, saying that they will offer a course on SMS-embroidery as a study circle during the spring semester. She had among other things read the Do-it-yourself-invitation on the project website on how to host your own sewing circle. She was asking us if they could use a picture from the website to promote their course *SMS-embroidery*. She was not asking for the things in the blue boxes. As pointed out earlier, most of the things that we have fitted into the boxes, are nothing out of the ordinary and most of them can be bought or even found in your home. One could thereby argue that *Threads* is able to spread and travel, not only in the two blue boxes that we have designed, but also through stories told of *Threads*. Most likely there are few people who will develop an embroidery machine that you can connect to a mobile phone or design a website the way we have

done. But what the example with the SMS-embroidery-study-circle shows is that at least parts of *Threads* can travel and spread beyond the two blue boxes and under alternative names.

*Threads* is without ends, it seems.

## ACKNOWLEDGEMENT

Thanks to everybody who made *Threads* possible and Pelle Ehn and Inger Lindstedt for feedback on this paper.

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# THE DISRUPTIVE AESTHETICS OF DESIGN ACTIVISM: ENACTING DESIGN BETWEEN ART AND POLITICS

THOMAS MARKUSSEN  
DEPARTMENT OF DESIGN  
AARHUS SCHOOL OF ARCHITECTURE  
THOMAS.MARKUSSEN@AARCH.DK

## ABSTRACT

The aim of this paper is above all to construct a new conceptual framework for understanding how and why design activism in public space matters. The paper sets off by providing a literature review of some of the existing theoretical frameworks in design research for understanding design activism. In so doing, I will identify a theoretical ‘blind spot’ in the research literature, which has blocked our view of how design activism functions as an aesthetic practice and not only a socio-political one. To remedy this shortcoming, I then introduce some notions from Rancière (2004; 2010) that enable design research to better explain the close interrelationship between aesthetics and the political in design activism. This will be further demonstrated through a series of case examples from current urban design activism. On the basis of this, I finally offer a more meaningful framework for the practice and study of urban design activism.

## INTRODUCTION

Design activism has become a topic of growing interest and research through out the past decade or so (see e.g. Borasi & Zardini, 2008; DiSalvo, 2010; Fuad-Luke, 2009; Markussen; Mogel & Bhagat, 2008; Thorpe, 2008). Generally, design activism is defined as

representing the idea of design playing a central role in (i) promoting social change, in (ii) raising awareness about values and beliefs (climate change, sustainability, etc.) or in (iii) questioning the constraints of mass production and consumerism on people’s everyday life (see e.g. <http://designactivism.net/>). Design activism, in this context, is not restricted to a single discipline, but range from product design, interaction design, new media, urban design, architecture, fashion and textiles, and so on (see e.g. Fuad-Luke, 2009).

However, what appears to be lacking in the current understanding of design activism is a firmer theoretical hold on how and why design activism matters? How does design activism work? What is the impact of design activism on people’s everyday life and what makes it different from its closely related ‘sister arts’ – political activism and art activism? In this paper these research questions will be investigated as to how they pertain to design activism in the public sphere and urban environment.

Obviously, the term ‘activism’ is meant to emphasize design activism’s kinship with political activism and anti-movements of various sorts: anti-capitalist, anti-global, and so forth. This has led some authors to assume that the activist nature of design activism can be properly understood in terms of concepts and ideas borrowed from either sociology (Thorpe 2008) or political theory (DiSalvo 2010). But even though design activism may share many characteristics with political activism, it should not be modelled one-sidedly on the basis of these external theories. Sociology and political theory has no doubt a fine-grained vocabulary enabling us to shed light on ‘democracy’, ‘public space’, ‘participation’ and other themes explored by design activists, but it has no language for expressing what is truly unique and singular to the *design* act. The design act is not a boycott, strike, protest, demonstration, or some other political act, but lends its power of resistance from being precisely a *designerly* way of

intervening into people's lives. This is a subject matter for design research.

By the same token, design activism has been interpreted in light of practices invented by certain art movements such as the avant-garde, 'social interventionism' and 'community art'. For instance, it has been pointed out that the subversive techniques used in contemporary urban design activism draw more or less deliberately upon practices of art production that were introduced by the Situationists in the 1960s (Holmes, 2007). However, in order to get a better understanding of what is peculiar about design activism, we need to shift the focus of attention from this art historian genealogy toward the design act itself. The techniques used by urban design activists may be similar to those of the avant-garde, but the effects achieved by exploiting them in a *designerly* way are different. These effects cannot be properly understood, for instance, according to the original avant-garde project of re-defining or broadening the boundaries of art. Nor should they be interpreted according to the grandiose social utopias or revolutionary hopes so dear to the avant-garde. Nonetheless, it is precisely in the intimate interweaving between aesthetics and the political that an interesting answer to the activist nature of design activism is to be found.

The aim of this paper is above all to construct a new conceptual framework for understanding what I shall call the 'disruptive aesthetics' of design activism as it is found in the public sphere. The notion of disruptive aesthetics embraces two key aspects of design activism. On the one hand, design activism has a political potential to disrupt or subvert existing systems of power and authority, thereby raising critical awareness of ways of living, working and consuming. On the other hand, design activism shares an aesthetic potential with art activism in its ability to open up the relation between people's behaviour and emotions, between what they do and what they feel about this doing. In creating this opening, design activism makes the relationship between people's doing and feelings malleable for re-negotiations. Understanding how the micro-political and aesthetic aspects come together in design activism (as compared to political activism and art activism) defines the crux of the problem.

The paper sets off by providing a brief literature review of some of the existing theoretical frameworks in design research for understanding design activism. In so doing, I will identify a theoretical 'blind spot' in the research literature, which has blocked our view of how design activism functions as an aesthetic practice and not only a socio-political one. To remedy this shortcoming, I then introduce some notions from Rancière (2004; 2010) that enable design research to better explain the close interrelationship between aesthetics and the political in design activism. This will be further demonstrated through a series of case examples from current urban design activism. On the basis of this, I then finally offer a new framework, which differs from

existing frameworks in that it offers more meaningful concepts for the practice and study of urban design activism.

## FRAMEWORKS OF DESIGN ACTIVISM IN DESIGN RESEARCH

Thorpe (2008) argues that "[d]esign lacks a good conceptual framework for activism, but fortunately sociology has one to offer, a typology of activism." She then uses this typology to systematise a large number of design activist cases into a limited set of design act categories. Design activism may thus manifest itself in the form of (i) a *demonstration* artefact that reveals positive alternatives that are superior to the status quo; (ii) an *act of communication*, in the sense of making information visual, devising rating systems, creating maps and symbols, etc.; (iii) *conventional actions* proposing legislation, writing polemics, testifying at political meetings, etc.; (iv) a *service* artefact intending to provide humanitarian aid or for a needy group or population; (v) *events* such as conferences, talks, installations or exhibitions; and (vi) a *protest artefact*, which deliberately confronts in order to raise reflection on the morality of status quo.

As always, such typologies and categories should be evaluated according to their ability to describe and provide new insight into the subject matter under scrutiny. In this regard, I will argue along with Fuad-Luke (2009: 81) that Thorpe's framework is insufficient. First, by using action concepts from sociology as her preferred conceptual tools, Thorpe put emphasis on what design activism has in common with social practices, but very little is revealed about the central elements of the practice of urban design activism itself: its techniques, design activist methods, the intended end users, etc.

Secondly, the concepts in Thorpe's framework seems to be too vague and general to actually enable us to make conceptual distinctions for understanding types of design activism. Often, when applying it to design activist projects, one ends up describing them in terms of conceptual hybrids such as protest-demonstration-service artefacts. For instance, the Recetas Urbanas project by Santiago Cirugeda, which I will provide a more detailed analysis of below, falls in-between all three categories. Surely, anomalies are most welcome in theory construction, because they can help us to locate inconsistencies in a theory that calls for repair. But if design activist projects tend to fall in between the categories as a rule rather than the exception, then these categories are analytically too imprecise and the framework should therefore be modified substantially so that it become more sensitive to the particular nature of design activism.

Third, sociological action concepts reveal little about the intended reach of design activism and most importantly its *effects* in terms of eliciting social and behavioural change. Interestingly, Fuad-Luke (2009)

points towards *disruption* being a central notion for understanding the effect of design activism: “Forms of activism are also an attempt to disrupt existing paradigms of shared meaning, values and purpose to replace them with new ones.” (Fuad-Luke, 2009, p. 10) Furthermore, he couples the notion of disruption with aesthetics when, in the end of his book, he argues that design activism calls for a revised notion of beauty: “we need new visions of beauty—we could call this beauty, ‘beautiful strangeness’, a beauty that is not quite familiar, tinged with newness, ambiguity and intrigue, which appeals to our innate sense of curiosity.” In bringing the notion of ‘beautiful strangeness’ into the discussion, Fuad-Luke draws attention to aesthetics being a central discipline for explaining how activist design artefacts promote social change through their aesthetic effect on people’s senses, perception, emotions, and interpretation.

Unfortunately, however, in his otherwise detailed introduction of various frameworks Fuad-Luke does not go further into a discussion of how the relation between disruption and aesthetics could be valuable for understanding design activism. Instead, his main argument seems to be that design activism should be analysed according to the issues and problems in the world that it addresses. For this purpose he proposes the so-called Five Capitals Framework “as a means of examining where activism aims to exert an effect on different capitals”: Natural Capital (concern for environmental resources, recycling, eco-design, sustainable solutions, and so on); Human Capital (e.g. concern for all human needs and skills); Social Capital (concern for strengthening relations between social networks in order to increase civic engagement, communal health, social inclusion, etc.); Financial Capital (e.g. alternative banking and micro-loans); and Manufactured Capital which is man-made artefacts that enable and improve production (e.g. architecture, infrastructure, and technologies).

While the Five Capitals Framework certainly helps to understand the many *problem spaces* of design activism and also the ideological agendas that design activists share, for instance, with environmentalists and non-profit organizations, it leaves the question of how design activism works on its own conditions unanswered. Admittedly, Fuad-Luke’s book offers a rich toolbox of techniques and methods for how design can engage people through participatory means or co-design, but neither of these is tied up specifically to design activism. Rather they are in widespread use in almost every area of design. What is even more critical is that none of the frameworks examined so far has anything to say about how urban design activism uses the sensuous material of the city as well as explores the particular elements of urban experience.

Alternatively, in order to fathom these conditions, I shall argue that design research is in need of a new framework based upon the notion of design activism as a *disruptive aesthetic practice*. By introducing this

notion I wish to increase knowledge in particular of the effects evoked by urban design activism. This is the only way in which it is possible to understand how design activism promote social change by addressing the urban experience itself.

Most recently, some insights into these effects have been laid out by DiSalvo (2010), who has studied some projects falling under the rubric of ‘design for democracy’. DiSalvo suggests drawing upon political theory as a conceptual resource for developing a more sensitive understanding of design activism. Notably, he argues that the distinction between ‘politics’ and ‘the political’ would be beneficial for the practice and study of design activism.

In political theory (see e.g. Laclau & Mouffe, 2001; Mouffe, 1998), ‘politics’ refers to the means and structures, which enable a state, region or city to govern. Among such structures one could think of laws, procedures of decision-making, systems of election, legislation, public regulations of people’s behaviour in the urban environment, etc. In contrast, the ‘political’ is a condition of society, of ongoing opposition and contest (DiSalvo 2010: 2-3). The political can be experienced through acts of interruption, disturbance or resistance in public space that either reveals or confronts existing power relations and systems of authority.

Following from this DiSalvo then proposes to make a distinction in design research between Design for Politics and Political Design. Design for Politics is when the purpose of design is to support and improve the procedures and mechanisms of governance. An example of this would be designers working on improving the graphic design of ballots for presidential elections in the US to prevent uncertainties about cast votes as it happened in the 2000 presidential election between Al Gore and George W. Bush.

Political Design is when the object and processes of design activism is used to create ‘spaces of contest’. For DiSalvo a paramount example of this can be found in the *Million Dollar Blocks* project. By using mapping techniques and diagramming this project creates spatial representations showing the residences of prison inmates throughout four US cities (see Fig. 1). Usually, crime analyses are based on data about where crime events occur, but here the idea was instead to start from data representing where the prison population live. In so doing the project makes striking patterns visible, namely a set of city street blocks where the government is spending more than \$1.000.000 annually to incarcerate residents of those blocks.

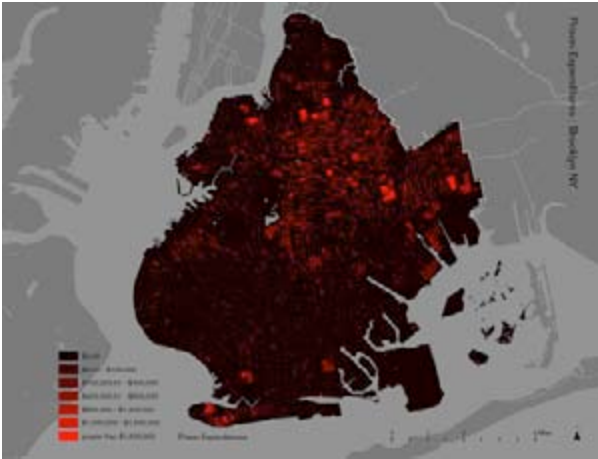


Figure 1: The Million Dollar Blocks project

The reason why the project qualifies as Political Design is because the objects and processes of the design (maps and diagramming) at one and the same time *reveal* and *contest* existing configurations and conditions of society and urban space. What are revealed are the understandings and information most often left out of standard analyses of crime occurring in the city. What is contested can be seen in the way in which the “maps effect an ongoing series of contests and dissensus concerning the relationship between crime, the built environment and policy.” With this notion of revealing and contest, DiSalvo (2010: 5) suggest that we begin to consider political design as a “kind of inquiry into the political condition.”

I find DiSalvo’s notion of Political Design particularly relevant because – in contrast to Thorpe’s and Fuad-Luke’s frameworks – it allows us to study the effects evoked by practices of urban design activism. Notably, these effects consist in *revelation, contest and dissensus*.

The only problem with DiSalvo’s approach is that he treats urban design activism merely in its relation to *political* conditions, that is, as a contest to those in power and authorities, while he does not say anything about how activist artefacts may also enter directly into the realm of real-life human actions. The *Million Dollar Blocks* project contest government, decision-makers and urban planners, whereas the citizens of the street blocks themselves are left largely uninfluenced. By focusing too narrowly on the political, DiSalvo thus neglect a crucial element of urban design activism.

Urban design activism is about introducing heterogeneous material objects and artefacts into the urban field of perception. In their direct intervention into urban space they invite active engagement, interaction or simply offer new ways of inhabiting urban space. In so doing, design activism alters the conditions for the urban experience.

Insofar as these objects and artefacts set new conditions for people’s urban experiences and actions in daily life, design activism should be seen as having an *aesthetic*

dimension along with its political dimension. Aesthetics here is taken in its broad Kantian sense as pertaining to the fundamental forms of our everyday experience. Not so that these forms are *a priori* or universal, as Kant would have it. On the contrary, they are the result of ongoing social construction and negotiations of urban space (cf. Marchart, 1998).

The remainder of this paper will be dedicated to the unravelling of this aesthetic dimension of urban design activism, since no framework to my knowledge has uncovered this aspect. First, I will introduce the notion of disruptive aesthetics as it is found in the work of the French Philosopher Jacques Rancière. Secondly, I will use this notion as a backdrop for a case analysis of the disruptive aesthetic of urban design activism, mainly focusing on some of the basic categories of urban experience: *walking, dwelling, playing, gardening and re-cycling* (cf. Borasi, 2008, p. 21). On the basis of this treatment, I will propose a new framework for urban design activism that replaces sociological action concepts with action concepts grounded in the urban experience. Each of these concepts will be illustrated through case examples along the way in order to make the framework operational for the practice of design activism.

#### DESIGN ACTIVISM BETWEEN AESTHETICS AND THE POLITICAL

According to Rancière (2004; 2010) the notion of aesthetic activity should be extended so as to include much more than fine art production (paintings, poetry, sculpture and theatre). Generally, aesthetic activity concerns a distribution of the sensible, i.e. a “distribution of space, times and forms of activity that determines the very manner in which something in common lends itself to participation and in what way various individuals have a part in this distribution” (Rancière, 2004, p 12).

Clearly, urban design activism could be described as a distributing of urban space and time and constructing alternative ways for individuals to participate and take part in a ‘common’ public environment. Yet, we need to be more precise than that.

For Rancière, what characterises the aesthetic act in particular, is that it introduces new heterogeneous subjects and objects into the social field of perception. In so doing, the aesthetic act effects people’s experience in a certain way: it reorients perceptual space, thereby disrupting socio-culturally entrenched forms of belonging and inhabiting the everyday world (cf. Corcoran, p. 2).

It is Rancière’s philosophical thoughts on the disruptive nature of the aesthetic act that in my view contains a significant, and hitherto unexplored contribution to the theorization of design activism. Often, disruption is used interchangeably in Rancière with the notion of ‘dissensus’. Indeed, the aesthetic act is said to be



enacted according to a 'logic of dissensus' (Corcoran, *ibid.*). Now, what does that mean?

Dissensus must be understood in contrast to consensus. Consensus concerns what is considered in a society to be a normal count of the social order. It prescribes what is proper and improper, and defines hierarchical systems where individuals are inscribed into certain roles and places. It is the idea that everyone's doing and speech are determined in terms of their proper place in this system and their activity in terms of its proper function. For instance, it is deemed improper if a citizen starts to use the urban landscape as his own garden sowing seeds of his favourite plants and vegetables in ditches, as guerrilla gardener Richard Reynolds started to do years ago. In this way consensus could be said not only to delimit people's doing; it also entails a common *feeling* of what is right and wrong. Hence, consensus could be said, as Rancière does, to consist in the matching of a way of *doing* and a horizon of *affects*.

Dissensus, on the other hand, consists in an egalitarian suspension of the normal count of the social order – of consensus. It is about the demonstration of a certain impropriety, which disrupts consensus and reveals a gap between what people do and how they feel about and is affected by this doing. In creating this opening the disruptive aesthetic act makes the match between doing and affect sensitive to renewed negotiations. Hence, new forms of belonging and inhabiting the everyday world may ensue and new identities – whether individual or social – may emerge.

Insofar Rancière sees dissensus as being an effect of aesthetic activity and not only political practice, his notion of dissensus has more explanatory power than the notion of the political that underlies DiSalvo's idea of Political Design. Indeed, Rancière offers several characteristics that allow us to distinguish aesthetic dissensus from political dissensus.

Political dissensus is usually conceived as having to do with one group superadded to another, the people against the State, friend against enemy, left and right, or other burning pairs of oppositions that characterises ideological propaganda in all its manifestations (cf. Thrift, 2007). Taken in this sense the political dissensus manifests itself as a struggle between two or more groups that as its goal has a reordering of the relation of power between the existing groups.

In contrast to this dichotomous notion of political dissensus, aesthetic dissensus is not about an institutional overturning or overtaking of power. The ultimate goal is not the realisation of grandiose social utopias through violent acts, riots or revolution, but a non-violent unsettling of the self-evidence with which existing systems of power control and restrict the unfolding of our everyday behaviour and interaction. The disruptive character of the aesthetic dissensus lies in the subtle way in which it cuts across hierarchies between practices and discourses working to establish zones where processes of subjectivation are momentary

free to take place. The aesthetic act may of course deal with political issues, but it treats "stakes of politics as a form of experience" (Rancière, 2004, p. 13), and not as an open-ended set of practices driven primarily by a contest of power and authorities.

#### WALKING

These are key insights for understanding how urban design activism matters. Let me try to illustrate this in relation to the first of the five urban act categories of my framework: *walking*. Consider, for instance, the iSee project by the Institute for Applied Autonomy. In our cities today, surveillance technology networks are increasingly being connected to remote monitoring services that stream CCTV data across the city into control rooms operated by local authorities and private security companies. This increasing surveillance is taking place without public debate or transparency concerning decisions about what areas of the urban environment needs surveillance systems. For instance, if the argument for the presence of CCTV cameras is to prevent crime, then it would be natural to set them up in low-income neighbourhoods and not only in the financial and high-income districts of the city. However, this is not the case.

The iSee project is an inverse surveillance system that enables people living in the city to track and avoid CCTV cameras. By visiting the iSee website you get a map providing an overview of the existing surveillance infrastructure in cities like New York, Amsterdam and Ljubljana (Fig. 2).

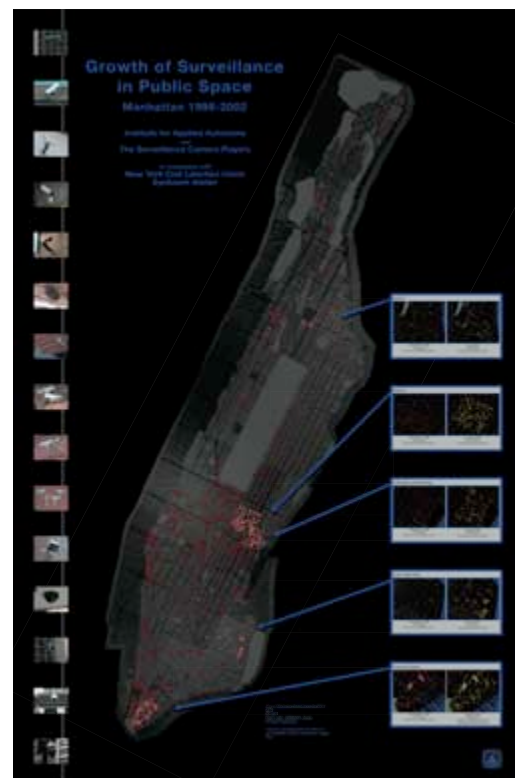


Figure 2: *iSee*-map showing Manhattan's surveillance infrastructure



In this way, the iSee project reveals how CCTV cameras permeates the urban environment, but it does something more. Additionally, it gives people the opportunity to create their own routes, so-called *paths of least surveillance* “allowing them to walk around their cities without fear of being ‘caught on tape’ by unregulated security monitors.” (Fig. 3; <http://www.appliedautonomy.com/isee.html>)



Figure 3: *Paths of least surveillance*

iSee illustrates how design activism as an aesthetic practice has the ability to open a gap between people’s doing and affect. By revealing and contesting the existing surveillance infrastructure, iSee makes citizens aware of how local law enforcement and private industry always keeps a watchful eye of each of their actions and doings in urban space. But – in contrast to the *Million Dollar Blocks* project – iSee invites the citizens themselves to react against and change these conditions. Simply by using iSee to construct new conditions that elicit more positive feelings about walking in the streets. In this sense, people’s doings and their affects about this doing are matched in a new and unforeseen way. So much said about the category of walking, but what about *dwelling*?

#### DWELLING

Municipalities all over the world place many restrictions on people’s possibility for dwelling. Especially in densely packed cities where getting a permission, for instance, to add an extra room or a terrace to your house involves a lengthy bureaucratic process, which more often than not ends up with a rejection. Sometimes aesthetic ideals are called upon in order to legitimate the delimiting of house owner’s wishes and creativity. For instance, people can be informed that adding a room to their house would perhaps disturb the homogeneity and visual consistency of the street façade.

However, in a series of projects gathered under the overall title of *Recetas Urbanas* (Urban Prescriptions), Santiago Cirugeda shows how citizens can get some of their dwelling wishes fulfilled without breaking the law. Municipalities are typically sworn enemies of graffiti and so if you ask the authorities for a permit to build a scaffold in order to remove graffiti from your house you are likely to be granted that permission, perhaps for a couple of month or so. In his *Scaffolding*-project, Cirugeda then uses such scaffolds as opportunities for

adding an extra room to buildings where enlarging is usually prohibited (Fig. 4).



Figure 4: *The Scaffolding Housing project*

The *Scaffolding*-project illustrates how design activism function as an aesthetic practice in the sense given by Rancière. Hence, the scaffolds represent a way of “doing and making that intervene in the general distribution of ways of doing and making” (Rancière, 2004, p. 13). The “general distribution of ways of doing” is the standard procedures and practice for enlarging houses sanctioned by the authorities. What the *Scaffolding*-project does is not so much a contesting of these politically determined procedures and conditions. Rather, it exploits these political conditions by turning them into new enabling conditions for unintended urban actions. By giving people the opportunity to build an extra room to their house their felt sense of belonging to the place is most likely to increase – or at least change. This is what is meant by the idea that design activism has the potential to re-negotiate the relationship between people’s doing (here: dwelling) and their feelings about this doing.

#### PLAYING

In most cities urban planning legislation destines the citizen to behave according to certain rules and regulations in the sense that it only allows people to experience certain things, but not others. Yet, the consequences of legislative power are far from being transparent and often they do not seem at all to reflect the interests of those living in the city. Citizens are typically not allowed to plant a tree at the corner of their street or to construct a seesaw in front of the local café for their kids to have fun while they are drinking a cup of coffee even though the owner of the café and a majority in your community think that this is a good idea.

In the project "Taking the street" (Fig. 5), Santiago Cirugeda turns local legislation into urban recipes instructing citizens, living in a district in Seville, in how they can order and transform dumpsters into playful installations or other kinds of installations of their own desire thereby enabling them to take active part in the planning and shaping of their neighbourhood (<http://www.recetasurbanas.net/index.php?idioma=ESP&REF=1&ID=0002>). If only on a temporary basis this project reveals how urban design activism may function as acts of resistance that can be used to suspend existing structures of power and bureaucracy in order to make unheard voices and hidden energies resound through the urban landscape.



Figure 5: Taking the Street by Santiago Cirugeda

#### GARDENING AND RE-CYCLING

Rancière's notion of aesthetic dissensus is useful for understanding the subtle tactics with which gardening can be exploited in a designerly way for the purpose of constructing disruptive interventions. According to Rancière, aesthetic dissensus is not an effect resulting from acts striving for institutional overturning or overtaking of power. Rather it follows from non-violent acts that unsettle the self-evidence with which existing systems of power control and dominate certain groups in our society. This unsettling of power may create spaces enabling new processes of community and identity making. It is important once again to underline that the act resulting in dissensus is inherently political and aesthetic.

The usefulness of these ideas can be demonstrated by analysing a recent project made by the Atelier d'architecture autogérée (aaa). In La Chapelle area, in

the northern suburban parts of Paris, aaa used gardening as a tactic for intervening in the area's wasteland and left over spaces. La Chapelle area is haunted by a number of social problems such as drug addiction, unemployment as well as the lack of cultural infrastructure. Typically, such problems do not attract finance and the attention of developers. However, aaa invited the local residents of La Chapelle to participate the design and building of Ecobox (Fig. 6).



Figure 6: Ecobox by aaa in La Chapelle, Paris

Ecobox consists of a series of gardens made from recycled materials as well as mobile furniture for meetings, gathering, cooking, playing, and other forms of social interaction. In addition a wall was built around the Ecobox, which had a series of peepholes determining the viewing conditions for people watching and gazing in from the outside. In the form of this wall, the Ecobox contest the dominating visual regimes in public space thereby suggesting a reordering of the relation of power between existing groups in society. The local residents of La Chapelle were used to be the ones looked at by the police or surveillance cameras, and many of them are denied the right to express themselves, as they are considered illegal immigrants. However, the Ecobox turns this power of relation on its head by giving the residents the control of the public gaze. This is not only an act of political design, but also an act of aesthetic practice as it changes the conditions for urban experience and provides means of expression for an otherwise overlooked social group.

#### A NEW FRAMEWORK FOR DESIGN ACTIVISM

On the basis of this I wish to propose the following

diagram representing a new framework for the practice and study of urban design activism.

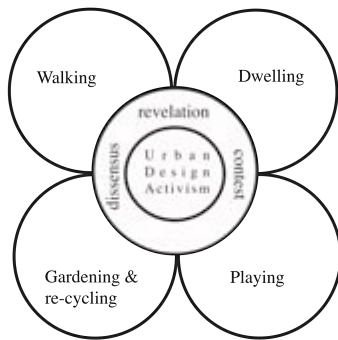


Figure 7: Framework for urban design activism

Needless to say, this framework should not be considered exhaustive, as many more categories of urban experience need to be added. Moreover, what the framework does not include either is a mapping of the techniques used in urban design activism. Among the techniques involved in the project examined in this paper, one could for instance think of *tactical cartography* as in the iSee-project, or *hacking of urban regulation* as in the Recetas Urbanas project by Santiago Cirugeda. There are a multitude of such techniques. Some of them are included in the other frameworks examined in this paper; some of them are not. The reason why I have not included techniques in the framework is that it is not the technique in itself that defines design activism. It is the effect it is capable of evoking in the user. Consequently, I have decided to include these effects in the framework.

## CONCLUSION

In this paper I have argued that the development of a new framework is necessary for understanding how urban design activism matters, how it works and its effect on people's daily life. As was shown in my brief literature review, most of the existing frameworks are insufficient, because they do not take the elements and material of urban design activism into account. For instance, Thorpe bases her framework on sociological concepts, while Fuad-Luke takes his point of departure from environmentalist thinking, namely as it is represented by the Five Capitals Framework.

Moreover, I have argued that a look toward the effect elicited by design activism is necessary to make clearer concepts about this practice. Surely, many of the design acts mentioned by Thorpe (acts of communication, protest, etc.) can be involved in design activism. But the point here is that they should only be considered of a design activist kind if – through aesthetic means and expression - they evoke the effects laid out by DiSalvo: revelation, contest and dissensus.

While DiSalvo goes a long way in unravelling the political side of these effects, he ignores their aesthetic

dimension. I have argued that a turn toward aesthetics in the sense given to the term by Rancière is useful for describing how activist artefacts promote social change by altering the condition for urban experience.

On the basis of this I have proposed a framework, which is in no way claimed to be exhaustive. Rather, it should be considered as an initial step toward a more complete picture, which cannot be provided however before more future work and studies of the practice of urban design have been carried out.

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# SCAFFOLDING CO-DESIGN WITH AN AMATEUR QUALITY COMIC

ROBB MITCHELL

SPIRE CENTRE FOR PARTICIPATORY INNOVATION RESEARCH

UNIVERSITY OF SOUTHERN DENMARK

ROBB@TELECOSY.COM

## ABSTRACT

This paper discusses an experiment in using a homemade comic to facilitate a visually based idea generating co-design activity with young children. The children were provided with an incomplete comic story that they were invited to complete by drawing a design idea in the final frame. The technique appears to have potential not only because of the quantity and range of ideas collected, but also because of the unexpected positive role that the children's drawings played as mediators between members of the design team. Reflections upon the case material draws on literature from a variety of fields such participatory design, activity theory, educational psychology and cultural criticism with the intention to contribute to discussions around involving children in design and of organising participatory and interdisciplinary development processes more generally.

## INTRODUCTION

Children may potentially be a rich resource for developers of interactive products and services: "their freshness, imagination and technical fluency enable them to discover new creative forms" (Garzotto 2008). However many existing approaches to access this creativity require great resources.

This paper commences with discussion of various user centered and participatory design approaches and guidelines for involving children in design processes.

Subsequently there is a description and reflection upon a no-budget attempt to quickly elicit design ideas from children without any specialist expertise. This took the form of asking two classes of 6-8 years old to draw the final frame of a bespoke comic created for this activity. Although the lessons that may be derived from this single case are of course limited, the Discussion section commences by outlining different ways of assessing the immediate results of the comicboarding exercise. An unexpected observation from this exercise was the observation that the real value of the children's drawings to the design team was not as a creative conceptual contribution, but as an ongoing boost to the morale of the team. A proposed explanation of this phenomena with reference to activity theory is presented. Suggestions for improvements to the exercise from both practical and ethical viewpoints concludes the discussion.

## RELATED WORK

Druin advises that involving children in design requires "training children during a long term relationship" (Druin 1999). The training of users appears likely to at least reduce their "freshness" and if not actually "designing the user" (Redström 2006) then it could certainly be argued to be a form of "designing the participant" to suit the preconceptions of the design team.

Alternatively, Gibson advises finding particularly expressive or gifted children (Gibson et al 2002) but such precocious children are not always easily identifiable or necessarily the most representative resource to call upon if designing products that are aimed at children of all abilities. It seems widely agreed that methods to engage children in almost any form of participation in design activity (from cocreation to usability testing), should be tailored to them for they are "not young adults but a special user group" (Deeming 2004).

Iversen challenges the notion that "designing with children is a distinct design discipline" (Iversen 2005) arguing that "users' age and cognitive abilities do not affect the general structure of participatory design but only the techniques applied" (Ibid). Iversen's argument

maybe probed by viewing it in light of Kensing & Blomberg's principles of participatory design (Kensing & Blomberg 1998). Most of the five conditions they stipulate for participants in participatory design can be discerned in much of the work of Druin and the other practitioners who involved children discussed here. However the fifth need for participants, that there is "room for alternative technical and organizational arrangements" (ibid) is not detectable in Iversen's approach. The design might be **with** children, but the process is designed **by** adult designers/researchers. However this is also an accusation can be levelled at many activities labelled participatory design generally, not just those involving children.

#### CHILDREN AND DESIGNS UNITED BY DRAWING

One undoubted difference between adults and younger children relates to drawing. Children reduce their spontaneity of drawing after they are 8 years old. This phenomenon was captured by Picasso when he said: "Every child is an artist. The problem is how to remain an artist once he grows up" (in Picasso & Bernadac 2002 p222). Ability and comfort in drawing is also a characteristic of most design professionals (Buxton 2007) and children participating in design workshops have reported that drawing was one of their favourite aspects (Guha et al 2004 p38). Thus developing further ways of supporting larger numbers of children in making a contribution to design through drawing their ideas seems a promising route to for "bridging the gap" (Grudin 1991) between users and designers.

#### COMICBOARDING

Moraveji et al (2007) report upon success in using various comic book formats to engage children with no prior experience of, nor obvious aptitude for brainstorming activity. Their experiments deployed, in expertly drawn comics, characters and plotlines from well known comic books, but with key frames of the story removed. Citing inspiration from the developmental psychologist Vygotsky (in Berk and Hare 1995) they claim to have "scaffolded" the idea generating process with such incomplete comics. In Moraveji's project for Microsoft, children implicitly suggested design ideas by giving instructions to a professional comic artist on a one-to-one basis as to what to draw in the blank frames.

#### LIMITATIONS OF PROFESSIONAL COMICBOARDING

The services of a professional comic book artist may not always be affordable for design teams, but if children could be encouraged to produce their own drawings as solutions to design problems, then a comic book scaffold could potentially be a means to elicit a large number of design ideas in a relatively short period of user contact. Given that children reduce their spontaneity of drawing after they are 8 years old (Bornholt & Ingram 2001) facilitating children drawing their own design ideas seemed a particularly promising approach for those below this age.

#### CASE MATERIAL

The context for this trial was a five weeks (part-time) portion of a postgraduate course in user centered design. This module at the University of Southern Denmark was organized in collaboration with the local electric utility *Syd Energi*. The author (who has a background in interactive arts) was working in a team of five with colleagues from engineering and engineering management backgrounds. This project team had the task of developing design concepts for domestic electricity metering devices that would encourage the reduction of energy consumption. The project brief stipulated that the devices should encourage whole households - including the very youngest members of a family, to participate in attempts to save electricity.

#### GENERATIONAL, CULTURAL AND LANGUAGE CHALLENGES

With a mean age of 29 years, none of the team members considered themselves "digital natives" (Prensky 2001 p2). Thus it appeared likely that children's knowledge, inclinations and expectations in regards to technology appeared likely to have changed greatly in the years since any of the project team members were children themselves. Furthermore, 80% of the project team members grew up in countries other than Denmark and had had very little-to-no contact with Danish children since coming to study in Denmark. This seemed a fairly extreme example of how "users and designers have different backgrounds and belong to different communities of practice" (Iversen 2005 p25). Therefore, at the earliest possible stage of developing device concepts, the team agreed it was necessary to gain an insight into the culture of Danish children and explore the design of an energy consumption meter from their perspective.

An arrangement was made with a local school to allow the project team brief access to two classes of 6-8 year old children for 40 minutes. Given that only one project team member had proficiency in the Danish language, visually based facilitation techniques seemed most appropriate as a means to bridge the language barrier in order to maximise the productivity of the contact time.

#### "HANNAH AND THE INVENTOR"

The author wrote and drew a *comicboard* that told the story a family in which the 7 year old girl and her parents were keen on measuring saving energy, but the girl's 4 year old brother was too young to understand. To address this, the girl has an idea that her little brother's enthusiasm for toys could be directed towards energy saving, if their inventor neighbour could be persuaded to invent something that combined play and energy saving. The inventor agrees to build something, but says that he does not know anything about children's toys so he asks the girl to describe a playful energy saving device he could create. The final panel is left blank with an instruction inviting the reader to answer this request by drawing a suggestion for what the inventor should build.



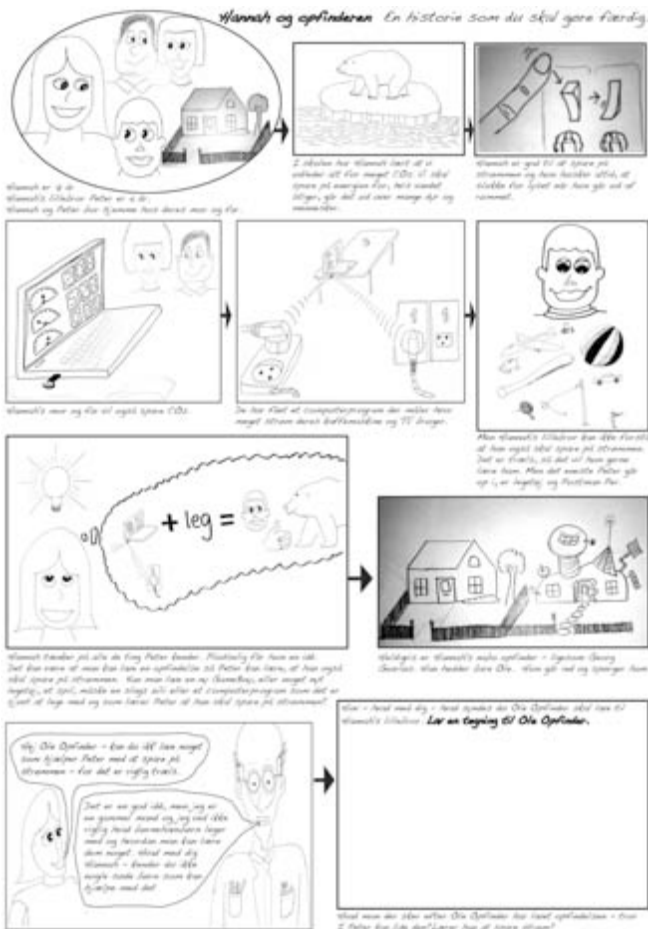


Figure 1. The A3 comicboard.

Modifying the behaviour of younger children was an aspiration that it was hoped that most children were familiar with. Focusing on modifying the behaviour of younger children also seemed a promising tactic in that it reduced the possibility of the cartoon reader feeling any implied criticism of their own current practice.

**STAGING OF ACTIVITY**

Upon arrival at the school it was confirmed that not all of the children were confident readers. Therefore the comic was first read out loud to all 30 children, whilst displaying a large scale version of the relevant accompanying picture panel (Fig.2).



Figure 2. Telling the comic story to all participants



Figure 3. Participants queuing up to receive their comic board.

Then the aims and hopes for the exercise were explained to them before the pupils enthusiastically queued up to collect their own A3 sized copy of the comic (Fig. 3) and returned to their own classroom where they sat down to draw.

**RESULTS**

Drawings to complete the cartoon were received from all but one of the workshop participants. The project team was startled by the range of ideas the children produced.

To briefly summaries the range of the contributed design ideas that were interpreted from these 29 drawings, the children's concepts can be grouped into seven broad areas, with several ideas falling into two or more of these categories. These areas were as follows: energy saving alarms (both audio and/or visual, automated energy savers (e.g. Figs 4 - 6), wearables (e.g. Figs 5 - 6), restrictions on ability to enjoy pleasures (such as playing outdoors or access to toy cupboards) if energy not saved (e.g. Fig. 7), energy generators (e.g. Fig. 8), automated electricity savers (e.g. Fig. 9 & Fig 11) handheld computer game consoles (e.g. Fig. 10) and emotion evoking devices (Fig. 12),

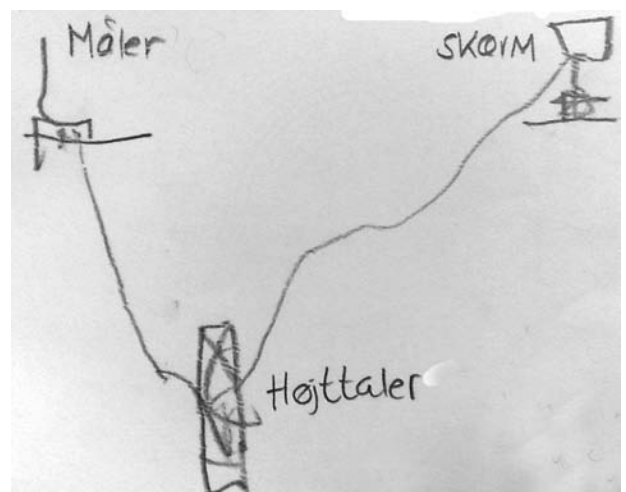


Figure 4. Alarm if excess power is consumed



Figure 5. A flashing wristband alarm



Figure 9. A movement sensor to detect lights left on



Figure 6. Glasses that beep and flash if too much power is consumed

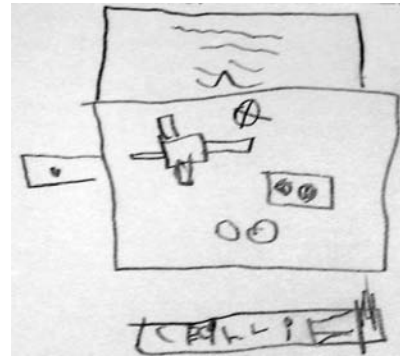


Figure 10. Handheld computer game that measures power

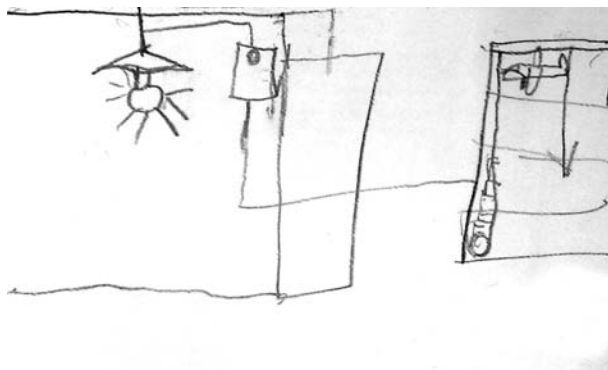


Figure 7. Toy cupboard that will not open if too many lights are left on

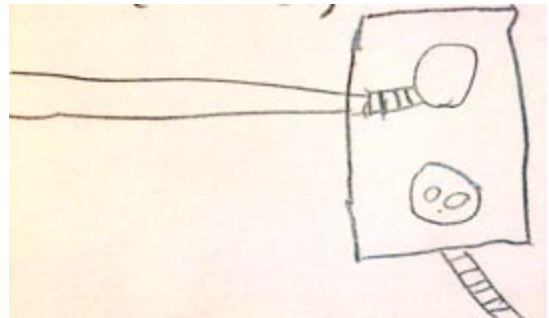


Figure 11. An automated power saver

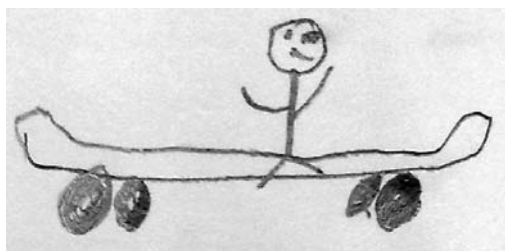


Figure 8. A skateboard to generate power



Figure 12. A robot that appears happy or sad, depending upon whether energy is wasted

This academic assignment was principally concerned with how to involve users in the design process. The development of design ideas beyond rough concepts was beyond the scope of this project. However it is hoped that reflecting upon the children's contributions and its aftermath from a more detached level will contribute to discussions concerning involving children in design and the potency of user generated design artefacts more generally.

## IMPLICATIONS

The wide variety of ideas resulting from the comicboard activity gives credence to the notion proposed by Moraveji (ibid) discussed above that involving a small number of children in participatory design is not likely to lead to representative results. Although this exercise occurred at an early stage of a project where there was a wish to generate large number of ideas - with adaptation, a similar technique could be considered as a route to address creative "blocks" at different stages of a project, even one not aiming at the design of devices intended for use by children.

## APPROPRIATE TECHNOLOGY

One of the arguments collected by Olsson (2002) as reasons not to involve people in participatory design was that users "do not know the potential of new technologies". This might seem particularly pertinent to the case of children. Others such as Kristensson (2002) in speaking about users generally say that knowledge of the relevant technology can be a "burden against creativity (ibid p60). In this instance by comparison with the graduate students of the project team, there appeared little gap in the understandings of potential technologies. There were no technologies that the students had discussed prior to the comic workshop which were not suggested by the drawings of the children. This is in line with the advice offered by a London user experience seminar which exhorted: "Do not underestimate how technically savvy children are" (Deeming 2004 p3).

Although all suggestions were technologically possible, the commercial feasibility of many of the contributed concepts such as powering a metering device through bouncing a ball or riding a skateboard (Fig 8) was a little low. This echoes the experience of Sciaffe and Rogers (1999) in their much lengthier co-design sessions: "On the one hand, kids come up with many wonderful suggestions that the design team would not have come up with...on the other hand, many of their ideas are completely unworkable" (ibid p4).

## UNCERTAIN INTERPRETATIONS

With many of the children's drawings the device or system that they invented was fairly clear to behold from either the drawing alone or from a combination of the drawing and a brief explanation that they gave. Other drawings though, required more effort on the part of the design team to translate a contribution into what

the project team considered a design concept (e.g. Fig 13 & 14).



Figure 13. An ambiguous design concept



Figure 14. Another ambiguous design concept

## MULTIPLICITY OF MEANINGS

It is over simplistic to consider that there was only one correct interpretation of the more ambiguous drawings. It is quite likely that the ideas of contributors themselves developed as they made their drawings. Professional designers are exhorted to use sketching as a way to develop ideas, which may change as they take shape on paper and upon later review and discussion (Buxton 2007 passim). It is plausible to assume that there exists a similar dialogue between concept and its visible manifestation whatever the age of the sketcher. As Rubin wrote in an art therapy context: "Even if it turns out that one's initial guess about meaning was correct, one should not assume that any image 'always' means something specific, nor even that its significance is invariant over time for any particular person" (Rubin 1984 p128).

This does not preclude that the project team mistranslated any of the drawings, since the author and colleagues are likely to have fallen into the trap identified by Sciaffe & Rogers of assuming that we could "understand what the kids are getting at" (ibid) whilst neglecting to consider that: "Kids have a different conceptual framework and terminology than adults" (ibid).



#### MISCOMMUNICATION IS NORMAL

The anthropologist Geertz argues that “it is not necessary to know everything in order to understand something (Geertz 1973 p20) and as Van Deurzen Smith, reminds us, there is no such thing as perfect understanding between people, “In some ways all human communication is based on error and difference” (Van Deurzen-Smith 1997 p225). And these errors are something she sees value in: “Mishaps and confusions bind us together as well as bind us apart” (ibid). Ambiguity is proposed to be a valuable resource for designers by some interaction researchers. Gaver et al (2003) were writing about user experiences of products and systems when they postulated that ambiguity can be “intriguing, mysterious, and delightful”(ibid p1). These words find an echo in the writings of the artist and educationalist Oxlade who contrasting technically accomplished drawing with the more spontaneous, proclaimed that the latter leaves people “intrigued, charmed, interested, moved by other human beings and can show us unexpected aspects of human existence” (Oxlade 2001 p3). A design concept from the children that was unclear to the project team was in some ways more valuable than the easily comprehended because they inspired more discussion and engagement with the drawing by different team members. The ambiguity of the children's drawings did seem to have a binding effect within the project team as discussed below.

#### VALUING PARTICIPANT DERIVED DESIGN IDEAS

The author spent around thirty hours developing their drawing skills and producing the comic. It seems reasonable to assume that a moderately imaginative person devoting an equivalent amount of time to individually generating design concepts may have come up with a range of design concepts that approached the total generated by the children. However, such a quantity of concepts by a single team member is unlikely to have been seriously considered by the other team members. Prior to the workshop the author proposed several possible design directions including the idea that the energy meter should incorporate a facility to generate electricity by kinetic means. These proposed concepts were rejected by the other team members. However when similar concepts resurfaced in the drawings of the children, they were enthusiastically taken up by many of the team members who had previously had little enthusiasm for design directions that involved dynamos.

#### NON DISCIPLINARY PROVENANCE OF A CONCEPT

Activity theory maybe called upon to illuminate why such provenance matters. Since these drawings were user created artefacts, the drawings belonged to the design team as a whole, unlike a sketch produced by individual team members. Activity theory proposes that tools are “exteriorized” versions of thought processes (Fjeld et al 2002). In everyday parlance, it is more common to speak of using tools to make objects or images. Activity Theory however shows how all the

artefacts produced and used during the design process, such as sketches and prototypes can also be considered as tools. Any tool can be said to embody to embody, to varying degrees, the knowledge, experience and/or values of their creators (Bannon 2002). Such manifestations of other people’s values can be either implicit or explicit but are likely to be present in any such tool or artefact. This is important to remember because as Eriksen and Linde (2006) explain, artefacts “drive design” (ibid p1). They also go on to say it is rarely contested that artefacts have an “important role” (ibid p4) to play in facilitating dialogue across and between different disciplines involved in the design process. An area worthy of further investigation generally is how the origin or ownership of an artefact might affect the reception of such “boundary objects” (Star & Griesemer 1999).

In interdisciplinary design, practitioners from different disciplines have different methods or tools at their disposal. It is typically the designer or perhaps the anthropologist, who produces design artefacts and brings them to the workshop table. Creating tools which are common to all team members thus may offer one route to establish a good common ground for interdisciplinary collaboration.

#### CHILDREN ADDING FUN AND MOTIVATION

Sciafe & Rogers report that “Kids ideas are most useful in helping us to design the motivating and fun aspects” of a design (1999). In the case of *Hannah and the Inventor* however, the effect was not so much of usefulness as an emotional effect. The encounter at the school was agreed by project team members to have increased our motivation, particularly the amount of fun that we had with the project. It is impossible to separate and give weight to different possible motivation enhancing factors such as the novelty of encountering the children, experiencing their environment or the actual results of the design activity itself. However, the fact that the contributed drawings continued to be handled and referred to in discussions amongst project team members in the subsequent weeks of the project inspires the following speculations as to their value as mediating artefacts within a design team.

#### SHOWING, TELLING AND MAKING

The influential design researcher Liz Sanders facilitates user contributions to designs through workshops deploying bespoke kits of colourful stationery materials. She stresses that users can be better understood through a combination of perceiving and analysing what users *say, do* and *make* (Sanders 2001) in such workshops. The different actions and articulations support and feed into each other, but need to be captured and understood as a whole – particularly since many adult participants have less skill and experience in creative visual expression. The verbal fluency that they use to explain their actions and creations within the workshop thus requires recording and/transcription in order to be accessible to researchers. An individual child’s

drawings however, can be argued to encapsulate what they *say*, *do* and *make* in a single, compact physical artefact. Vygotsky (in Berk & Winsler 1995) argues that for children, play, art and narrative are overlapping activities. This is in line with the author's recollection of his own experience as a child when he and his contemporaries would happily while away hours telling action stories through drawings (both individual and collective) which would both inspire and be inspired by physical play. In most cases such drawings were done to enjoy the process of figuring out a story rather than intending the drawing to be displayed as a picture.

Although too much can be read into these personal experiences, it certainly seems plausible to propose that in a nutshell, it can be said that children tell (or *say*) narratives as they *do* and through the drawings they *make*. This might then go somewhere to explain the potency of children's drawings in the described exercise.

Haughney et al report on success in using the "*visual language of comics*" as a method of relaying insights gleaned through qualitative exploratory interviews with users (Haughney 2008). If users, such as children of a certain age, are comfortable with drawing and can thus provide visually perceivable design artefacts, then such drawings offers a more direct version of Haughney's technique as a means of passing on and continuing to be inspired by encounters with users throughout the life cycle of a design project.

## IMPROVING COMICBOARDING

This section briefly discusses how this comicboarding exercise might have been improved both as design technique and also highlights some ethical concerns.

### EFFECTIVENESS AS A DESIGN TECHNIQUE

There are many possibilities by which this technique may be enhanced as a means to inspire and capture children's design concepts and insights into their attitudes towards the problem area. Pre-testing a comic with a smaller group of children and involving children in the design and production of the comic itself are just two means by which the likelihood of providing the appropriate degree of scaffolding to participants' creativity might be increased. Facilitating children to compare and discuss possible combinations of their different ideas would give an insight into how children viewed each others' ideas as well as generate improvements to concepts and generate new ideas. For Guha et al, such an activity is a vital stage of their cooperative inquiry process which they call "mixing things up" (Guha et al 2004). Multiple cameras set up to video record could provide a means to preserve concepts and feature ideas that participants did not incorporate into their drawings. This could also glean an insight into how children felt about their concepts, and how their idea development may have been shaped by contact with each other, or any of the adults present. However, the comic exercise was developed as means

to enable rapid facilitation by researchers who did not speak the children's language. In order to implement the enhancements mentioned above would require greater time and other resources such as translators - both on site and to review video material. Comics are far from the only means though to scaffold a quick creative activity. In this respect a more careful consideration of what a comic offers compared to other techniques such as those recently developed by Joaquim Halse in what he calls a "fieldshop" (a compressed combination of workshop and field study) involving puppets (Binder et al 2010) and after Brandt & Grunnet (2002); physical props as "things to act with" (ibid p3).

### REFINING THE FRAMEWORK

Some kind of loose financial or physical scale limits might help the contributed design concepts to be more practical. The limits of such a design brief could and should be phrased in terms understandable by children. For instance the inventor in the story could stipulate that his workshop is quite small in size, so that the new invention would have to fit through a small doorway. Providing bricolage materials might offer an alternative means to guide the scale of devices in contributed concepts. Limitations in price or complexity could be loosely suggested by explaining that the inventor could only build something that was not much more expensive than a television, or some other easily recognized device.

### ETHICAL CONSIDERATIONS

In working with any potentially vulnerable group such as children, the impact of any novel exercise should be considered from their perspective and their interests. In this case the project team considered the pupils to be contributors to an educational project rather than as subjects in an experiment. Indeed, from a long term environmental perspective, the energy reduction goals of this project could be seen as more in the interests of the children's generation than that of the graduate students.

However, Guha has reported that children of this age group can become upset if they perceive design researchers ignoring or modifying their ideas since they can find it difficult to "let go" of their concepts (Guha et al 2005 p40). The comicboarding exercise described in this paper, was in some ways more extreme in that the children's drawn concepts were taken away and not returned. It was both discourteous and unprofessional of the project team to have not undertaken any follow up correspondence with the children. Practitioners considering similar exercise should consider embedding such courtesies in their project timetables.

According to Perkins (2005), the acknowledgement of authorship should also be a cornerstone of professional design ethics. In this instance, although the project team did not attempt to pass off the children's creativity as their own, the absence of rigorously recording which child was responsible for which drawing meant that the authorship of their concepts was anonymous.

Transcribing names and demographics details of contributors could also be of benefit to researchers analysing children's drawings and it is thus recommended that such information is recorded.

## CONCLUSION

This paper has described how, on the basis of a limited trial, a non professionally produced comic appears to offer potential as a low budget means of scaffolding design concept generation with young children. The contributions from children in the case material have been discussed in regards to various viewpoints. Suggestions have been made as to how to improve such an activity. Explanations have been offered as to how children's drawings maybe a special instance of the representation tools and tangible materials used in the design process. The comicboarding exercise might seem to be simple and quick activity, but it has raised many issues and resulted in many unexpected observations. This serves as reminder that participation, like interaction and user experience cannot be directly designed itself, but can only be designed **for**.

## ACKNOWLEDGMENTS

Thanks to teachers and participants of Ullerup School and Ken Mathiasen for translation of the comicboard and arranging the workshop.

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# REFLECTION AND DOCUMENTATION IN PRACTICE-LED DESIGN RESEARCH

MAARIT MÄKELÄ  
AALTO UNIVERSITY SCHOOL OF ART AND  
DESIGN, DEPARTMENT OF DESIGN  
MAARIT.MAKELA@AALTO.FI

NITHIKUL NIMKULRAT  
LOUGHBOROUGH UNIVERSITY,  
SCHOOL OF THE ARTS  
N.NIMKULRAT@LBOU.AC.UK

## ABSTRACT

Practice-led research has been under debate for nearly three decades. One of the major issues of this form of research concerns how the researchers who are also the artists/designers can reflect on and document their creative processes in relation to their research topic. In this paper, we review and discuss reflection and documentation in practice-led design research through four doctoral research projects completed at the Aalto University School of Art and Design. The cases come from craft related fields, i.e. from ceramics, glass, jewellery and textiles. This paper poses twofold questions: firstly, it examines the role of creative processes and their outputs in practice-led research context and secondly, the role of documentation and reflection of the creative processes and products in the studies. In conclusion, documentation in practice-led research context can function as conscious reflection *on* and *in* action. Any means of documentation, whether it is diary writing, photographing or sketching, can serve as a mode of reflection.

## INTRODUCTION

In the last three decades, practising artists, designers and craft people have taken up an innovative position as

practitioner-researchers in academia by conducting academic research *through* their own practice. The notion of research through practice can be traced back to the separation made by Christopher Frayling (1993) in his examination of the role of art and design in relation to research practices. He divides design research into three different categories depending on the focus and mode of the given task. *By research into art and design* he implies that art and design is the subject of inquiry to be looked into, a phenomenon to be studied from the outside. *By research through art and design* he proposes that the creative production can be understood as a research method. *By research for art and design* he refers to a kind of research in which the end product is an artefact within which the thinking that led to its making is embodied (Frayling 1993, 5; see also Scrivener 2009, 71). The exploration of knowledge partly through making artefacts has brought a new dimension to design research as the practitioner-researcher not only creates an artefact but also documents, contextualises and interprets the artefacts as well as the process of making them. This way of creation allows practitioners to elicit reflection in and on their working processes (Schön 1991) that can be considered new knowledge gained in action.

This form of gaining knowledge sheds light on the development of design research to include the traditional basis of the field, the creative practice, with a focus on the sources of knowledge – the making process and the maker. The interchangeable labels of research with the inclusion of creative practice embrace ‘practice-based’, ‘practice-led’ and ‘artistic research’. The core concept of research labelled with these terms is the relationship between the researcher who is simultaneously an artist/designer, whose artistic process and production of artefacts is the target of the reflection. “The whole issue is ... about the self-reflective and self-critical processes of a person taking part in the production of meaning within contemporary art, and in such a fashion that it communicates where it is coming from, where it stands at this precise moment, and where it wants to go” (Hannula, Suoranta & Vaden 2005, 10).

This paper reviews and discusses practice-led design research through four completed doctoral research projects from craft related fields, that is, in the fields of ceramics, glass, jewellery and textiles. Each case includes both creative processes and exhibitions executed by a researcher who is also a practising artist/designer. The paper poses twofold questions. On the one hand, it tackles the role of creative processes and their outputs in practice-led research context. On the other, it examines the role of documentation and reflection of the creative processes and products in these studies.

In this paper, we will first update the debate on the discourse of practice-led research in art and design, focusing especially to discussion related to documentation and reflection. After this, we will closely examine four individual craft-oriented cases, focusing on the creative process and ways in which each artist-researcher documented, reflected and contextualised their own creative processes. Finally, we will compare these cases' creative processes' documentation, reflection and contextualisation in the context of practice-led research.

#### ROLE OF REFLECTION AND DOCUMENTATION IN PRACTICE-LED RESEARCH

Contemporary art and design practices are saturated with theoretical knowledge as artists and designers integrate research methods into their creative processes in diverse ways. Indeed, the field of academic research, qualitative research in particular, seems to be able to offer methods, theories and approaches that are able to constructively support creative production. Kathrin Busch (2009, 1-2) points out that the attempt to implement a theory-derived and practice-based concept of art within an academic curriculum initially was a response to a changed notion of art – one in which art and theory has become entangled in multiple ways and focused on the production of knowledge rather than that of artworks. This trend clearly changed the concept of art from what had been traditionally/historically taught at art academies to the development of processes and capacities. This is also one reason why the desire to institutionally anchor work methods based on investigation or research to new curricula is arguably justified. Further, Busch (ibid.) states that artistic appropriation of knowledge evokes different and independent forms of knowledge that might be seen to complement or stand as an equivalent to scientific research. However, the spectrum of that which can be substantiated under the term 'artistic research' is broad and certainly not homogeneous. In this paper, we use 'practice-led research' as an umbrella term that includes ongoing discussions under the terms 'practice-led', 'art-led' and 'artistic research'.

Mika Elo (2007, 14) reminds that a reflective relationship with tradition has been part of the practice of art at least since the age of Romanticism, just as in the natural sciences the production of 'epistemic things' has been intimately connected to experimental praxis throughout the modern era. Similarly, Ilpo Koskinen (2009, 11) states that research in social and so-called 'hard' sciences has shown for more than 40 years that practice is its basis. In this regard, the notion of 'practice-led' or 'artistic research' is not new – the new element is rather the connection between the art practice and the university institution. What is essential concerning this paper is a result of this connection, i.e. a new actor that has appeared on the stage – a practitioner who reflects upon her/his own practice.

Stephen Scrivener, who has discussed the relationship between art and design practice and research in his several writings, argues for design research where research and design are coupled and calls the foundation for such practice 'research-in-design' (Scrivener 2000, 392). This corresponds to social scientist Donald Schön's theory of design as reflective practice (Schön 1991). According to Schön, our knowing is in action, ordinary in tacit form and implicit in our patterns of action. *Reflection-in-action* indicates a process in which practitioners encounter an unusual situation and have to take a different course of action from that which they usually do or have originally planned (ibid., 128-136). On the other hand, *reflection-on-action* includes an analytical process in which practitioners reflect their thinking, actions, and feelings in connection to particular events in their professional practice (ibid., 275-283).

Scrivener (2000, 392) emphasises that in each 'research-in-design' project, systematic documentation and reflection-in-action play a crucial role as it supports the practitioner's reflections and brings greater objectivity – or critical subjectivity – to the whole project. He also stresses the importance of the final reflection – or *reflection-on-action* in Schön's term – that it should reflect not only on the project as a whole in relation to the issues explored but also on the goals attained and the reflection in action and practice itself. The reflection conducted in different stages of the project provides primary material for communicating and sharing of the experiences related to the project. According to Scrivener (2002, 25) documentation can assist in capturing the experiential knowledge in creative process, so that what the practitioner learns from within his/her practice becomes explicit, accessible and communicable.

Correspondingly, Nigel Cross (1982, 223-335; 1999, 5-6) discusses knowledge intertwined in the practice of design. He argues that the knowledge of design resides in people, processes and products. Part of this knowledge is inherent in the activity of designing and can be gained by engaging in and reflecting on that very

activity. According to Cross (2001, 54-55), knowledge also resides in the artefacts themselves, in their form and materials. Some of this knowledge is also inherent in the process of manufacturing the artefacts, gained through making and reflecting upon the making of these artefacts. Thus, the triangle of maker-making-artefact seems to provide a useful means through which it is possible to approach practitioners' ways of knowing (Mäkelä & Routarinne 2006, 21-22).

The theatre director Mark Fleishman (2009) uses the term *creative discovery* when discussing the relationship between creative process and knowledge. This concept underlines the importance of the two-fold process of making and reflecting and the knowledge that this process might be able to reveal. He also stresses the need for documentation to be related to the different stages of the creative process, thus sketching out the link between (art or design) practice, documentation and evaluation. The linkage will be next examined more closely by introducing four craft-related doctoral dissertations completed at the Aalto University School of Art and Design, or formerly named University of Art and Design Helsinki. The Doctor of Arts degree has been available in this university since 1983. The opportunity to create products as part of the dissertation began in 1992 (Ryynanen 1999, 13). As all the studies undergo a scientific evaluation process, the written component of the study is therefore expected to meet academic requirements. The following reviews will focus on the creative process and ways in which each artist-researcher documented, reflected and contextualised their creative processes.

### MAARIT MÄKELÄ: CLAY PICTURES AS FEMALE REPRESENTATIONS

The ceramic artist Maarit Mäkelä graduated as a Doctor of Arts in 2003 with her study *Memories on Clay: Representations of Subjective Creation Process and Gender* (Mäkelä 2003). The supporting structure of the study is the art making process that is documented in three exhibitions. The domain of the female body is intertwined in the arguments of the study in several ways. The female body is the theme of the art made during this research process, as well as thematically the main focus of the theoretical discussion used for contextualising and making sense of these artefacts.

In this study an artist-researcher connected art with research by following certain routes that have informed her experience as a female artist and as a feminist researcher. Thus, the speaker in this study is the artist-researcher who reflects and reviews her intuitive work process. The research proceeds as a dialogue between ceramic art and feminist research. The inquiry begins with making artefacts. This means hands-on actions with clay and, the product of which are artefacts arranged in the form of an exhibition. Each artistic work period is followed by a research period. In this study the

artistic work periods and research-oriented work periods are repeated three times.

To be able to reflect the overall process, Mäkelä utilised two means of documentation. Firstly, a professional photographer documented the exhibitions and each exhibit. Secondly, she kept working diaries throughout the creative processes related to her study where she collected various textual and visual materials related to the topic. In some parts of the diary she developed her ideas by sketching. She also reflected her creative processes in the diaries by making notes, clarifying her thoughts and developing the ideas in a written format. In her case, the content of notes is connected closely to the idea of self-reflection, i.e. the mode of reflection where author scrutinises and clarifies her thoughts and conceptions related to her own actions by writing (see e.g. Anttila 2006, 78). For example, while working in the studio, she notes:

Physical work has begun – apparently with a slow process during which I take the material into my possession both physically and mentally. The process has a meaning like a ritual. My working methods are simple. I use as simple tools as possible and touch the material a lot... This is a rite, an initiation rite during which I move from the level of (logical) thinking to an intuitive and physical mode of working (Extract from working diary, 9 January 1996; see also Mäkelä 1997, 64).

All documentation served as data for the written part of the study. The written dissertation consists of three main chapters, each of which focusing one of the three exhibitions. In each chapter she reflected on one exhibition and creative processes related to that exhibition.

During the study, the artist-researcher updated culturally tied representations of femininity. By playing with already existing female representations and printing them on clay, in this way, Mäkelä brought them into a new context and participated in their reproduction and re-contextualisation. For example, in the first exhibition, she interrogated the experience of femininity by using the post-modern device of loaned images. In the series of clay pictures appointed with the name *Monthly Bleeding* (Fig. 1) the photograph of Marilyn Monroe is used as a starting point of the work (Fig. 2).



Figure 1: Mäkelä's work *Monthly Bleeding*, 1996, silkscreen and painting to Finnish earthenware. Photograph: Rauno Träskelin.



Figure 2: Original photograph of Marilyn Monroe, 1956.

When brought to the rough earthenware, the sister figures of Monroe continue the complex representations of femininity as the outlines of Monroe's body have been strengthened by rugged, scratchy marks. The marks have been carved as a part of the wet ceramic surface. The smooth feminine shapes have thus acquired new lines, which are partly atop the original lines, and partly pushed under the original ones. Even though its serial nature is one of the central features of this work, each of the plates is also meaningful, as they all embody different representations of femininity.

According to Griselda Pollock (1988, 6), representation bears the wider meaning of analysing something or some phenomenon, giving it meaning and making it understandable in relation to other representations. As a concept, representation emphasises the meaning-producing nature of saying, presenting, thinking and knowing. When understood in this way, the ceramic representations of women produced during the research process have a central meaning: not only do these works preserve the female experience but also analyse and comment on it. In this way, personal experience has been woven in as an integral part of the study and, as such, forms a central source of the process of producing knowledge.

Thus, in the case of Mäkelä, the artistic production operated as a reflector with which she was able to explore her theme, femininity, profoundly. The result of this process was clay pictures, which were then shared via three exhibitions. The documentation consisted of photographs taken from the exhibitions and each exhibited artwork. The related creative processes were also reflected in the working diary. The final reflection took place in the pages of the dissertation, when all these documents served as data for discussing and contextualising the topic profoundly.

#### KÄRT SUMMATAVET: ARTISTIC INNOVATION INSPIRED BY TRADITION

Kärt Summatavet is a jewellery artist who received a Doctor of Arts in 2005. Her dissertation is entitled *Folk Tradition and Artistic Inspiration: A Woman's Life in Traditional Estonian Jewelry and Crafts as Told by Anne and Rooski* (Summatavet 2005). Her study comprises a written thesis and three art projects carried

out between 2001 and 2004. It investigates the relationship of the Estonian oral tradition and traditional crafts with the life experience of a female member of a traditional community. The work seeks ways in which folk tradition can be utilised as a source of artistic inspiration for contemporary jewellery art.

In her research, Summatavet utilised fieldwork with participant observation – a method used in cultural anthropology and ethnography – to study Estonian traditional crafts and oral tradition that cannot be found in any literature or archives. The information collected during the fieldwork also acted as inspiration for Summatavet's artistic creation. The fieldwork was carried out mainly with two bearers of Estonian traditional handicraft: the Setu singer and craftsman Anne Kõivo and the Kihnu Island's craftsman Rosaali Karjam. Through deep communication with these bearers, Summatavet not only expanded the knowledge of her country's living tradition and handicraft as the reflection of one's life story, but also gained artistic inspiration useful for her own jewellery creation presented in three art projects. When knowledge of traditional jewellery and crafts combined with modern technologies, new opportunities and challenges for carrying out jewellery art projects emerged.

In Summatavet's case, the process of documentation took place substantially during the fieldwork, forming a collection of research and artistic material as the product of documentation. During the fieldwork, the interaction between Summatavet and the traditional bearers generated mutual relationship and understanding between them. On the one hand, the artist motivated the artisans to discuss their experience in a contemporary context, and in Rooski's case, to start documenting her own mitten's patterns. On the other hand, the artisans inspired the artist, especially in Anne's case when she assisted the artist in interpreting Setu's women's life and utilising the interpretation for the three jewellery projects. The data collection collected during the fieldwork over several years thus consisted of not only interview records and photographs of the bearers and their collections, but also sketches, notes and diaries kept by the tradition bearers.

Summatavet studied the collected material repeatedly, then interpreted and used it as data in her written thesis and as inspirational basis for her art projects. The inspiration evolved into a close association between the documented material and the artist-researcher's emotion elicited during the fieldwork, and was then presented in the form of jewellery art. The fieldwork and the art projects influenced each other and were carried out as an intertwined process. In other words, while the fieldwork supported the creative work, the creation production generated new questions to be tackled in the fieldwork.



In each art project, Summatavet reflected her interpretation of life stories told by the bearers and developed the project's theme further based on a particular story. Her art projects aimed at combining tradition with modern techniques. For example, in the project and exhibition namely *Childhood and Girlhood*, Summatavet gained inspiration from Anne Kõivo's life stories about the brooch and song of women in Setumaa, southeast of Estonia. 'The brooch is so old that mother's voice is in it', says Anne (Summatavet 2005, 141). A Setu woman wears a brooch and silver chains when singing in an important event (Fig. 3 and 4). The brooch symbolises protection and has been passed from one generation to another within a family.

The lyrics of autobiographical songs usually tell about childhood's happiness and freedom. This ornament and songs inspired Summatavet as she connected it to her own childhood's lullaby. She then conceived 'lullaby' as one of the main themes of the exhibition. The theme was presented in a collection of copper brooches representing a fairytale world dreamed by a little girl. Summatavet employed symbols, signs and patterns in presenting the theme through a concrete material (Fig. 5). In the creative process, Summatavet also learnt technical possibilities of applying fine and thin enamelling and enamel painting onto big copper convex forms.



Figures 3 and 4: Anne Kõivo's silver ornament and Anne (middle) wearing the ornament when performing in a choir. Photograph: Märt Summatavet.



Figure 5: Kärt Summatavet's jewellery piece namely *The Forest Nymphs, 1999-2000*. Materials and techniques: copper, silver, enamel, painting enamels. Photograph: Rein Vainküla.

## OUTI TURPEINEN: INSTALLATIONS AS TEST SPACES

The glass artist Outi Turpeinen graduated as a Doctor of Arts with her thesis namely *A Meaningful Museum Object: Critical Visuality in Cultural History Museum Exhibitions* (Turpeinen 2005). Her study consists of a series of three exhibitions and a written thesis. The study examines the relationship between a cultural history museum exhibition and the objects on display, especially the formation of meaning of the exhibition. Therefore, as part of her study, Turpeinen created sculptural glass works as fictional museum objects, and based on these works, constructed installations in the museum context.

For this purpose, Turpeinen visited several cultural history museums and analysed their exhibitions. Some of these museums displayed exhibitions, which were done in collaboration with artists. In these cases Turpeinen examined how artists changed the exhibition design and how this brought new meaning to the museum objects. Based on the abovementioned experiences and studies, she created three installations, which were displayed as part of her doctoral study.

In the case of Turpeinen, documentation is related to the study in two phases. The first phase took place while visiting cultural history museums. During the visits, she documented the exhibitions by photographing, and kept diary where she wrote notes and sketches (Fig. 6). This kind of experimenting and documenting went on during the whole study process. For Schön (1991, 80-81) the verbal and non-verbal expression is analogous: drawing and talking are parallel ways of designing, and together make up what he calls 'language of design'. The drawing reveals qualities and relations unimagined beforehand and thus, the moves of hands are able to function as experiments. Therefore, the graphic world of the sketchpad can also function as the medium of *reflection-in-action* (Schön 1991, 157). Accordingly, the sketches Turpeinen did while visiting in the museums is a kind of visual reflection based on the theme explored.



Figure 6: Outi Turpeinen makes notes in her diary in Thalang Museum in Phuket, Thailand, December 2003. Photograph: Rauno Rönneberg.

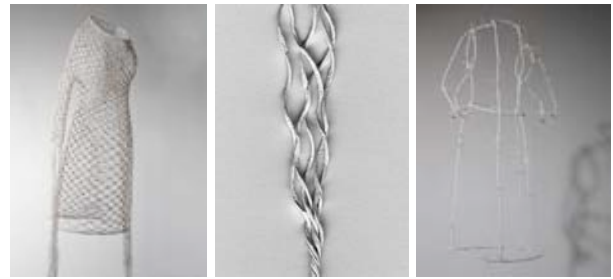




conceptualising to manipulating the physical material to execute artworks. She noted both factual and tangible aspects, such as the choices of material and the reasons for selecting them, and less concrete ones, such as her emotions when handling a material. In Nimkulrat's case, diary writing was a reflective process evolving correspondingly with the situations she stumbled upon in the artistic process. In other words, diary writing facilitated her self-awareness of cumulative thoughts, intentions and decisions in the action, or *reflection-in-action* (see Schön 1991, 128-156), which she could revisit and reflect on when preparing the written thesis. Some writings about thoughts or actions, which seemed trivial in the creative process, shed light on the overall process after it was completed. An example can be seen in a diary entry made during the making of *Get Sorted* (Fig 10), an artwork in *Seeing Paper* series:

... Life is in a mess because one makes it messy, like I did with the neat twisted paper yarn. I am the one who created a terrible mess with the strings, and I must be the one who sorts the mess out in order to form the piece on the mould. ... I have to control not only the messiness of the strings but also my pulling strength. If I pull the strings too hard, I may break some strings. On the other hand, if I pull them too gently, the knots are too loose. This material doesn't want to be controlled. I have to add new strings at several places where the old strings are broken. I hide the broken strings very neatly. ... (Extract from working diary, 28 March 2005; Nimkulrat 2009, 115).

The above note shows not only her intense experience with a type of paper string (Fig. 11) but also her feelings towards it in relation to the material's physical qualities, such as being weak and difficult to sort out. As this type of paper string was untwisted from a strong, straight and smooth type, the experience with the weakness and messiness of the material became unexpected to her and influenced her thoughts of the ongoing work. When the work was finished, the note led to the title *Get Sorted*. Then, Nimkulrat associated the experience of the rough textured and easily broken strings with her earlier experience of something else – barbwire (See also Nimkulrat 2007b, 17-24). She adopted phenomenological thinking to understand the association. A tactile phenomenon, as Merleau-Ponty (1962, 369) pointed out, is effective when it finds something similar within the person who touches. The material's association with barbwire thus shows the way in which the artist-researcher's tactile experience sought connection with consciousness and recalled the memory of prior experiences. This association became the input of her creative process of a subsequent artwork using the same material, namely *Private Area* (Fig. 12). She knew that she could represent the association and made the material's qualities visible as the key feature of the work through forceful pulling to break the strings.



Figures 10, 11 and 12: *Get Sorted*; material used to create *Get Sorted* and *Private Area*; *Private Area*. Photographs: Maj Lundell and Minna Luoma.

In Nimkulrat's case, the creation of artefacts was performed as the *reflection-in-action* of her previous creative process. Through the interaction between different research approaches (i.e. making, reading and questioning) the research problem regarding the relationship between material and artistic expression developed and was tackled accordingly. Documentation was proven crucial for conducting this practice-led research. Without the documentation of the artistic process, artworks produced in the process may not be adequate to provide data for analysis and to generate reflection (Nimkulrat 2007b). The documented visuals and texts became data, which was later organised, reflected on and articulated. The implicit artistic experience is thus attainable and debatable in the context of disciplined inquiry because of documentation (ibid.).

## RELATIONSHIP BETWEEN REFLECTION AND DOCUMENTATION

In this article, we have reviewed the different roles and modes of reflection and documentation carried out in four completed practice-led doctoral research in the field of design. The craft-related cases portrayed above demonstrate various ways of documenting research and creative practices, as well as of reflecting *in* and *on* actions in the creative processes. This is to locate the cases in terms of Schön's division, the two steps of reflection, i.e. *reflection-in-action* and *reflection-on-action*. These steps can be traced from the cases in different levels.

Firstly, in Mäkelä's and Nimkulrat's cases, *reflection-in-action* functioned as an inherent method for collecting information about the creative processes related to the study. In these cases, the reflection is made possible by utilising diary writing, photographing and diagram drawing i.e. means of documentation. Also, Turpeinen utilised this form of reflection when making sketches in her diary during her visits in the museums. Secondly, in later steps of the study, when bringing the data in connection with the relevant research literature, the collected data elicit insights and understanding for the study. This step of the study,

*reflection-on-action*, is apparent in all the reviewed cases.

On the other hand, when considering the meaning of documentation, it can be utilised in two ways. Firstly, as shown in the cases of Mäkelä and Nimkulrat, documentation can serve as the references *of* making artefacts, and secondly, as apparent in the cases of Summatavet and Turpeinen, documentation can be used as basis *for* making artefacts.

The first mode of documentation – documentation *of* making artefacts – takes place at the same time as the artist-researcher gradually forms material into artefacts. This mode of documentation can be carried out visually and textually, as both Mäkelä and Nimkulrat did throughout their creative practices related to the topics of their doctoral dissertations. The textual documentation is carried out in the form of diary writing. As presented above, some texts in Mäkelä's and Nimkulrat's diaries reveal their thoughts and emotions evolved during their encountering with their materials, techniques and tools. The proceeding thoughts and emotions once recorded play a significant role as material for discussing the research topic in the process of writing up the thesis. In this way, the textually and visually recorded documents illuminate when sharing the artist-researcher's ways of working, thinking and knowing in his/her action.

The second mode of documentation – documentation *for* making artefacts – arises before the actual creation of artefacts when the artist-researcher is in the process of searching inspiration for his/her creation. As can be seen in both the cases of Summatavet and Turpeinen, this mode of documentation can also be performed visually and textually. In Summatavet's case, the recorded interviews and photographs collected during fieldwork were used as inspiration for her jewellery art making. On the other hand, Turpeinen utilised visuals and notes in her working diary documented during her visits to different cultural museums as the basis for developing themes of her installations. Both cases reveal ways in which the documented visuals and texts have an important role of providing themes for the artist-researcher's creative process.

Based on the introduced cases, it can be concluded that in practice-led research context, documentation can function as a research tool for capturing reflection *on* and *in* action. When artist-researchers document their practice-led research processes, they consciously reflect on the current experiences during the process (*reflection-in-action*) and on the documented experiences after the entire process (*reflection-on-action*). This does not mean that documentation is the foundation of research or theory construction (Freidman 2008, 157). Rather, documentation makes reflection explicitly articulated in a form available for the

practitioner-researcher to revisit and analyse in order to develop and construct design knowledge.

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# SOME NOTES ON PROGRAM/EXPERIMENT DIALECTICS

JOHAN REDSTRÖM

INTERACTIVE INSTITUTE

JOHAN.REDSTROM@TIL.SE

## ABSTRACT

Searching for ways of conducting practice-based design research, we have explored an approach based on the formulation of design programs as a foundation and framework for carrying out design experiments. Over the years, we have presented a number of such programs along with experiments that explore and express their potential. There are, however, methodological issues in this way of working that need further development. One such set of issues pertains to what we might refer to as a program–experiment dialectics, that is, how the research process unfolds over time as program and experiments influence, challenge and transform each other.

In what follows, aspects of this dialectic will be discussed with focus on issues such as how such a process is initiated, how the unfolding of the research process depends on both stabilisation and drift, and what it means to say that such a process comes to a closure.

Keywords: design programs, experimental design, practice-based research.

## INTRODUCTION

Over the past decade, we have developed a practice-based approach to design research centred on the notions of programs and experiments. Introduced in more detail elsewhere (e.g. Binder & Redström 2006, Hallnäs och Redström 2006, Koskinen et al 2008, cf. also Brandt & Binder 2007), this approach centres on the explicit formulation of design programs acting as a foundation and frame for carrying out series of experiments.

Compared to many of the epistemological discussions in practice-based research which often centres on the articulation of knowledge as such (cf. discussions such as Biggs 2006, Rosengren 2007), the discussion that follows will concentrate on how these programmatic practices work, rather than on what (kinds of) knowledge they may (or may not) produce. In many ways, the notion of program referred to here is close to the everyday use of the term, as in e.g. conjunction with architectural programs or educational programs, but there is also a relation to how Lakatos' used the notion of programs in science, and especially how central frames of reference in science evolve over time (Lakatos 1978).

With origins in the Greek word *programma*, a public notice, meanings of the term program include (from the Merriam-Webster Online Dictionary):

– *a brief usually printed outline of the order to be followed, of the features to be presented, and the persons participating (as in a public performance)*

– *a plan or system under which action may be taken toward a goal.*

To give a practical example, consider the design program for Static!, a research effort into how design research could offer a new set of perspectives and possibilities on energy consumption in everyday life in contrast to the prevalent strategies of changes the current state of affairs either by improving the technology or informing the consumer (Redström 2010, p. 17):

– *The aesthetics of energy as material in design: working with energy not only from a technical but also from an aesthetic point of view.*



– *Reflective use: systematically reinterpreting designed things not only in terms of utility and ease-of-use but in terms of critical reflection through the things at hand*

Within this program we developed examples such as the Energy Curtain, the Flower Lamp (with Front Design) and the Power-Aware Cord (Mazé 2010).

The basic mechanisms for putting this process in motion are typically present in the form of a critical question about the present and a suggestion about an alternative way of doing things. In the example given above, this can be seen in how the program contains a challenge to consider technology not in terms of energy efficiency, but energy aesthetics – and (therefore) that we need to work with it as material in, rather than infrastructure behind, design. And with respect to consumers and consumption, the program emphasizes use as practice, what we actually do, and suggests that the very interaction with everyday objects is a site for design intervention.

This way of expressing the starting point for a research process is therefore quite different from, say, setting the frames using questions such as “How can we make people more aware of the energy consumption?” or “How can we make energy consumption visible?” However subtle we may express this in the research literature, there is a basic difference between such questions and statements like “*systematically reinterpreting designed things...*”.

Even when we ask open questions on the form of “How can we...?”, these are not without context. Who is asking, for what reason and with what expectations? In case we want to do things *differently*, there is a need to bring also such factors influencing where and how answers will be searched for into the picture. This is where the program makes a difference; a difference similar to how “Let us try this instead!” differs from “How can we change this?”. Correspondingly, the processes set in motion are equally different to each other.

Thus, a characteristic of programs like this is that they seem to blend what we otherwise might consider questions and answers. Instead of presenting a question to be answered, they present propositions or proposals that need to be substantiated. However, much like how the way we phrase and rephrase a question as we develop an understanding of what an answer could be like, and thus make questions and answers evolve together, this approach builds on the idea that certain insights depend on a process of change driven by an interaction between program and experiment.

We have described a number of programs and experiments like this, such as Slow Technology (Hallnäs & Redström 2001), IT+Textiles (Redström et al 2005), Textile Interaction Design (Hallnäs & Redström 2008), and Switch! (Mazé & Redström 2008). It is experiences from this work that form the basis for this discussion. An early description of our

programmatic research process may serve as a way of introducing the basics of the work process (Redström 2001, p. 26):

*Thus, we have a process of:*

*i) formulating a design program;*

*ii) realising the program by designing, implementing and evaluating design examples;*

*iii) reflection and formulation of results, e.g., reporting on the experiences gained, formulating new working hypotheses, reformulating the design program.*

While at some point satisfying a need for a compact and rational description of a work process, it is also quite clear that this picture of what programmatic research is like is much simplified and in some ways raises as many questions as it answers. For instance: where does the first program come from? Is it always the case the program comes first? And if it doesn't, what does that imply when you say that the program acts as a foundation for the experiments? Given the complexity of design processes in general, is experimentation simply a matter of ‘realising’ a program?

This text is an attempt to outline what we might call a *program/experiment dialectics* (cf. Binder & Redström 2006). Like dialogue and debate, the term dialectics stem from philosophical practices in Ancient Greece (e.g. Plato 1998). In the dialectic, participants start with different views, but unlike debate, in which the participants typically remain with their original opinions trying to win each other over, what then happens is a matter of reaching a deeper understanding by using the opposing views to discover shortcomings and flaws in the original argument. Later Hegel used notions such as abstract-negative-concrete to describe a historical dialectics through which a richer understanding of a notion is developed by moving from the ‘abstract’ to something ‘concrete’ (Hegel 1873, p. 237):

*The absolute idea may in this respect be compared to the old man who utters the same creed as the child, but for whom it is pregnant with the significance of a lifetime. /.../ So, too, the content of the absolute idea is the whole breadth of ground which has passed under our view up to this point. Last of all comes the discovery that the whole evolution is what constitutes the content and the interest. It is indeed the prerogative of the philosopher to see that everything, which, taken apart, is narrow and restricted, receives its value by its connexion with the whole, and by forming an organic element of the idea.*

While Hegel certainly is very far from what is dealt with here, the idea of a dialectic process that moves from the abstract to the concrete is relevant also here: it talks not about going from abstract idea to material thing, but from an empty concept – ‘abstract’ referring to something void of relations and context – to something ‘concrete’, an understanding rich in relations and experience. Also in this sense, the initial program is



indeed 'abstract' and the process of experimentation a matter of making it more 'concrete'.

And so, let us now look into how programs come about, what happens with the relation between program and experiment as the research process unfolds, and finally if we can say something about when such a process comes to a closure.

## BEGINNING

As an illustration of how a process like this may come about, let us look at one of the most influential programs ever proposed in design: the Bauhaus. Having far-reaching effects not only on how we consider the design of industrial products (and indeed for the formation of the discipline industrial design), it has historically also served as role model for much design education. The Bauhaus is also interesting because of the many rather strong statements made by Gropius and others regarding its ambition and purpose (Gropius 1926, p. 95):

*The Bauhaus wants to serve in the development of present-day housing, from the simplest household appliances to the finished dwelling. In the conviction that household appliances and furnishings must be rationally related to each other, the Bauhaus is seeking — by systematic practical and theoretical research in the formal, technical and economic fields — to derive the design of an object from its natural functions and relationship.*

Even in this short passage, we can clearly see the main components of this program: the interest in the everyday where each object belongs to a system, the aim to find a rational basis for design, as well as the influence from other fields and science. Programmatic statements like this certainly have provided both direction and depth, but were they there from the start?

It seems they were not.

The work of Anni Albers (b. Fleischmann) provides some interesting glimpses into the early days at the Bauhaus. Here follows a transcript of an interview with her made for the oral history archives of American Art (Albers 1968):

*SEVIM FESCI: Yes. Before we leave the Bauhaus, because we were still there -- I would like to ask you what is this creative atmosphere of the Bauhaus?*

*ANNI ALBERS: This is what I mentioned there in the article -- well, the Bauhaus today is thought of always as a school, a very adventurous and interesting one, to which you went and were taught something; that it was a readymade spirit. But when I got there in 1922, that wasn't true at all. It was in a great muddle and there was a great searching going on from all sides. And people like Klee and Kandinsky weren't recognized as the great masters. They were starting to find their way. And this kind of general searching was very exciting. And in my little articles this is what I called the creative*

*vacuum. But the word "education" was never mentioned. And the people we think of as the great masters -- Klee and Kandinsky -- they weren't available for questions. They were the great silent ones who talked among themselves maybe, but never to small little students like me. But we knew that what the Academy was doing was wrong and it was exciting that you knew you had the freedom to try out something. And that was fine. But, as I say, it wasn't that you went there and were taking something home from there. You were a contributor.*

*SEVIM FESCI: It was more a kind of laboratory.*

*ANNI ALBERS: Yes, from all sides. Everybody tried his best and we didn't know in which direction we were going. Because there was nothing. You only knew that what there was in other schools or academies was wrong and didn't satisfy.*

Clearly, the strong programmatic statements were not present at this time – but other fundamentals of a design research program certainly were: the creation of an experimental environment, the urge to do things differently, and a substantial openness to what might come out of it.

With respect to the emergence of this 'new' practice, Albers writes elsewhere:

*At the Bauhaus, those beginning to work in textiles at that time, for example, were fortunate not to have had the traditional training in the craft: it is no easy task to throw useless conventions overboard. /.../*

*But how to begin? At first they played with the material quite amateurishly. Gradually, however, something emerged which looked like the beginning of a new style. Technique was picked up as it was found to be needed and insofar as it might serve as a basis for future experimentation.*

*Unburdened by any considerations of practical application, this uninhibited play with materials resulted in amazing objects, striking in their newness of conception in regard to use of color and compositional elements. (p. 3)*

As it seems, the first explorations were far from the systematic practical and theoretical research Gropius proposed in the quote above. Further, Albers writings indicate that the turn towards a more disciplined effort did not appear top-down, but that such foundational aspects of the program actually appeared in and through their explorations:

*A most curious change took place when the idea of a practical purpose, a purpose aside from the purely artistic one, suggested itself to this group of weavers. Such a thought, ordinarily in the foreground, had not occurred to them, having been so deeply absorbed in the problems of the material itself and the discoveries of unlimited ways of handling them. This consideration of usefulness brought about a profoundly different conception. A shift took place from the free play with*

*forms to a logical building of structures. /.../  
Concentrating on a purpose had a disciplining effect,  
now that the range of possibilities had been freely  
explored. (p. 4)*

The formulation “suggested itself” may appear somewhat mystical, and the circumstances for the emergence of the functionalist turn are certainly more complex than this. But there is something of great importance in this, and that is how the introduction of a new conceptual framing re-contextualised the experiments by suggesting a new direction ahead.

We can see traces of very similar processes in our work. As in how early experiments with the aesthetics of computation made us formulate the Slow Technology program (Hallnäs & Redström 2001), or in how the IT+Textiles program (Hallnäs et al 2002, Redström et al 2005) emerged out of experiments initially not at all focusing on the particular combination of computational technology and textiles, but rather on open explorations on the usage of alternative materials in interaction design. These experiments involved not just textiles, but also redesigned IKEA furniture, waste materials at the office, etc. (Hallnäs et al 2001).

So, to return to our basic question: does the program always come first? There is no single answer to this question, but it appears as if programs for practice-based design research to a certain extent depend on the existence of a kind of “proto-practice” for them to emerge. The importance of the critical milieu, the open experimentation calling for a conceptual reframing to make sense of early intuitions, etc., are all central properties of the context that opens up for the formulation of a strong program. Still, the program comes ‘first’ in the sense that all this fall in place only when that conceptual framing suggest that clear direction forward. It is through this move that the basics of the program/experiment dialectics that from this point will drive the process is first established.

## UNFOLDING

The mutual dependency of program and experiment stems from the program’s need for materialisation –that which will make the hypothetical world-view of the program into something ‘real’– and the experiment’s need for precise frames –that which makes the experiment into something more than tinkering or undirected exploration. A program is not just a program, but a program *for* something, and it is this *some-thing* that the experiment materialise.

Further, an experiment needs some kind of intention or direction to really work as an experiment in research. In other areas of research this could be the hypothesis to be tested, the problem to be solved, etc. The design program, however, is more suggestive in nature. Of course it takes a stance in relation to some key issues, sometimes even including practical matters such as how to work and with what. Yet, it must be open for interpretation and in some respects even only tentative;

it needs interpretation to become explicit. It must respond to an urge to change.

We interpret the program through experiments. Through the way we set up the experiment, we present a certain perspective on the program. Using the metaphor of a design space opened up by the program, we might say that we use the experiment to explore this space, positioning us somewhere to be able to say “this is what the design space looks like over here”.

The experiment makes these interpretations of the program through the addition of constraints, by making certain issues, such as work method and material, more specific, etc. We might say the experiment setup act as a kind of specification of the program with respect to some subset of issues.

Let us compare this with the situation in more traditional research were we design an experiment meant to address the hypothesis. On basis of the results of the experiment, we may then either affirm, refute, or, more likely, rephrase the hypothesis and iterate the process – and we will do so not only on basis of the results of the experiment, but also on basis of how well the experiment as such actually addressed the hypothesis.

Clearly, there is more to this than just affirmation or rejection of hypotheses. Thus, design plays a central role also here (the experiment *is* a design), as do interpretations of issues and questions through design (as in how the experiment is designed to address issues suggested by the hypothesis). In a sense, the experiment is an interpretation of what is important about the hypothesis; an interpretation expressed through the way it is set up, through the way it is designed. Just consider the diverse character of the actual experiments in different traditions in psychology (e.g. behaviourism, cognitive psychology, ecological or gestalt psychology).

In this experimental design research, this practice-based approach driven by design experimentation, we work with programs rather than hypotheses but they too have this characteristic of depending on experiments to come to life, to become something we not only speculate about. Though our programs are not affirmed or rejected through our experiments –as it rarely is of much value to us to simply refute or accept a given program since our interest lies with what it can *do* for us – we still use experiments to explore what the program means.

## STABILISATION

The perhaps most important difference between the design program and other constructs such as a hypothesis, is that while the hypothesis ideally should be quite precise and ‘testable’, a design program needs to be suggestive and open for the unexpected. Whereas the hypothesis ideally is addressed through one experiment, the design program needs to open up a space where innovation and future development is possible, thus typically requiring us to perform series of experiments to illustrate the diversity it affords.

This means that our design experiments not only need to expose the logic of the program – they must also illustrate it by means of exhibiting a logic in relation to each other. Though the program should afford a rich space, it must not be random but a structured one – or else we could as well do without it. As a result, the issue of interpretation becomes rather central here: the interpretation of the program we make as we design experiments, the interpretations of the experiment we make as we analyse the results, the interpretation we make as we look at a collection of experiments belonging to one program, etc.

Given the inherently open and suggestive nature of the design program, and how experiments can be considered interpretations of the program, we see another reason why program and first experiment often seem to develop more or less simultaneously.

When designing, we typically design *some-thing* given, i.e., an object of a familiar kind such as a house, a certain piece of furniture, a communications device, etc. These things function as a baseline against which we may relate program and experiment. It might even be that such existing objects act as the key we need to form our initial program. Besides relating to everyday object categories, we may also relate in this way to design experiments and examples stemming from other programs, as when other researchers elaborate on ideas introduced by someone else.

Importantly, that *some-thing* given is more than a concept, it is also form – and this particular form (also in a very concrete sense) has an influence that is hard to escape, at least without conscious effort. It is quite interesting to see that in many projects –our own and other’s– where it has been assumed that the precise form of an early proposal or design example is not that important, we still see that the concrete form of such early proposals have a tendency to survive throughout the design process. In the same way, early design examples tend to get a strong normative function as they help establishing the program (and thus the program/experiment dialectics).

As an illustration from our work, consider the Interactive Pillows. Developed just before the IT+Textiles program begun as a way of both initiating collaboration and for expressing basic intentions behind the program, they seemingly received a rather strong normative function for what would come in at least three different ways: not just using textiles as material, their usage and place in everyday life are also tightly related to a traditional textile domain; they use dynamic patterns of light as their primary temporal expression; and they are re-interpretations of existing objects rather a new kind of object in itself. These three characteristics, neither of which are really in focus in the actual research program are afterwards present in a number of examples created within this program.

## DRIFT

Given that experiments play an important role when interpreting the program, it is also clear that the program is not the only thing determining what happens as we perform our experiments. Just as the program creates a frame for experimentation, so does the experiment create a frame for design work – and into this design work we of course also bring our own ideas about the program and yet other matters. The kind of research dealt with here is often inter-disciplinary. Such settings highlight the fact that the interpretations participants make typically differ from each other – not only do we bring different skills and perspectives into the process, we also look for different things. In case the participants have strong individual agendas, these will of course influence the course of events, and to some extent compete with the agenda put forward by the program.

The issue of how participants’ agendas might compete with the design program in terms of influence, leads us to another aspect of how program and experiment are related, that of how the program maintains influence on the experiments, thus not only acting as a starting point but as something continuously present in the work. That the program has such a presence is essential, as we otherwise will risk uncontrolled drift.

The influential power of the program depends on its suggestiveness, i.e. in what ways it is able to suggest a (consistent) way forward in the situations that occur, e.g., by enabling the participants to see certain potentials, to interpret what is going on, to decide what to do next, etc. This is a difficult role for the program, our provisional regime: while being open for the unexpected, it must at the same time be strong enough to maintain influence even when we are improvising, when spontaneous and intuitive.

When thinking and doing are intertwined, as they are when we make things, how things unfold also depends on what works, what can be done here and now with the materials of the design situation. Especially in collaborative work, what quickly establishes a way to move forward is likely to gain influence over something more difficult or time-consuming. The reason is that the latter in practice means almost stepping aside the process for a moment to figure it out, a moment during which the context might have changed rendering the idea less relevant to the movement forward. It is like a discussion or a debate – once a moment has passed, it is gone and hard to recover...

All this puts a certain demand on how we manage the materials of the design situation, as well as how we manage the many agendas that influence what is going on. In practice, it means that both program and experiment need to be set up in a way that will make the drift caused by all these things put into motion within the realms of what we are interested in investigating. That the program is able to ‘talk to’ the participants is therefore one of its most important features.

In relation to this, we can get another perspective on why some experiments, be that they have not been fully interpreted as such, often exist before the program is formulated: experiments may guide the formulation of the program in order to make the program tell us more precisely what it is about the experiments that is important. Having seen the outcome of such early experiments, we can make the program compensate for aspects not that important in the outcome, trying to calibrate the conceptual frames so that they don't guide us in the wrong way. This can not really be done without the kind of interpretation of the program that an experiment embodies. But this also means that early experiments often obtain a strong normative function. Thus, further experimentation need not only challenge the program, but also the experiments that helped establish it – or else we risk getting trapped in variations of the first experiment.

Let us now return to the example of an early normative design example, the Interactive Pillows, presented above. Towards the end of our work with IT+Textiles, we developed a new program, Static!, and although this program certainly builds on many of the ideas we had developed in previous programs, it was a step in a new direction as we then turned towards issues of sustainability (cf. Redström 2010). Now, if we look at the design experiment that became the pivotal point in the shift from the first program to the other, the Energy Curtain (described as a design example in both programs (Redström et al 2005, Mazé 2010)), there are again some strong similarities to the Interactive Pillows: the relation to a very traditional textile domain, the use of light patterns for dynamic expression and the re-interpretation of the interaction with an everyday object.

That design examples have this stabilising normative function is not in itself problematic, as there is a need for both stabilisation and drift. In the case of professional practice it might even be something we look for, as in our interest in the canonical examples that define a brand identity. Here, however, the possibility to expose these examples from a new point of view as we initiate a shift between programs is crucial as it can allow us to articulate ideas we might have developed in the practical experiments but that are not explicit in the actual program. In this case, this can be seen in how we developed the idea about critically re-interpreting the interaction with familiar objects into a central *leitmotif* in Static!

## CLOSURE

At some point, there is a need for distillation, of bringing things together into something that can be set in relation to the world outside. That a key feature of the program is how it establish mechanisms for pushing the process forward, creates a certain difficulty when it comes to the issue of termination or closure. Since the program's influence exists on basis of how well it supports taking the next step, it becomes difficult indeed look to the program itself for termination criteria.

Firstly, the program is not only a response to a set of issues or questions, but also some sort of assemblage of the resources needed for its realisation. In practice, termination of programs is often just as much a matter of the amount of funding, time, material and other resources available as it is a matter of when a set of experiments are finished. Still, what allows us to continuously calibrate and craft the research process is how well we can align research content within such constraints.

One way to answer the question about when a program is finished, would be to say the work is done when what is intended to be seen is truly present in the expressions meant to present it. If the fidelity is not good enough, if there are other expressions standing in the way obscuring the view, if the expression is not strong enough... well, then it is simply not ready.

Perhaps we can compare this situation with that of when a prototype is 'ready'. In the case of prototypes, it is quite clear that this question depends on what we want the prototype to investigate and express. In some cases, a scale drawing is sufficient to capture what we intend, whereas other issues might require scale models, functional mock-ups or experience prototypes. For instance, when it comes to prototyping interaction with technology there is often significant disagreement about what it takes, ranging from proponents of the use of simple mock-ups to enact scenarios since it is really in the social realm the most crucial aspects are to be found, to proponents of the necessity for fully functional prototypes to capture detailed technical interaction with the device. Depending on who we ask (and when), we will get quite different answers to the question of when a prototype is 'finished' with respect to the questions asked as it depends on what we look for and what we think needs to be there for us –and, importantly, also for others– to see it.

Again, however, this is indeed a decision we make, and not an objective observation about the work. With respect to issues of knowledge and research, this is somewhat unsettling, and it is therefore important to understand the wider context of making this decision to stop the process. When evaluating a program, it is placed in relation to other programs. Asking questions about strengths and weaknesses, possibilities and problems, we try to find out what the program can do, often with a focus on what new ways of thinking and doing it opens up. Such a critical examination of the program can only be done when there are examples enough to really express the design space opened up; the extent to which the experiments take advantage of and present what is 'new' in the hypothetical worldview proposed in the program is central here. And so, another termination criteria, is when we see that this critical examination is not only possible, but fair to make as all the basic components necessary to make the basic argument are in place (cf. Buchanan 1995).

If the evaluation of the program in the context of competing ‘knowledge regimes’ represents an outside-in view, the corresponding inside-out view can perhaps be described as when the process stalls. While stalling might happen from time to time in any creative process, what is referred to here is when we come to a point where it is not possible to re-formulate the program as a response to the drift caused by the program-experiment dialectics over time, but when it becomes more or less necessary to do so. This might be seen in that new experiments do not seem to express much not already expressed in previous experiments, or that their most intriguing aspects seem to point to a need a shift in basic framing to be further developed. Another indication we might have reached a critical point is that we begin to rephrase earlier experiments as we begin to see them differently. Or, in other words, we come to a point where the program loses its ability to suggest a way forward.

### CONCLUDING REMARKS

As seen in the Bauhaus, new practices often have to transgress disciplinary borders in their pursuit of alternative ways of thinking and doing. One should, however, not confuse this with the issue of academic multi-, inter-, post- etc. disciplinarity. Of course, some of the proto-practices explored in programs like these might end up forming (parts of) new disciplines, but most of them do not. What is crucial here, however, is that one would not capture what is interesting about them by reference to how different disciplines come or do not come together in a given process. It is probably more useful to think of the programmatic approach to design research as orthogonal to more disciplinary concerns, similar to how Gibbons et al describe Mode 2 research (1994, p. 5):

*it develops a distinct but evolving framework to guide problem solving efforts. This is generated and sustained in the context of application and not developed first and then applied to that context later by a different group of practitioners. The solution does not arise solely, or even mainly, from the application of knowledge that already exists. Although elements of existing knowledge must have entered into it, genuine creativity is involved and the theoretical consensus, once attained cannot easily be reduced to disciplinary parts.*

The possibility of using design programs to establish a kind of ‘provisional knowledge regime’ (cf. Binder and Redström 2006), has made this approach very useful in contexts that on one hand depends on experimental design work but on the other does not really build on a strong and well-established practice in itself – but where the very search for foundations for, and examples of, a practice-in-the-making is a core issue. Albers descriptions of the Bauhaus clearly show that the use of a program to support a practice-in-the-making is not new.

With accelerating technological development and new societal challenges, the need to develop ‘new’ design practices to address their potentials and problems has increased as well. Many of these will end up as local and temporary micro-practices far from the large academic structures we refer to as disciplines. But there is a need for such alternative ‘proto-practices’. You can not explore the sea only using super-tankers.

### ACKNOWLEDGMENTS

This work would not have been possible without the collaborative efforts the programs mentioned represent. Thanks also to the XLab project (Thomas Binder, Eva Brandt, Mette Agger Eriksen & Johan Redström) funded by the Danish Centre for Design Research (2006). Special thanks to Thomas Binder without whom many of the ideas articulated here would never have been thought. Additional support for this research has been provided through the Forms of Sustainability project, funded by the Swedish Research Council.

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# GIGA-MAPPING: VISUALISATION FOR COMPLEXITY AND SYSTEMS THINKING IN DESIGN.

BIRGER SEVALDSON  
OSLO SCHOOL OF ARCHITECTURE AND DESIGN  
OCEAN DESIGN RESEARCH ASSOCIATION  
BIRGER.SEVALDSON@AHO.NO

## ABSTRACT

Designers and design is facing ever growing challenges from an increasingly complex world. Making design matter means to cope with these challenges and to be able to enter new important design fields where design can play a crucial role. To achieve this we need to become better at coping with super-complexity. Systems Oriented Design is a new version of systems thinking and systems practice that is developed from within design thinking and design practice. It is systems thinking and systems practice tailored by and for designers. It draws from designerly ways of dealing with super-complexity derived from supreme existing

design practices as well as refers to established perspectives in modern systems thinking, especially Soft Systems Methodology, Critical Systems Thinking and Systems Architecting. Further on it is based on design skills like visual thinking and visualisation in processes and for communication purposes. Most central are the emerging techniques of GIGA-mapping. GIGA-mapping is super extensive mapping across multiple layers and scales, investigating relations between seemingly separated categories and so implementing boundary critique to the conception and framing of systems. In this paper we will present the concept of GIGA-mapping and systematize and exemplify its different variations.

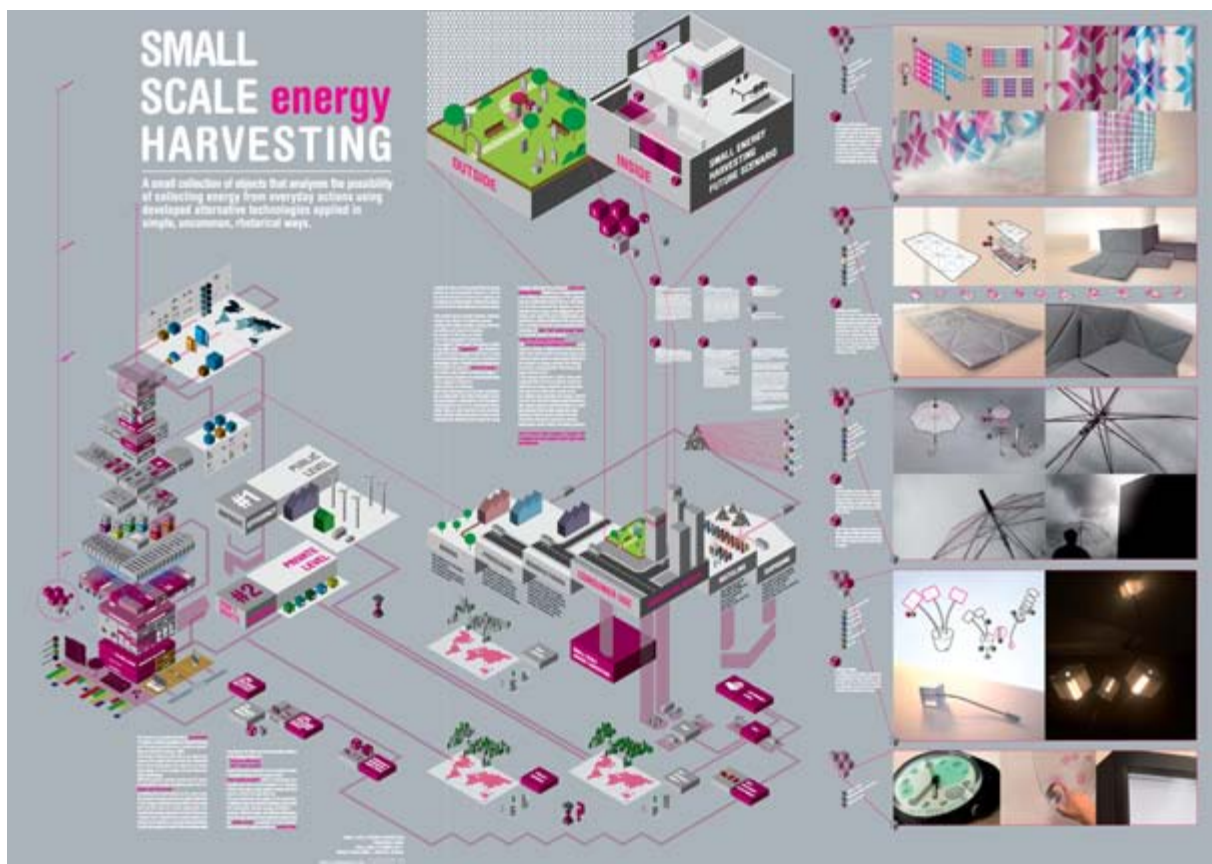


Fig 1: A mixed GIGA-map of the possibilities for distributed small scale energy harvesting and how this would impact human behaviour. Zoom in to see some more details. (Student: Francesco Zorzi 2009)

## INTRODUCTION

This paper presents research by design on one of several particular techniques (GIGA-mapping) developed for and within an emerging approach to design for complexity called Systems Oriented Design. The background and status of the research into Systems Oriented Design (SOD) and some of its different aspects has been reported on before and will not be discussed in depth here (Sevaldson 1999 a,b, Sevaldson 2000, Sevaldson 2001, Sevaldson 2005, Sevaldson 2008 a,b, Sevaldson, Hensel, Frostell 2010, Sevaldson & Vavik 2010). The scope of the paper is limited to the special theme of GIGA-mapping though the wider context and the relevance of this approach are touched upon as far as the format of the paper allows doing so. Another limitation to this paper is that it merely gives an overview and a series of examples and a general discussion on GIGA-mapping. In a forthcoming article we will report on the techniques and details of GIGA-mapping as a design activity.

Systems Oriented Design as well as GIGA-mapping has been developed by the author and colleagues at the Oslo School of Architecture and Design. During the last ten years we have investigated methods and techniques that address the challenge of complexity in working with products, services, large scale systems, information, media types and representations of design processes. The presented studies are bottom up research based on findings from mainly master level student projects in collaboration with partners from business and organisations, and in workshops for several consultancies and organisations.

This initiative has been driven by the increasing complexity that confronts designers individually and the design profession in general. Very severe and crucial problems need to be solved in the future and designers are in a special position to make a difference to make design matter. Designers work with many levels of innovations and they are inherently trained to work with very complex problems in a holistic manner. But designers need to become better at dealing with complexity. This is rarely trained especially and it is our intention to contribute to improve this field of design practice.

SOD is systems thinking tailored by and for designers. While this research started from within experimental design in the *OCEAN design research association* (1995) it was reaching a new stage when we started to address and relate complexity in design with systems thinking in 2005. Today the research refers to three main conceptual frameworks:

- Design thinking and design practice
- Visual thinking and visual practice

- Systems thinking and systems practice

These will shortly be described below, only touching upon issues I found especially relevant for the theme of the paper.

GIGA-mapping, the topic of this paper is embedded in this context of design, systems thinking and visualisation. GIGA-mapping is creating an “information cloud” from which the designer can derive innovative solutions. While mapping in general is a way of ordering and simplifying issues, so to say “tame” the problems, GIGA-mapping intends not to tame any problems. GIGA-maps try to grasp, embrace and mirror the complexity and wickedness of real life problems. Hence they are not resolved logically nor is the designerly urge for order and resolved logic allowed to take over too much and hence bias the interpretation of reality.

## DESIGN THINKING AND DESIGN PRACTICE

Design Thinking has been defined as inseparable from design practice (Lockwood, 2010, Cross, 2007, Cross, 2011, Brown and Katz, 2009). Research by Design manifests the nature of Design Thinking. New knowledge emerges and is externalized before, during, and post practice (Sevaldson 2010). Synthesis is the central aspect of design thinking. The process of synthesising, though debated, remains enigmatic and resists strict methodological framing. I base my conception of this process very much on the five stage model by Wallas (1926), later by most writers reduced to four stages. The four stages are Preparation, Incubation, Illumination, and Verification.

Incubation and illumination is found and described by an overwhelming majority of very creative people (Csikszentmihalyi, 1996). Though both incubation and illumination resist a deeper understanding beyond what can be derived from observations and testimonies, nevertheless we can influence the process of synthesis. Incubation is typically a process where complex information is processed over time. It is in the preparations, the information collection and in the tentative, iterative, and heuristic development that we can do things differently. Incubation and illumination is then not really phased but appears more or less integrated in preparation and verification activities.

## VISUAL THINKING AND VISUAL PRACTICE

Visualisation, visual thinking, descriptive and generative diagramming are central in this heuristic process. Visualisation is a field described by e.g. David McCandless (2009). Visual thinking is earlier described by Rudolf Arnheim (1969), and diagramming e.g. by Tufte (1983). While

infographics are mostly occupied with communicating information to a passive audience, visualisation in GIGA-mapping intends to be applied in processes as well as for communication and involves participation and collective production of information.

I will return to this topic when discussing it in relation to GIGA-mapping.

## SYSTEMS THINKING AND SYSTEMS PRACTICE.

The aim of the reported research is to develop systems thinking as a design proprietary knowledge and to develop it as a skill and a practice.

Designers are to a certain degree trained in working with “wicked problems” (Buchanan, 1992, Rittel and Webber, 1973) and to generate holistic resolutions from complex project information. Designers are often positioned very close to decision making. Designers do often also have a special holistic overview spanning from technical, via socio-cultural aspects to economic aspects. This provides the designer with power to induce change.

Recent developments with impacts of globalisation and requirements to sustainable production pose increasing challenges to the designer. It is required that designers respond not only to singular aspects of the design task, like the concept, usage and shape of the product and service, but also that they increase their understanding regarding e.g. technology, client-specific frameworks, cultural aspects, market analyses, sustainability and ethical concerns. In practice some of these requirements tend to be emphasised on the cost of others. Often the holistic perspective is sacrificed because of a lack of ability to maintain complexity throughout the design project. The ability of designers to address many aspects simultaneously and to generate holistic, and at their best, synergistic responses is in fact a type of soft systems practice. This has been recognized by others who made an effort to systematize and learn such abilities. One example is Mayer and Rechtin (Maier and Rechtin, 2000, Rechtin, 1999) who have coined the term Systems Architecting. The term is used in a new type of project management profession working along with the traditional project managers not to replace them but to supplement the hard logistics with more artistic, intuitive and holistic perspectives. The term Systems Architect is inspired by the building architects ability to keep a holistic overview, to negotiate the views of experts and to hold the threads of a complex project together. If we look into ‘normal’ design education and practice, it is apparent that we do not really live up to be honoured like that. We do not teach and develop those assumed advantages of the design professions very actively. We do not have good concepts for dealing with super-complexity. Systems thinking is one of few general frameworks to deal with complexity. It is used in most sciences

and practices where different variations and approaches to systems thinking are developed. Systems thinking in design is currently not very widely spread though there is a growing attention. But there were a number of people who have referred to systems thinking like Rittel, Alexander (1964), Harold Nelson and Erik Stolterman (2003) Glanville (1994) Jonas (1996) and others. Though a handful design thinkers have made some substantial contributions to systems thinking in general, hardly anybody has developed a systems practice from within design, specially informed by design thinking and design practice. This is remarkable when we compare us with other fields where proprietary adaptations of systems perspectives are normal. We find those in engineering, sociology, management, military operations, psychology, economy etc. But not in design. When we want to build the proprietary version of systems thinking and systems practice in design we need to build on the inherent abilities of designers to cope with complex problems.

## FRAMEWORK

Parts of this new framework of SOD has been defined in earlier publications and will only be referred to very shortly here (Sevaldson, 2008b, Sevaldson, 2009b, Sevaldson, 2009a, Sevaldson et al., 2010, Sevaldson and Vavik, 2010). Its theoretical basis is found in systems theories especially Soft Systems Methodology (Checkland, 2000), Critical Systems Thinking (Ulrich, 2000, Midgley, 2000) and Systems Architecting mentioned before, and especially in the reinvention of diagramming in architecture as a generative tool (Allen, 1999, Berkel and Bos, 1999, Davidson et al., 1998, Eisenman, 1999, Massumi, 1998, Sevaldson, 1999a, Somol, 1998, Bettum and Hensel, 2000). This shift freed the diagram from sheer representation and clarified its potential for being a central device in generative and creative work.

SOD brings together these different design and systems practices with Critical Systems Thinking, foresight and scenario thinking. Critical Systems Thinking applies different systems frameworks critically in relation to what purpose they are serving. Design practice has especially much to contribute to established systems thinking. Significant is the ability to incubate and synthesise solutions within fields and applications where there are no singular and clear responses to be found, and where the value of responses is evaluated iteratively through practice and by gathering experience, expertise and intuition over time.

## METHODS

The work presented below is Research by Design conducted over the last years by the author, colleagues and students at the Oslo School of Architecture and Design and in the framework of the OCEAN design research association. In an



earlier paper the author has described seven modes of practice research in design (Sevaldson, 2010). While earlier studies were of the type six, *Experimental Design Practice*, where *the practice is experimentally changed and modified to explore and develop specified investigations, research questions or effects* the research into Systems Oriented Design is of type seven. This is *The inductive and iterative theory-driven & theory-driving experimental design research practice* (pp.28). This indicates that the development of a new design technique is conducted in an intimate relation between different modes of practice and different modes of reflection. For further elaboration on Research by Design methods and perspectives please review these publications (Sevaldson, 2000, Sevaldson, 1999b, Sevaldson, 2010).

It is from the practice of GIGA-mapping that we have gathered the experience we needed to start systematising it in this paper. The approach to analyse this research by design is a soft categorizing of the different maps we have produced with students and colleagues and business associates. The sorting is done according to two types of criteria: the structural and graphical type of maps and the functional usage of the maps.

#### GIGA-MAPPING: VISUALISING FOR COMPLEXITY

One of the most important, but also underdeveloped, advantages of designers regarding design for complexity is that they have special abilities to use visualisation as tools for analyses, as process tools and for communication. Visualisation and visual thinking has increased in importance after design computing has become standard (Sevaldson, 2001). Visualisation in design is used for representation, drawing sketches and renderings of possible solutions. More recently visualisation in design has been inspired by information visualisation and visualisation of dynamic actions like e.g. service design blue prints and story boards. Most of these applications and other uses of diagramming in design do have specific limitations to theme and scope. Service design blue prints are mostly framed by the emerging disciplinary boundaries. Information visualisation as a field is almost entirely concerned with communication and less with processes. The use of diagrams in design projects as well as in design research is not well developed and in many cases there is a wide spread misuse of diagrams like the Venn diagrams or Pournelle diagrams leading to oversimplification of complex problems.

With GIGA-mapping we intend to brake these diagramming clichés as well as other schemata and prejudices. GIGA-mapping is a tool to increase and aid our capacity to grasp and work with super complexity. Visualisation skills can also be used in more abstract phases of the processes. Fields of

knowledge can be visualised so that a better overview is achieved. The complexity of a problem can be mapped out and visualised. Structures of systems and processes can be diagrammed. Very valuable are the tentative iterative “not-always-knowing-what-one-is-doing” states of sketching and visualisation. The potential of true visual thinking emerges not only from documenting thoughts but by visualising and dynamically forming the analyses and developing the thinking from the visualisation. Generative visualisation is one of the central advantages of the designer.

#### THE RELATION TO OTHER WAYS OF DIAGRAMMING

GIGA-mapping is nothing principally new. We find similar approaches like mind mapping or concept mapping. Especially the Rich Picture introduced by Checkland (1981) is relevant as a predecessor of GIGA-mapping, especially because it was introduced as a means of working with Soft Systems Methodology, e.g. human activity systems. The intentions of the Rich Picture are pretty much similar to the ones of GIGA-mapping. The difference are qualitative and quantitative rather than principal. They are found in the practice. The way the Rich Picture is practised is still quite limited in scope and numbers of issues on the plate. Its main aim is to create an overview, ordering and simplification. Also the Rich Picture is mainly practised as an illustrated network diagram.

GIGA-mapping breaks the barriers of information quantity by separating the process tasks and the communication tasks. The GIGA-map needs in its first phases only to communicate to its creators. This allows for a dramatic increase of information amount, since creating the map internalizes far larger information amounts than what would be the case when approaching it as an outsider. Also the graphic means and the designer’s ability are central. The GIGA-map is regarded as a design artefact itself. This nested design process has proven to be very efficient in getting at grips at a higher level of complexity.

Another way that GIGA-maps might differ is in the fact that they should layer many types of information. Categorically separated information channels needs to be interrelated.

Yet another difference is the multi scalar approach in GIGA-mapping, spanning from the global scale down to small details.

#### RUPTURES IN THE DESIGN PROCESS

A central aspect of working with very complex tasks is to keep as many aspects of a problem field in play for as long as possible throughout the process. A natural progression in the design process is narrowing down aspects and possible solutions towards the end of the process where the windows of opportunities are closing and when the resources invested are increasing and errors would have

increasingly serious consequences. This process is often hampered with problems. One problem is that the amount of information is so large that not everything is properly taken into consideration. Small issues that seem unimportant can become crucial for the process at certain moments. If they are forgotten because of sheer information overload, the result can be a costly rupture in the process. Another typical rupture may occur when the client organisation is not understood properly. Different sections of the organisation are not always well coordinated which can lead to ruptures in the design process. An early anchoring of the project in the relevant sections of the organisation can be crucial. Such sections would be marketing, economic, strategic management, technology and production.

Another example of ruptures is caused by problems occurring in the implementation phase when the product or service system is to be launched into the real world where it becomes a player in complex emergent systems like stock markets, trends, raw material markets etc. A careful early forecasting of the implementation phase and investigations into worst case scenarios and risk evaluation might induce early interventions in the design that could prevent some of these problems.

To help avoid such ruptures, and to engage with as many as possible issues and keep them in the play as long as possible, the author has developed the concept of the Rich Design Space (Sevaldson,

2008a). GIGA-maps are the central device in the Rich Research Space which includes social spaces, media spaces and physical spaces. All information throughout the process needs always to be highly accessible to remain active for a longer period in the process. This allows back tracking and rechecking information at any time to reduce risks of errors.

Designing “builds” material for decision making. This material is both textual and visual, abstract and figurative. The complex information in a design process should be “alive” throughout larger parts of the process either spontaneously or at checkpoints or iterations.. This means that designing generates information that will modulate itself along the process.

Re-examining the design material at points of iteration will help secure that the information is brought into play and developed while it is updated and re-understood through the designing process (Fig. 2).

GIGA-mapping is the central tool for such sampling, re-aligning and synchronizing of complex information through out the design process.

Needless to say the suggested techniques will not entirely remove any ruptures, but they ensure that a proper effort is made to avoid them as much as possible or to be prepared for them should they occur.

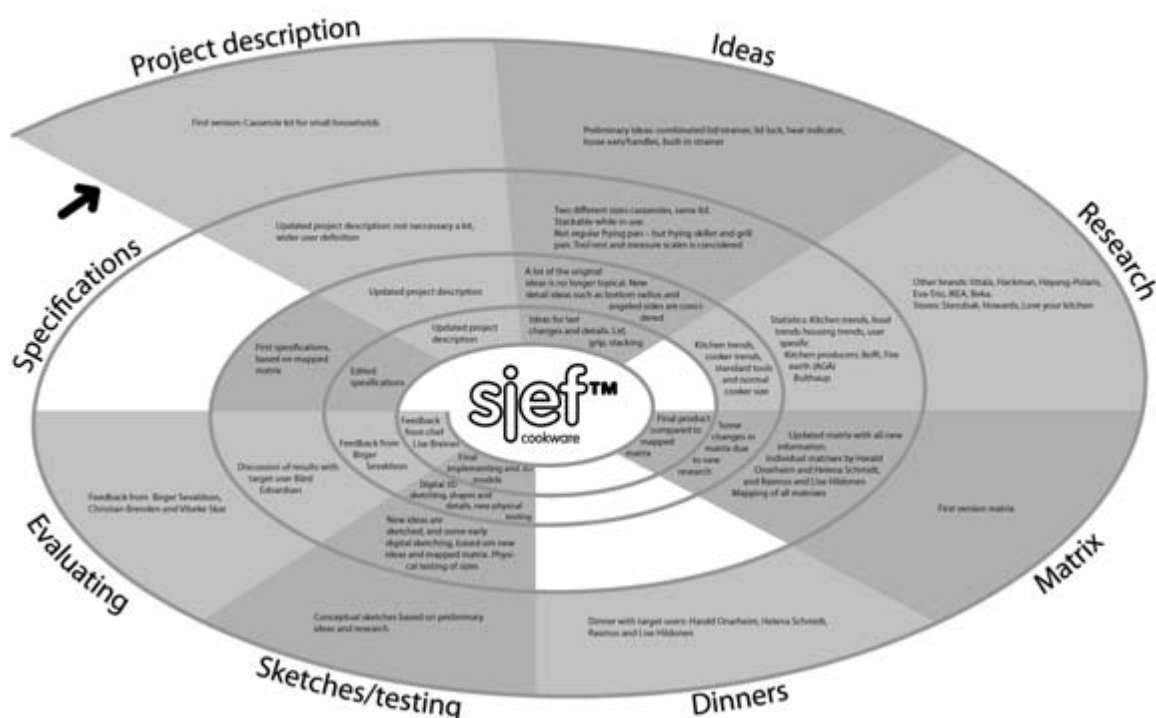


Fig 2: Diagram of a guided process for design process iterations. The spiral diagram indicates how the design process went through four iterations where the same themes or issues were rechecked. These were Project description, Ideas, Research, Matrix, Dinners, Sketches / testing, Evaluation and Specification. Not all of these were re-examined for each iteration. Some issues required more rework in the iteration and the rework would vary in different stages. This diagram was directly used as a process tool to check each stage in iterations. Zoom in to see details. (Students: Balder Onarheim, Pål Espensen, 2008)

## BEYOND THE HORIZON

GIGA-maps are ultimately tools for drawing systems boundaries. Boundaries are needed to frame the system. They define the simplified and manageable framework for the design intervention. But simplification is often done too early and too quickly. Before one can draw the boundary of a system or frame the problem we need to unfold the field way beyond what we assume is the horizon of relevance. Only when we know the landscape past that horizon we can withdraw and draw the boundary in an informed manner. Small things far out on a chain of effects can become crucial to make a project live. We need to find those crucial triggers that are not immediately visible. GIGA-mapping ensures that all efforts are taken to track down what is relevant and to include it in the design. This approach is our answer to boundary critique, a well known perspective in systems thinking (Midgley, 2000).

## TYPES OF GIGA-MAPPING

There is no definite number of types of GIGA-maps. I arrived at a tentative list of maps by going through a large number of GIGA-mapping exercises. It is possible and probably beneficial sometimes to design a new type specially adapted to the problem at hand. Possible mappings include:

- Hierarchical maps: Mind maps
- Non-hierarchical maps: Concept maps
- Time based maps: Gantt
- Time based maps: Timelines (non-Gantt)
- Time based maps: “Key Frame Mapping”
- Time based maps: Flow charts and similar.
- Time based maps: Digital animated maps.
- Time based mapping: Story boards.
- Image maps: Qualitative information in maps,
- Images, video, soundtracks.

- Spatial maps: Geographic maps or construction plans. Flow patterns.
- Intensity maps: Gradients and interpolation of continuous intensity fields.
- Mixed maps

## USAGE OF GIGA-MAPPING

Our bottom up and practice based research on GIGA-maps compiled a possible list of the following functions:

- Learning: Mapping and coordinating pre-existing knowledge.
- Research: Including and organizing knowledge gained from targeted research.
- Imagination: Generative, iterative design.
- Management: Working with the involved organisation as a complex social organism.
- Event mapping: Working with orchestrating of complex events.
- Planning: Registering, describing and modifying complex processes.
- Innovation: Defining areas and points for intervention and innovation.
- Implementation: Engaging in all details and agents ecologies and environments of complex implementation processes.

## A MATRIX OF GIGA-MAPS

The matrix below shows how the different mapping types have been preferably combined with the different themes (Fig.3).



	Research	Learning	Generative	Management	Event mapping	Planning	Innovation	Implementation
Mind maps	X	X						
Concept maps	X	X				X	X	
Gantt diagrams				X	X	X		X
Timelines		X		X	X	X	X	X
Key frames		X	X		X			X
Flowcharts						X		X
Animations			X		X			X
Story boards			X	X	X		X	X
Image maps	X	X	X				X	
Spatial maps	X		X		X	X		X
Intensity maps	X		X		X		X	
Mixed maps	X	X	X	X	X	X	X	X

Fig. 3: The matrix shows the different types of design activities and types of maps and suggests what type of map is best suited for what activity. This is suggestive and not to be taken as a rule.

#### ADDITIONAL FUNCTIONS OF GIGA-MAPPING

The matrix is far from exhausting the functions of GIGA-mapping. There are many functions that are generic and applicable across all types of maps. Amongst them are: 1) Building expert networks and communicating with them, mapping a field involving stakeholders; the GIGA-map can be used to define where expert knowledge is needed; 2) Defining the boundaries of a system in an informed manner as mentioned before; and 3) Visualisation and communication of the final projects.

#### APPLICATION AREAS

In the following section we will go through a series of examples to demonstrate some of the usage areas mentioned in the matrix. The samples are following the same order as the matrix above. Because of issues of confidentiality most of the mappings with professionals cannot be shown.

#### RESEARCH

A good way to build knowledge for a project is to start with mapping out the things one already knows and what one assumes. This is a superior tool to register and coordinate knowledge from several collaborators and to jump-start the project.

When this first mapping is done the maps are used as starting platforms to do literature and internet search for missing information which is filled into the map. The next step is to define spots and areas where more substantial knowledge is needed. This indicates how to compose an ideal expert network for the project and helps meeting the experts well-prepared. New versions of the mapping are produced including the experts contribution. Then the maps are used to define zoom in areas and zoom out areas. These are areas where a shift in resolution is needed to grasp more detailed insight or to get a more global overview. Finally areas for innovation are searched for.

*Example: Research mapping for the design of an electric car:* The example shows the areas that need to be researched in a design process for an electrical car (Fig. 4). The diagram does not show the necessary research itself but it shows the themes that need to be researched. The unique quality of this map is that it immediately gives an overview of the extent of the task and then will help planning the research phase in a more realistic manner and it ensures that the needed knowledge level is achieved as fast as possible. It also helps to sort the research into the areas that need to be researched in depth and those where one can rely more on experts.

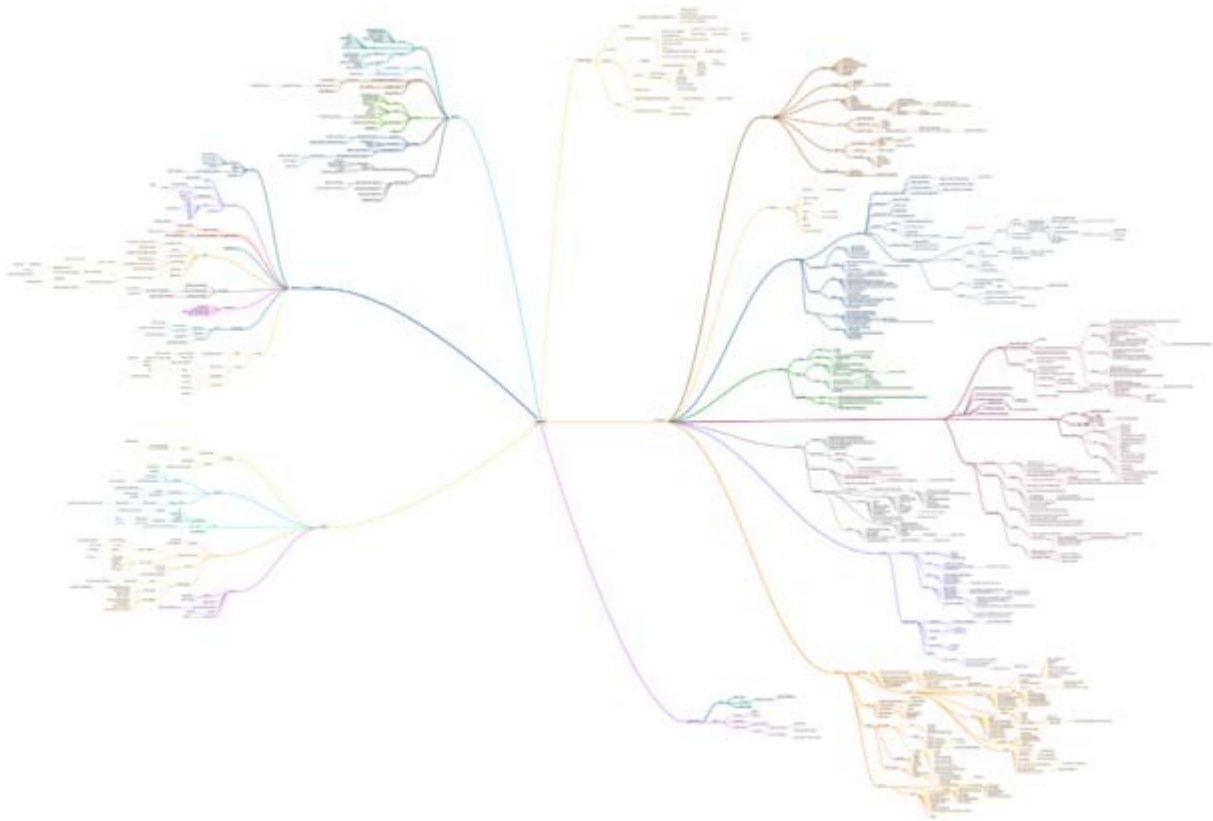


Fig. 4: Research mapping: The GIGA-map shows the mapping of the needed research to design an electric car. The map shows all the market-related, cultural, user-related inputs to the left and the technological requirements to the right, forming a double mind map with two focal centres. The map was first developed in the soft ware MindMap and later refined in Illustrator. Zoom in to study details. The visibility of the details is limited in this format but it gives an impression of the amount of information that was included. (Students: Thor Henrik Bruun and Fredrik Bostad, 2010)

## LEARNING

GIGA-mapping and a systems-oriented approach is very useful for extreme learning situations. It helps to map out the knowledge field early, to jump-start targeted quick research and to start with establishing the expert network early. GIGA-mapping helps to take an active role with the experts and to pose well-grounded questions. It also helps to make scenarios for problems one might face ahead.

*Example: Story porcelain lamps.* The case of the porcelain lamp indicates a very fast learning process, where a new material technology had to be learned and where there was no time for trial and

error (Fig.5). The learning process started with, and was very much dependent on, a “meta-map” that depicted a narrative travel through the learning process. The challenges were extreme: To learn a very difficult material and material technology, to design a product for this material, to produce molds and prototypes and to test sandblasting on the material to create patterns, something that hardly was done before in this way. The early establishment of an expert network was crucial. Though the experts initially were very skeptical to the success of the project, the process was successful and the porcelain Lamps produced within the deadline, the Milan Fair 2010.

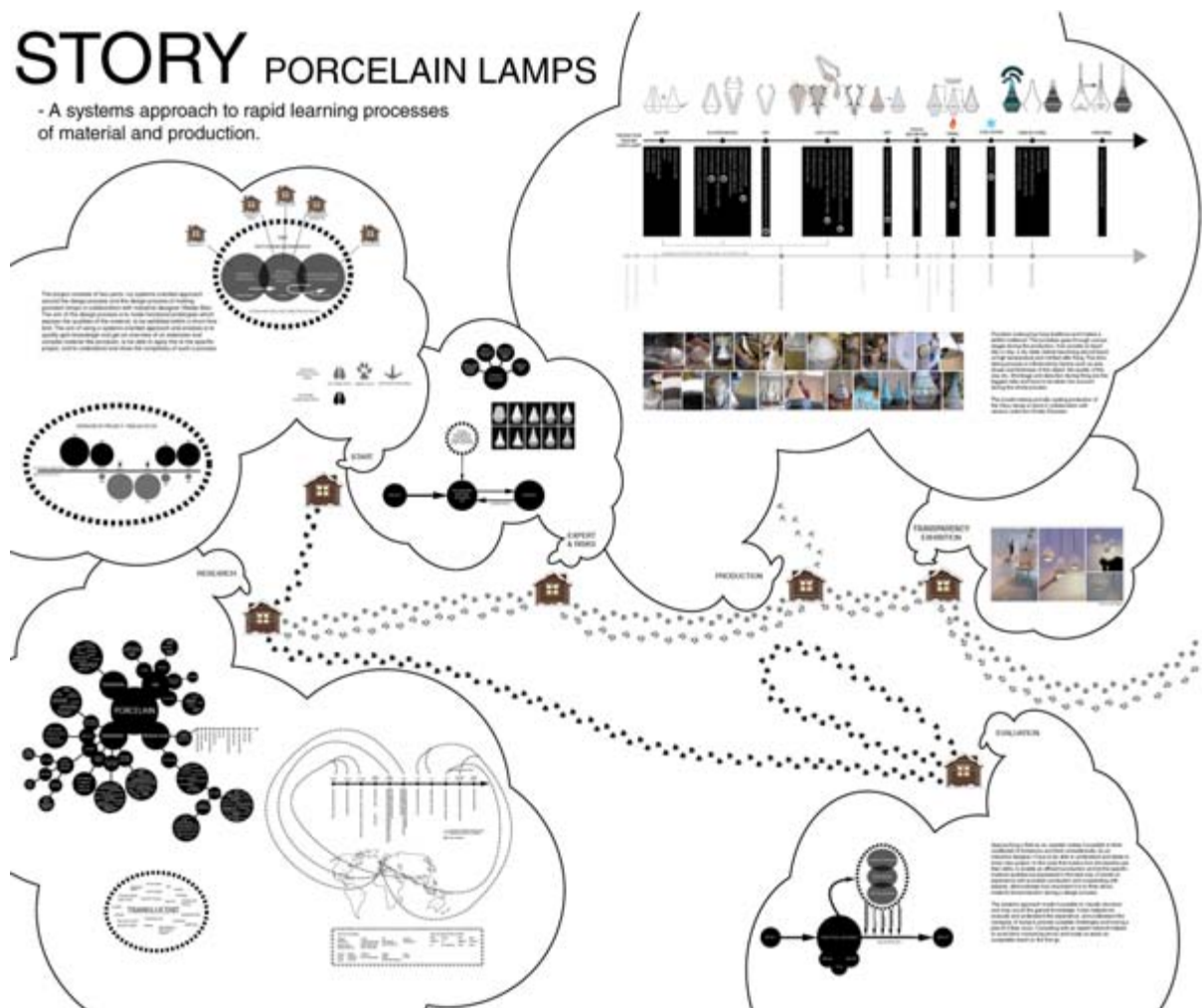


Fig. 5: The map shows the interlinking of several stages and maps in a systems oriented learning process. A for the student unknown material (porcelain) was researched and learned in an exceptionally short time. Porcelain is a very difficult material and the learning process was successful so that the final product, a lamp, was exhibited at the Milan fair after a period of only three months. The map shows start-up activities, research, experts and risk evaluation, materials and technology and evaluation activities. It also demonstrates a mixing of different mapping principles applied at different stages of the design process. Zoom in to see details. (Master's student: Ida Noemi Vidal, with Vibeke Skar, 2011)

## GENERATIVE DIAGRAMMING

Generative dynamic diagramming is used for mapping out and manipulating information that is imaginative and will form structural bases for design. Generative dynamic diagramming is closely tied to design computing, and animation processes. This emphasises the flexible and dynamic features of the information field. Also such diagrams often operate on field intensities rather than on entities and relations.

This strand of research is now about to be taken up again and related to GIGA-mapping in future planned projects.

*Example: Ambient Amplifiers* (Sevaldson and Duong, 2000a). This urban project was based on seed-information that was tentatively fed into a process of generative diagramming. Then these diagrams were interpreted and formed the template for design intervention. The process of interpretation was highly informed by an extensive research of the site (Sevaldson and Duong, 2000b) touching all kinds of issues from social structures, topographical features, political intentions and understanding the main actors at the site (Fig. 6).

The uniqueness of this approach is bringing together generative visualisation based processes with large amounts of real life information.

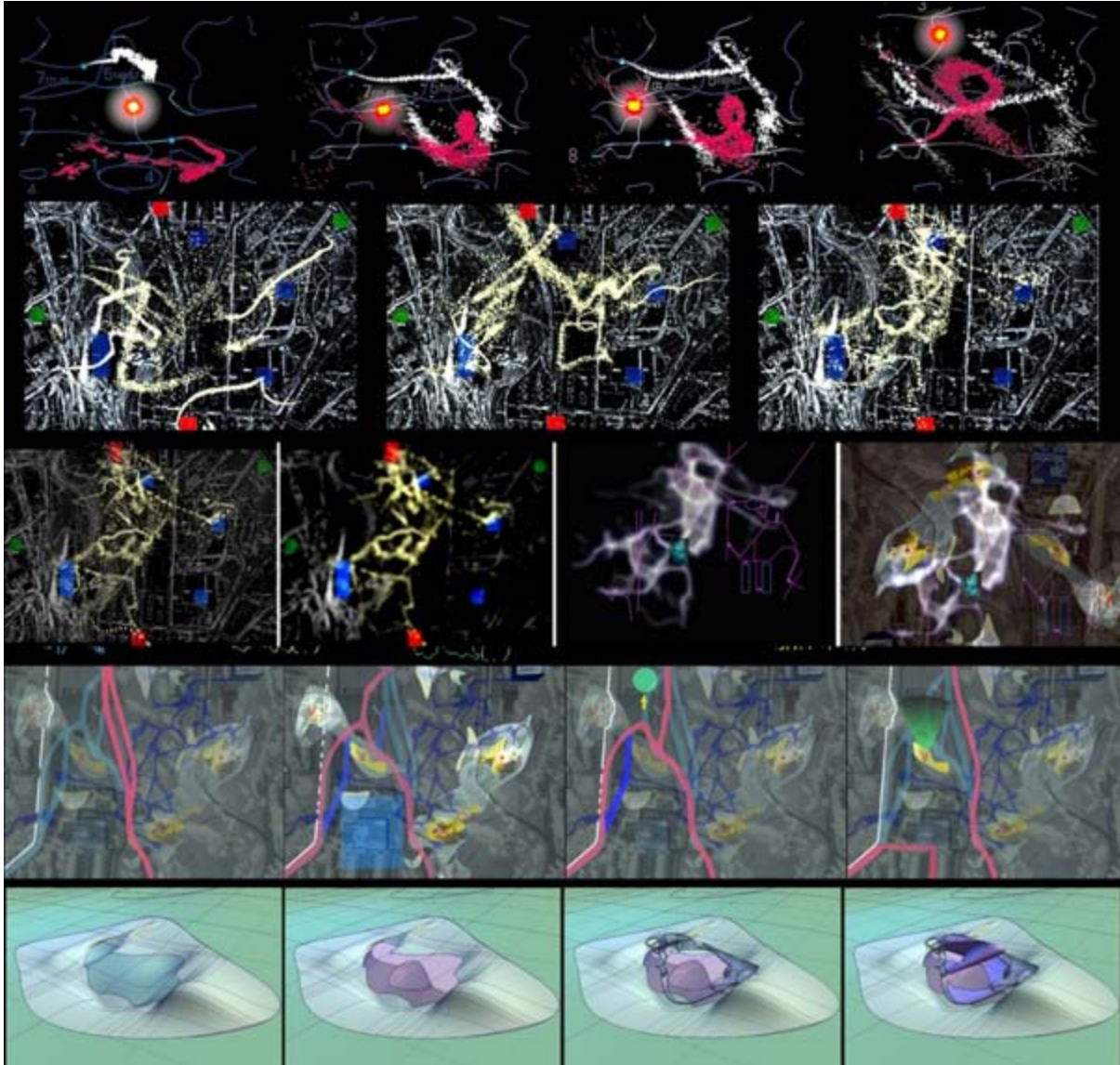


Fig. 6: Ambient Amplifiers: The project started with un-programmed spatial structures generated from an intricate setup of particle animations derived from the topographic model of the site and the influence of the main institutions (top row). Through several graphic stages (second row) the generative diagrams were slowly programmed by using them to inform the design interventions for the site (third row). These were a freely distributed path / play surface (fourth row, dark blue) a programmable road system (light blue and red) a flexible fence to the botanical gardens (white) and a system of “islands” (yellow) as institutional devices for collaboration between actors on the site. These are shown in the four different stages in the lower row. This process of interpretation was informed by a big amount of back ground information. (Author, 2000).



## MANAGEMENT

GIGA-mapping, and especially time-line mapping showed to be an excellent tool for meetings that are addressing especially complex issues, like strategic discussions, cooperation and processes. The meeting format allows dropping a written agenda. By only agreeing upon a theme the issues are unfolded in collaboration around the map. The meeting becomes open ended but still focussed and communication is very much eased when the map is used actively.

GIGA-mapping is used with success in groups where they help to establish a shared image of the complex field at hand. Mapping is then a social activity where all should contribute.

*Example: Mapping of research landscape at Institute of Design Oslo School of Architecture and Design. The mapping produced a new information access to the richness of the research landscape. The first map was organised in a clustered fashion that goes beyond the established types of maps. On the global level it is structured like a concept map and on the local level, for each cluster built up around each project, it is organised like a mind map (Fig. 7). It revealed the complexity of each research project and its layering and how they are theme-wise related. It created the bases for more synergies and the foundation for building overviews, consensus, relate knowledge activities, for resourcing and to plan for future projects (Fig. 8). The process demonstrates how different types of maps are useful to depict the same information and read it in different ways.*



Fig. 7: GIGA-map that was a product of a two hours workshop unfolding the complexity of the research activities at the Institute of Design at AHO. Each project (depicted in black frames) is surrounded with a network of collaborators, experts and financing bodies. Zoom in to see details. (Design research colleagues, AHO, 2010).

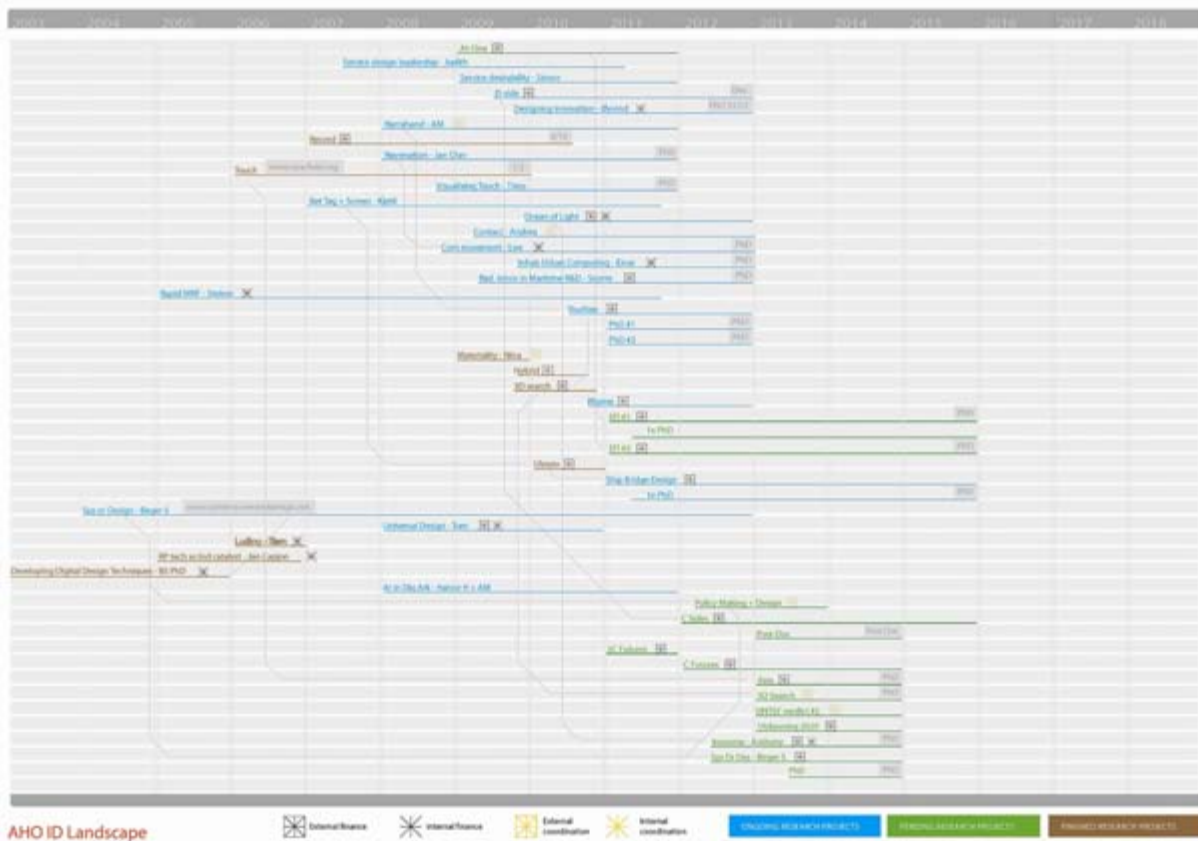


Fig. 8: At a later stage the projects were mapped along a time line in a “quasi-Gantt” diagram. This would draw the picture in a different way, losing some information but displaying other. (Design research colleagues, AHO, Adrian Paulsen, 2010).



## EVENT MAPPING

Mapping out events on spatial maps will provide the information needed to create well-timed experiences and to produce worst-case scenarios to prevent disasters from e.g. crowding.

*Example: Miniøya festival for children.* In the Music festival for children it was essential to avoid crowding. Therefore the project intended to plan for a careful orchestrating of resources and attractors throughout the event. When a special popular group was on the stage several other actors were triggered to prevent over-crowding. Additional attractors where activated elsewhere to “stretch” the field of

spectators so to avoid too dense crowding. Also the security staff was directed to the needed points to be ready for preventive action. It was possible to forecast and orchestrate the distribution and densification of crowding by looking at the spatial map and a time line with the activity program of the festival simultaneously. The achievements and innovations were: Crowd management through attraction control and balancing. The activation of several operational levels when needed. Just-in-time security management. Mapping of events in the form of snapshots was developed further and later lead to the concept of “Key Frame Mapping” (Fig. 9).

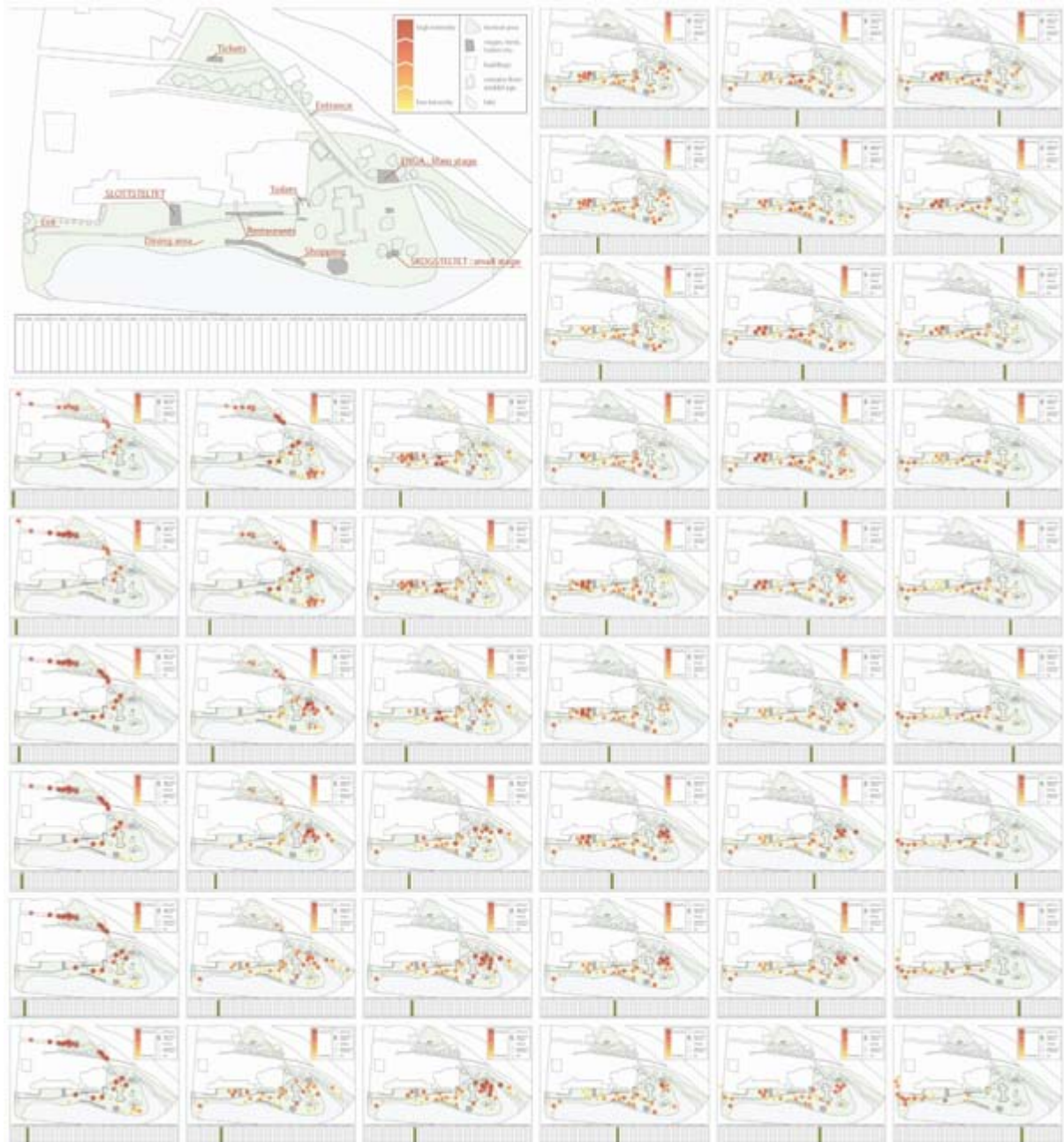


Fig. 9: Event mapping in scenario snapshots. “Key Frame Mapping” showing many different imaginable scenarios of crowding on a festival for children. Each “key frame” indicates a particular scenario between which it is possible to interpolate. Zoom in to study the variations. (Student: Ingunn Hesselberg, 2009)

## SEQUENTIAL ANALYSES AND SCENARIOS

The mapping out and unfolding of complex sequentially ordered scenarios can be diagrammed in several additional ways. Typical are Gantt diagrams, Flow charts and Pert diagrams. Also casual loop diagrams are used to find feedback loops. Most often one is better off in a design project to disregard strict diagramming rules like the flow diagram conventions.

*Example: A suggestion for an oil spill prevention system based on risk calculation and social networking.* The example shows a diagram that is treating sequential analyses in a designed way where rich information is combined. The analytic and systemic approach led to an innovative solution that coordinates all stakeholders and that makes risk evaluation accessible and useful so that the stakeholders can act for prevention rather than for repairing damages (Fig. 10).



Fig. 10: The GIGA-map shows a sequence of a typical oil spill disaster. This sequence is the key to map out and understand all actors, communication channels, technology and procedures involved and to pose critical questions for improving the response to oil spill disasters. This chart takes some features of the traditional flow chart breaks its conventions and adds new information in the form of a mind map structure and additional diagrams. (Student: Adrian Paulsen, 2010)

## PLANNING

GIGA-mapping is very useful for super-complex planning of processes.

*Example: Training software.* The intention in this case was to use the addictive features of computer games for reinforcing physical activity. Levelling points, goals, social networking and status are built into the game in a similar way as in a massive multi

player on-line game. The orchestrating of progress was developed along a complex mixed time line diagram. The result was an innovative genre-blending new software. Mixed time line diagrams are useful to work with when orchestrating complex multi-layered events that stretch over a long period of time (Fig. 11). (Student: Erik Falk Petersen).



Fig. 11: The shown GIGA-map is based on a Gantt diagram principle but has added qualitative information. The map, arranged along a time line, mixes elements from Gantt with other diagramming and qualitative information in the form of images. Zoom in to see details. (Student: Erik Falk Petersen, 2009).

## INNOVATION

GIGA-mapping leads to innovation because of the unfolding of potential points of interventions.

*Example: Fire Rehearsal Centre.* Through GIGA-mapping the student discovered the psychological aspect of fire prevention equipment. This equipment is by most people used very rarely or never. But it still plays a role even when not in use by providing a psychological effect of security.

Through GIGA-mapping the focus-point was moved from the fire situation to a point before an eventual fire. This could easily become a fire

prevention project, but the new angle of approach was the psychological factor. By addressing the user's knowledge and skill the feeling of security was improved by rehearsing (Fig. 12).

The result was a genre-crossing mobile edutainment centre for practising and testing all kinds of fire equipment (Fig. 13). A trustworthy financial model included co-financing from insurance companies, product manufacturers, fire prevention organisations, government and individual users of the centre. (Student: Heidi Borthne).



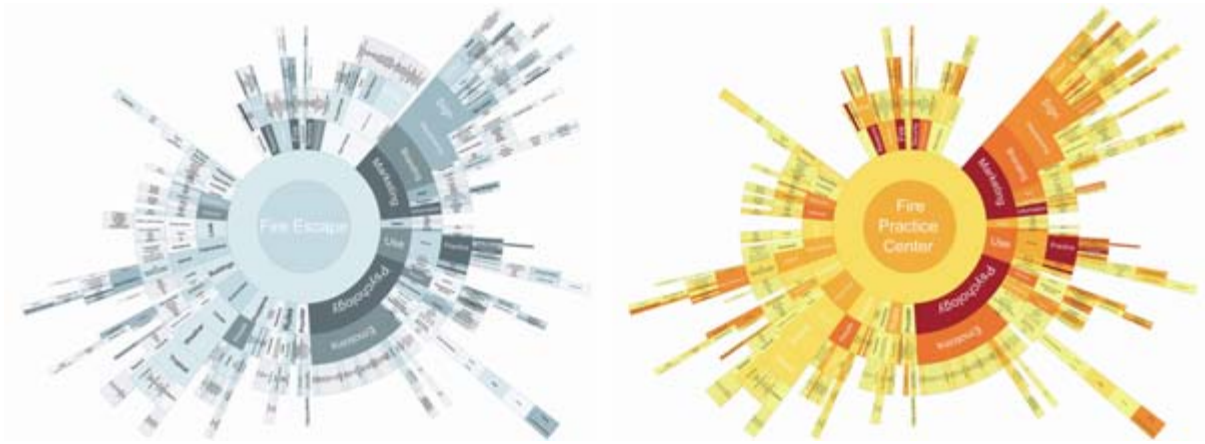


Fig. 12: The GIGA-map to the left shows the initial research where the redesign of fire products was at stakes. The systems analyses revealed other points for innovation with a bigger potential for having an impact. Especially the psychological factor was identified as important. The focus was moved towards prevention and education addressing the psychological factor by providing confidence. The GIGA-map to the right is redesigned with this new focus. The resulting new map was different from the original one in only a few areas. Zoom in to see more details. Some information is too small to see in this format. (Student: Heidi Borthne, 2009)



Fig. 13: The suggested training centre. This was a mobile unit designed to fit into a standard container size. Activities like testing escape ladders and ropes, jumping onto fire escape cushions and finding the way in smoke filled labyrinths are indicated. (Student: Heidi Borthne, 2009)

## IMPLEMENTATION

Implementation processes are super-complex because it is in this process the design intervention meets real life. GIGA-mapping is useful for creating very complex implementation scenarios.

*Examples: Customized aid for disabled children in development countries.* In this unique concept, learning processes in developed countries and developing countries are tied together, to create

synergies and to enable mutual knowledge transfer. The aim is to provide highly customized aid for disabled children. The higher education system in Norway is suggested to cooperate with local organizations and homes for disabled in Uganda to achieve this. The implementation is designed down to the smallest detail in a circular GIGA-map (Fig.14). It is circular because the process is started with repetitive iterations engaging in new sites over time.

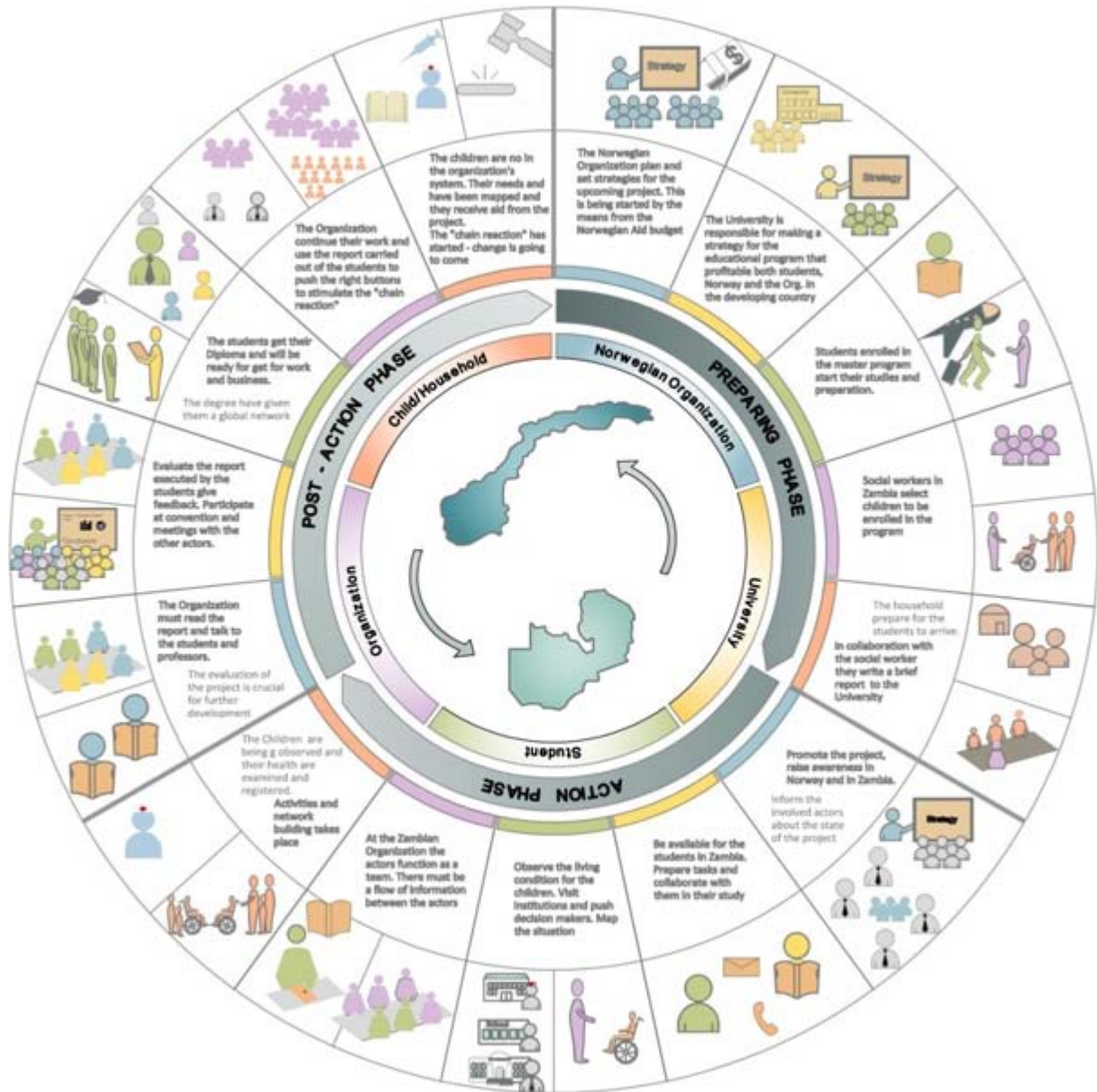


Fig. 14: Synergistic education system for disabled children in developing countries. The implementation follows a series of defined steps and is restarts with reusing experience for the next project when finalized. (Student: Terese Charlotte Aarland, 2009)

## CONCLUSIONS AND FURTHER RESEARCH

The research by design presented here has generated new knowledge on visualization of super-complexity in design. GIGA-maps are rich multi-layered design artefacts that integrate systems thinking with designing as a way of developing and internalizing an understanding of a complex field. It also is clear that the research needs further development and registration. Still some major realisations have been made and tasks for further investigations are uncovered. These will be reported on in forthcoming publications.

Typically, the shown examples are not “pure”. They are categorised according to their most dominating feature, but it is important to recognise that all examples do break established diagramming conventions. As a consequence, they mix and juxtapose information sets and ways of visualising this information.

Conventional diagrams (with numerous exceptions) tend to represent information in far too limited ways. They work like diagrammatic “strait jackets” on the information because they tend to lead towards a tidy sorting and “over-designing” of the information. The conventions strive for categorical clarity on the cost of interlinked richness. Their main purpose is to communicate information. This limitation is not useful when dealing with super-complexity as a process, where much larger complexities can be handled by the involved parties. Mixed diagramming techniques and frequently inventing new ways of depicting information are crucial in GIGA-mapping.

The innovations found in the processes and modes of mapping are not only that very rich diagramming and visualisation are useful in complex processes, compared to less rich visualisation, but that they also demonstrate the necessity of interconnecting and juxtaposing information that is categorically separate, and to investigate and create their connections. Investigation, research, involvement, action, generation and creativity are interlinked and facilitated through the GIGA-map. GIGA-mapping has shown, by ways of varied Research by Design experiments that it can play an important role in the challenges increasing complexity poses to designers. It is a tool for generating concepts that are very well rooted in real life conditions. It incorporates design thinking and intuitive approaches to systems thinking and it is a good tool for rapid learning and for collaboration.

Future challenges are:

*Pedagogical challenges:* The challenges of teaching design students to work with and within super-complexity needs further addressing. These problems have been touched upon earlier (Sevaldson, 2008b). These problems seem partly to be on an individual level (individuals vary greatly in their ability to cope with super-complexity and systems thinking) partly in the field (design education is not geared towards systems thinking) and in the specifically developed techniques (e.g. SOD needs better pedagogical approaches).

*Development of practice:* The practice of GIGA-mapping is not yet fully developed and errors and pitfalls not fully investigated. Though some experience

that is not reported here is registered, it needs further research.

*Validation:* GIGA-mapping needs to be fully tested and further developed in business and out of the academic context. The reported research is moving ever closer to the state of real life implementation and has already been tested amongst consultants and in companies, and will be tested in a large innovation project in the near future.

*Synthesis:* A critical point is the process of deriving emergent points of interventions potential innovations and synthesising new solutions and synergies from the maps. Though quite some achievements have been reported it still needs to be reported in a larger amount and to a deeper degree.

*Building criticality:* The GIGA-mapping technique would benefit from a critical modus e.g. a way of triangulating different information sets to reach more robust renderings of super-complexity. Though this is already addressed within the multiplicity of GIGA-mapping and the relations to Critical Systems Thinking, this needs further development.

Additional development of the techniques needs to be reported. Amongst this is the further development of GIGA-mapping techniques according to the following lines:

- An investigation and further recapturing of generative dynamic diagramming techniques and how they can better merge with the current developed GIGA-mapping.
- Further investigation into the use of software for GIGA-mapping, including the benefits of using interactive maps and animation.
- Reporting on the practice of GIGA-mapping where many approaches and techniques have tentatively been defined and tried. These need further development and systematisation to prescribe and open out for practices of GIGA-mapping in design.

This paper presented a series of cases where the ability to handle large amounts of information has been shown to be beneficial for innovative yet realistic design suggestions. The training of how to handle super-complexity is urgent within design so as to meet the challenges posed by globalization and sustainability. Improving these abilities and skills are crucial for designers to be able to make substantial contributions to society and in the process also gain in their own importance.

## ACKNOWLEDGMENTS

I would like to thank my colleagues at the Oslo School of Architecture and Design especially Michael Hensel for many years of support and valuable comments and Andrew Morrison for valuable comments and always being a willing reader.



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# THE IMAGES OF THE FUTURE OF CRAFT AND DESIGN PROFESSIONS

KRISTIINA SOINI-SALOMAA

DEPARTMENT OF TEACHER EDUCATION

UNIVERSITY OF HELSINKI

KRISTIINA.SOINI-SALOMAA@HELSINKI.FI

## ABSTRACT

Craft and design form a part in the creative industries. Consequent upon the ongoing transformation of creative economy, craft and design sector is looking for new activity models. The growth of experience economy, welfare and leisure services leads to novel customer needs. The craft and design professionals require new professional models, partners and networks to respond the changing customer needs. The transformation from product-oriented model to process-oriented and customer-oriented models presumes novel professional skills.

Nowadays craft and design students are tomorrow's professionals. How the craft and design students' expectations confront the demands of the operational environment in the future? The Finnish industry can employ only limited amount of designers. The new and innovative operational models are needed to provide for the employment of Finnish craft and design sector.

Is there call for small sized local production in the future? The need for the next door services and customized products can strengthen regional and

local craftsmanship and small business. Also the ecological values and sustainability support the philosophy of craftsmanship. The challenge in the branch is to create interesting sustainable production and service supply. Can the design education respond to these challenges?

## INTRODUCTION

Creative industries are rising in importance in economy. According to the Economy and Culture report by European Commission (2006) the creative industries advance the economical and social development and innovations. Also in Finland the political and economical investments in creative industries have strengthened. Development strategy for entrepreneurship in the creative industries' sector for 2015 (2007) carried out by Ministry of Trade and Industry. In particular craft and design sector, many development projects and surveys are executed and reports are published in Finland during the last decades. (e.g. Johnsson & Äyväri 1996, The Finnish Craft Organization 1998, 2001, Luutonen & Äyväri 2002, Kälviäinen 2005, Lidh 2005, Ministry of Trade and Industry 2006, Ruoppila 2007, Luutonen & Tervonen 2008, 2009).

Craft entrepreneur's success addresses to personal skills, craft products and the mastery of the whole activity process. On the other hand, craft entrepreneurship is limited with exiguous economical and personal resources. According to many researchers (Luutonen & Äyväri 2002, Fillis 2004, 2008, Walker & Brown 2004, Simpson, Tuck & Bellamy 2004, Reijonen & Komppula 2007) the motivation and success factors in craft entrepreneurship are based on different factors compared other business sectors. Well-being and the possibilities to manage one's own life career seem to be appreciated higher than economical success.

The future of the craftsmanship is entangled with wide-ranging social change. The megatrends influence inevitable to the development of the branch but essential factors are actors' own decisions, competence to react to rapid changes and do concrete steps. On the other hand the long tradition of the craftsmanship can prevent the radical new innovations - on the other hand the continuum of maker tradition can secure survival in the unpredictable future. (cf. Fry 2011, Fuad-Luke 2009)

#### KNOWING ABOUT THE FUTURE?

The image of the future means the knowledge of the future situation which is based on the understanding of present and the past, interpretations, observations, beliefs, expectations, values, hopes and fears. The images of the future have a strong influence in human and society conscious and unconscious decision making. The positive or negative appreciation of the images of the future motivates and activates personal and social choices and decisions. The effect is dialectic –strengthening with contrasts: decisions made at the present influence the quality of the future, the quality of the image of the future influences the content of choices. (Rubin 2000, 16; 2003, 902 – 903)

According to Rubin (2000) the images of the future route individual's choices and motivate make her or his own future. At its best they give ways to react to the present challenges, downside they can diminish individual's ability to influence to own life. Individual's thoughts and expectations of the future are qualifying more or less the present frames of mind. (Rubin 2000, 16, Seppänen 2008, 7) The aim of the research process is also to motivate participators to evaluate values and targets and activate their decision making to new innovative future choices and possibilities.

#### THE IMAGES OF THE FUTURE OF CRAFT AND DESIGN STUDENTS

The data is emphasized in designer students' (n=30, 42 per cent) and vocational craft students' (n=31, 43 per cent) stories. University level students' (n=11) stories cover 15 per cent from the data. Most of the respondents (n= 50, 69,44 per cent) were in age group 20 – 29 years, 16,67 per cent were younger and 13,89 per cent older. The female respondents dominated (n=61, 84,72 per cent) the data, male respondents (n=11) were 15,28 per cent. Mostly (76 per cent) the respondents did not have previous working experience in craft and design sector, only 24 per cent of respondents had experience in branch.

The inquiry was formed so that the story was telling about the working day in September 2020. It was divided in six theme parts: 1) orientation to the working day 2) operational environment and changes 3)

professional key competences 4) operational model and business ideas 5) professional identity 6) aims and dreams.

#### OPERATIONAL ENVIRONMENT

Some global megatrends emerged clearly in the data. Changes in product manufacture in Finland were essential risks in the branch. The automation and production in cheap imports countries are seen often as threats to design and craft production. Employment opportunities in Finland were seen uncertain and many respondents resulted in their stories to move abroad mostly to big metropolis in Europe like London. Although the respondents were noticed that the global production might concentrate in Asia, nobody told about willingness to work as a designer in Asia or Africa. Might be so that the students commonly become conscious of the demands of professional internalization but the real steps are to daring to take for beginners. The previous surveys bring out the prudence and difficulties of small business' internalization. (Fillis 2004, 2008, Lidh 2005, Ruoppila 2007, Luutonen & Tervonen 2008, 2009)

The local working environment descriptions related strongly working on own studios, workshop or boutique. Typically the story told about the boutique in a small Finnish town or about the workshop nearby home in the countryside. The idea was to combine work and family life or to get more freedom to artistic work. The female respondents preferred more the combination with family and home life. Very few students described working in internet or taking advantage working in virtual and collaboration networks. Only two students told designing in virtual networks.

The changes in ecological values appreciated highly and hoped that the sustainable development confirms craft products' valuation. The values were associated with quality, aesthetic character, experiences and welfare. The customers hoped to appreciate personalized manufacturing of good quality. Craft making nurtures welfare, self-fulfilling and is an alternative to consumption. The craft was seen as a counterforce to hurry, economic growth and disposable culture. The craft was appreciated as a life style choice or way to manage own welfare. This conflict between life style and economic growth is essential in craft entrepreneurship as in previous research reports were founded (e.g. Luutonen & Äyväre 2002, Fillis 2004, Reijonen & Komppula 2007).

The students did not either elicit their own values or the values behind the professional identities. Nobody was thinking about the choice or situation in the future where product manufacturing would be limited or totally rejected for instance resulting from environmental catastrophes. The operational models or business ideas that would base on services or immaterial commodities were not mentioned. Also nobody wrote

about the new technologies as 3D printers which are assumed to revolutionize the personalized production.

#### OPERATIONAL MODELS

The changes in operational environment brought the students to think over the changes in operational models. The own working situation was seen in two ways. Part of the respondents thought that the circumstances in the branch is weakening and that makes the own possibilities mysterious in the future. The competition inside the sector assumed to tighten up and only the best can success. The increased competition was seen a consequence of multitude education in the craft and design sector. Part of the stories were discovered 'survival discourse' where the working situation founded to become better. The big challenges in the operational environment were recognized and the special possibilities in the branch were seen as a social counterforce.

The own possibility was seen in a small-scale local production. Many believed that the global sustainable development policy will support the local production and self-sufficiency. Many international forecasting organizations as Knowledge Works Foundation (2011) and Forum for the Future (2011) promote the same tendencies. The products in the future were described quite traditionally like they show up today. The students wrote the production of custom-made or tailored clothing, home decorations or instruments. Also small-scale collections and art pieces were designed and produced. Services were design services, welfare services, guidance and teaching and styling consultancy. Typically the living was understood to earn from multiple ways as own production, subcontracting, teaching and even working in other fields.

The product manufacturing was expressed with craft techniques as sewing, weaving, glassblowing, pottery, instrument building and cloth printing. The artisan students wrote about repairing and service of the products. Specially clothing artisans used concepts like remake, redesign and tuning. The work included also customer contacts and consulting in different occasions. The physical customer service was mostly connected with tailoring and fitting. The guidance and teaching were seen mostly as an extra income.

Marketing manners and channels were quite traditional following the situation in nowadays in craft and art sector. The internet, web pages and web shops were the most popular marketing channels. Also visibility in the media and references were seen important. Would have expected that the young students would see marketing in the future more innovative while they use social media fluently.

The determination of customer segments notably proved difficult. The respondents either had not yet studied trading and marketing or the design studies are not very customer oriented. Mainly in the stories were told the

basic operational model that the customer comes to the shop or work shop unprompted to look the products or services. The students did not analyze exactly the real target groups, some student even mentioned how disagreeable they feel when thinking customers. In spite of all should it be quite important during the education analyze the potential customers and customer orientation for design and production? There still exists illusion in craft and design sector connected with the product oriented thinking that the products are mostly made by maker preference. Marketing is seen an operation with helps to sell products to unallocated customers. This trend was seen both in artisan and design students profiles.

#### PROFESSIONAL KEY COMPETENCES

When analyzing the competences, the students' stories follow partly the curriculums in craft and design education. The objectives of educational institutes naturally emphasize quality, success and professionalism. The professionalism and criteria of success are defined as multi skillfulness and networking capability in diverse collaboration. The training programs highlight the different professional possibilities and occupations which follow after the training. Expertise, entrepreneurship, entrepreneurial attitude and creativity are connected with success.

The students were asked to write about know-how and skills they will need in the future work. The manufacture skills were strongly emphasized in the stories. It might depend on the artisan students (43 per cent) share of the data. The product making, craft skills and material expertise were in remarkable role. Almost equally important competences were collaboration, interaction and network skills. Interaction was understood important in customer service like tailoring and custom-made products. The design skills were seen core competences especially by design students, they were more willing to share the other parts of the business like accounting and marketing with other actors in the networks.

The entrepreneurship dominates career in craft and design sector, traditional paid work is limited and exists mostly in design, retail, marketing, teaching and guidance. Though the business competences were mentioned important in every curriculum and training programs, they were not remarkable in the students' stories. It is noteworthy that the entrepreneurship as professional identity was very strong in the students' future scenarios but the business competences were not. They saw craft and design entrepreneurship more like self-fulfillment.

#### PROFESSIONAL IDENTITY

The personal success factors were mentioned self-confidence, courage, perseverance, humanity, learning

potential, creativity, open-mindedness, carefulness and trustworthiness. These characteristics are naturally suitable for entrepreneurship or expertise. (see Ruohotie 2002) In the stories the confidence in own talents and great faith in success were emphasized. The success demands courage, perseverance and social competence and in the competition you must believe yourself and fight for the success.

Mostly the students wrote about desirable and successful professional future. The working day in September 2020 was busy but rewarding. The working environment was described comfortable and supportive, the worker is in right place in a right time. Also many stories told about the busyness and long working days. Exhaustion was recognized but it was determined turned down believing own possibilities to control the workload and working times.

The own welfare was very important. One choice to control it was entrepreneurship. The craftsmanship and craft identity were equated with self-regulation and freedom to rule the time use and life style. Especially the female respondents told hopes associated with family and children. Some preferred the family life more important than work in the future. The desirable life style should be slow life and the ambition was slow down and jump away from the treadmill.

## DISCUSSION

The students' future stories tell about the hopes and fears of the newcomers in the branch. The future offers possibilities but also threats. The spectrum of the possibilities is wide which makes the decision making difficult. On the background exists the decent needs for security, the pressure for the success and balance between different roles in life. The future opens as a multi professional path which naturally cannot be pieced together at this time. The professional growth is continued mostly on employing oneself as an entrepreneur or continuing the studies.

The strong entrepreneurial note is quite natural in the branch. Although the dreams were related to famous brand designer status, this kind of future path seem to be available seldom. The basic operational model might be a small business in local networks. The standing out in the branch demands forceful investments in the tightening competition. The unemployment is a distinct threat in craft and design sector.

How the craft and design students' expectations confront the demands of the operational environment in the future? The opinions of the experts in the creative industries see limited possibilities if the branch cannot profile over the operational models and get new collaboration with and over the creative industries.

At the moment 94 schools in different levels are offering education in culture field. The education in culture field covers 12 per cent of youth age group. The

education in branch seems to be overestimated in the whole country because the unemployment is bigger in branch as it is approximately. The problem is that the education in culture field does not respond to the needs in working life. (Ministry of Education and Culture 2010, 12 – 18; 26 – 28)

The education of the craft and design sector (part of the culture sector) in Finland qualify big amount of degrees in vocational, polytechnic and university levels. The labor of craft and design sector was 29 448 persons in 2008 where unemployed were 12,4 per cent. At the same year were qualified 1340 vocational degrees, 613 polytechnic degrees and 281 university degrees in craft and design sector. That means 2000 workers more every year. In the intermediate evaluation of the education in culture field (2010) the education was estimated oversized and the starter amount was pitched to 2120 starters approximately. The oversized education exists mostly in vocational level in craft and communication. (Ministry of Education and Culture 2010, 12 – 18)

The creative and culture industries are growing. However the problem is that the education does not face up with the labor markets. In the craft and design sector the reason can be still rather product oriented education. The art and unique production can cherish limited amount of professionals and the remarkable growth of call cannot be expected. The call of new services might exist in the welfare and tourism sector adapting craft and art for different action and experience workshops.

The young peoples' expectations and visions for the education in branch do not necessarily match the reality in the labor markets. The strong trend of individuality has supposedly strengthened the attraction of craft and design education. The images of creativity and self-fulfillment are emphasized highly. Also the students described same objectives. Mostly the students in this inquiry planned to start entrepreneurship in local networks in a place of domicile. The orientation to work abroad was mostly recognized by the design students.

So the dilemma is how to combine the global and local possibilities and risks. The Finnish industry can employ only limited amount of designers and the global design are predicted to move to Asia. The new and innovative operational models are needed to provide for the employment of Finnish design. On the other hand is their enough call for small sized local production? The need for the next door services and customized products can strengthen regional and local craftsmanship and small business. Also the ecological values and sustainability support the philosophy of craftsmanship. The challenge in the branch is to create novel, interesting and sustainable production and service supply.



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# UPON OPENING THE BLACK BOX OF PARTICIPATORY DESIGN AND FINDING IT FILLED WITH ETHICS

MARC STEEN

TNO

MARC.STEEN@TNO.NL

## ABSTRACT

In this essay, I bring together Participatory Design's (PD) tradition of critical reflection on one's own practices, and Science and Technology Studies' focus on specific activities ('opening the black box'), in order to explore the ethics of PD. Three different forms of ethics—*ethics-of-the-other*, *pragmatist ethics* and *virtue ethics*—are discussed and several examples from practice are provided to argue that PD is 'filled with ethics': PD participants always find themselves in ethical situations and engage with ethics—even if they are unaware of these ethics or if these ethics remain implicit. It is proposed that reflexivity provides ways for PD practitioners to cope more explicitly and mindfully with these ethics.

## UPON OPENING THE BLACK BOX

In his influential article, 'Upon opening the black box and finding it empty', Winner (1993) expressed discontent with the many studies in the field of science and technology studies (STS) that discuss technology without addressing moral questions. He appreciated that STS-ers ('social-constructivists'), with their empirical and detailed studies of the ways in which people practically develop and apply technology, 'opened the black box [of the development and application of technologies] and showed a colorful array of social actors, processes and images therein', but criticized their approach because 'the box they reveal is still a remarkably hollow one'. Many STS scholars neglect, ignore or steer away from ethical questions.

In this essay, I will respond to Winner's plea to pay more attention to ethics. I will attempt to bring together the critical reflection that has always been a part of the tradition of participatory design (PD) (Bjerknes, Ehn, and Kyng 1989; Ehn 1990; Greenbaum and Kyng 1991; Kyng and Mathiassen 1997; Schuler and Namioka 1993), and the study of people's concrete practices that has been the main method within STS (Latour and Woolgar 1986; Latour 1987; Pinch and Bijker 1987; Woolgar 1991b; Bijker and Law 1992; Knorr Cetina 1995; Rip 2000; Oudshoorn and Pinch 2003). By combining critical reflection and a focus on concrete practices, I will explore the ethical qualities of PD practices and argue that PD practices are always 'filled with ethics'. I will argue that 'to find oneself in ethical situations and to engage with ethics' is always part of PD practitioners' job descriptions—even if they are unaware of these ethics or if these ethics remain implicit.

This focus on ethics is in line with Bjerknes and Bratteteig's (1995) observation that the focus of PD has shifted from politics towards ethics. Based on a review of (typical, Scandinavian) PD projects, they argue that 'All the projects in the 70's had an explicit political bias in wanting to change the preconditions for system development ... The political system developer is an emancipator, carrying out an action programme to give the weak parties knowledge they can use to increase their power.' And 'From the middle 80's, the quest for democracy was left to the individual system developer', whose responsibility 'changed towards being a facilitator of a morally ... 'correct' system development process ... The ethical system developer is mainly responsible towards their own individual ethical codex ... promoting workplace democracy through engagement in system development situations.'

It is this kind of ethics<sup>1</sup> that I will be concerned with: a kind of ethics that focuses on the micro scale of PD

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<sup>1</sup> I associate ethics with the ways in which people experience freedom and responsibility in smaller groups, e.g. in face-to-face interactions, whereas I associate politics with the ways in which power and agency are organized in larger contexts, e.g. in organizations or societies. In other words: ethics always occur within a context of politics. As a

participants, their ways of interacting and cooperating with each other, their ways of organizing research and design processes, and their thoughts and feelings.

Moreover, in my exploration below, I will focus on *specific* and *social* practices. This focus follows from the character of PD practices, which are always *specific*, in that they are concerned with developing specific problems for specific problems, rather than with general solutions for general problems, and always *social*, in that communication and cooperation between people are at the heart of PD. This is in line with Van de Poel and Verbeek's (2006) proposal to 'perform a context-sensitive form of ethics', i.e. to focus on people's specific practices within a project, rather than evaluating the ethical consequences of the outcomes of their project—as is often done in studies of ethics of design.

## A TURN TO ETHICS

There is a growing interest in the relation between ethics and design, at least since Papanek's (1991) appeal to designers to turn their attention to real problems and real needs. More recently, it has been argued—e.g. under the label of *value sensitive design*—that designers attempt to embed specific values in the products that they develop, and that this embedding process should be made more transparent, so that people can more consciously participate in this process (Friedman and Kahn 2002; Albrechtslund 2007; Van de Poel 2009; Manders-Huits 2010). This line of thought is similar to notions from STS concerning designers' attempts to create *scripts* (Akrich 1995; 1992), i.e. to make prescriptions that designers put into their products in order to influence people's behaviour, and to *configure* users (Woolgar 1991a; Mackay et al. 2000), i.e. to make descriptions of users in order to define and fix users, so that they can be designed for. Designers envision new products as well as what people can do—or *should* do—with these products, which can be considered as a material form of articulating prescriptive ethics.

Another way of drawing parallels between design and ethics was put forward by Whitbeck (1998), who proposed to treat ethical problems not as rational decision problems—as well-defined problems that have a number of well-defined solutions from which one selects the best option, based on rules or reasoning, as so-called 'rational foundationalist' approaches would have it—but, instead, to treat ethical problems as ill-structured problems that need to be dealt with like how designers deal with such problems. Similarly, Lloyd (2006) noted that design thinking and ethical thinking are both concerned with envisioning and developing

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consequence, the 'black box' that I attempt to open (the ethics of PD) is significantly smaller than Winner's 'black boxes', which often contained both political and ethical aspects—see, e.g. Winner's (1988) accounts of the ways in which technical systems influence people's agency, with the example of city planners that built low-hanging viaducts in New York City in order to prevent coloured people, who could not afford cars and had to use busses, to reach Jones Beach.

possibilities and with evaluating and choosing between possibilities.

Below, I will organize my argument around the notion of *design thinking*, i.e. the idea that design is concerned both with exploring and articulating problems and with exploring and developing possible solutions and that these processes are intimately intertwined: the 'design process involves finding as well as solving problems' (Lawson 2006, p. 125) and the 'problem and solution co-evolve' (Cross 2006, p. 80). Furthermore, I would like to distinguish between two elements of design thinking: 1) generating ideas and developing knowledge, e.g. when studying the problem or articulating a problem definition; and 2) making decisions and creating things, e.g. when developing and trying-out possible solutions. Moreover, I propose that, in order to understand the ethics of PD, we need to understand the ethics of the processes in which PD participants generate ideas and develop knowledge and the ethics of the processes in which they make decisions and create things.

In Western culture, there are two mainstream schools of ethics: *deontological* ethics, which are based on an understanding of one's duties and which focus on applying universal, moral rules, typically by reasoning logically; and *consequentialist* ethics, which are based on evaluating the positive and negative consequences of one's choices and which aim to maximize the positive consequences. Rather than drawing from these two schools, I chose to draw from three relatively less well-known forms of ethics: ethics-of-the-other, pragmatist ethics and virtue ethics. The main reason for this choice is that these three are typically concerned with specifics, with concrete, practical and social practices (similar to PD which is concerned with specifics, with concrete, practical and social practices), whereas, deontological or consequentialist ethics typically tend to be concerned with universal duties or with abstract rules.

## ETHICS-OF-THE-OTHER

With *ethics-of-the-other*, I refer to forms of ethics that take the other and the relationships between other and self, as a starting point. Philosophers Emmanuel Levinas (1906-1995) and Jacques Derrida (1930-2004) are proponents of such ethics. Levinas wrote extensively about the encounter between other and self, and Derrida about *différance* and otherness. In their ethics one always finds oneself within other-self relations, i.e. within ethical relations.

In a PD project, different people meet and attempt to communicate and cooperate—which Levinas and Derrida would conceive of as encounters between other and self and as ethical situations. In my doctoral dissertation (Steen 2008), I studied two PD projects and, using concepts from Levinas and Derrida, reflected critically on our own practices in these practices. Below, I will discuss two key findings.

First, in our projects, we attempted to gather knowledge, e.g. about users and their needs and preferences, and we approached these users, e.g. in workshops and interviews, and in these encounters we tended to reduce what we saw and heard from them to concepts that we were already familiar with—‘The foreign being ... becomes a theme and an object. ... It falls into the network of a priori ideas, which I bring to bear, as to capture it’—which led to ‘the reduction of the other to the same’ (Levinas 1987, pp. 48-50). Levinas characterized this tendency as the making of a grasping gesture, by which one pulls the other into one’s own way of thinking, which makes it very difficult to learn anything new. He described the self, as a ‘melting pot where every Other is transmuted into the Same’ (Levinas 1996, p. 13). In an attempt to gather knowledge, the self grasps the other and draws the other into its own ‘melting pot’.

PD practitioners cannot escape this tendency. Their interests and ambitions, their knowledge and ideas—their selves—get in the way of their attempts to be open towards others, towards users and co-workers.

In one project, we conducted a series of four co-design workshops with different groups of police officers. Based on the findings from each workshop, we gradually changed our project’s focus and developed a mobile telecom application that promotes cooperation between police officers. Such a way of adapting the project, based on interactions with users, is considered good practice in PD. However, we also missed several opportunities to learn from police officers and to let their ideas affect the project. E.g. in the first workshop, we jointly articulated four topics that they (police officers) experienced as problematic. But after the workshop, we (project-team members) chose to focus on one topic that was comfortably close to our own ambition to develop a telecom application—and ignored other topics that were relevant for the police officers.

This example illustrates a key question of PD: How to balance users’ concerns with project-team members’ ambitions? Or, drawing from Levinas: How can PD practitioners balance their ambition to be open towards the other with their tendency to grasp the other, to privilege the self over the other? We can turn to Levinas for a suggestion to attempt to counter this tendency. He envisioned an attempt to escape the gesture of grasping via a form of desire that is not aimed at satisfying the self, but is respectful of the otherness of the other: ‘This desire without satisfaction hence takes cognizance of the alterity of the other’ (1987, p. 56).

Second, in our projects, we did not only need to move towards openness (divergence), we also needed to move towards closure (convergence); we needed to draw conclusions and deliver results, and this involves the making of decisions. Derrida remarked that one cannot make a genuine decision by merely applying knowledge or simply following rules: ‘It is when it is not possible to know what must be done, when knowledge is not and

cannot be determining that a decision is possible as such. Otherwise, the decision is an application: one knows what has to be done, it’s clear, there is no more decision possible; what one has here is an effect, an application, a programming’ (1995, p. 147-8). Derrida noted that people often attempt to *program* invention and that this can lead to ‘the invention of the same’ (1989, pp. 46-55); one tends to stay within one’s own comfort zone, which makes it hard to get out-of-the-box, to be open to otherness and to create anything new.

PD practitioners bring their skills and methods, their knowledge and ideas, and these enable them to move towards closure. Moreover, their tendency to move towards closure and to program invention is often stronger than their attempt to move towards openness and to be open to otherness.

In the other project, we cooperated with informal carers—more specifically, with people who provide ‘primary’ informal care for people who suffer from dementia and who live at home, often their husband or wife. In this project, some project-team members, working within a psychology tradition, conducted a questionnaire-based survey in order to obtain a statistically sound overview of the needs of people with dementia and of their ‘primary’ informal carers. In parallel, other project-team members, working within a co-design tradition, conducted informal interviews in order to inform and inspire their creative process.

Both approaches are attempts to combine moves towards openness, i.e. to learn from potential users, and towards closure, i.e. to draw conclusions about users’ needs and to create products for them. However, our methods enabled us to *program* innovation; we moved more easily towards closure than towards openness. The people who conducted the survey used questionnaires and had to make the respondents’ diverse and rich utterances fit into the questionnaire’s fixed and narrow categories, and the people who conducted the co-design interviews started with ideas to create a telecom application and probably had these ideas in mind during the interviews and privileged their own ideas over users’ ideas. We can turn to Derrida for a suggestion to better balance openness and closure. He advocated welcoming the other: ‘To invent would then be to “know” how to say “come” and to answer the “come” of the other’ (1989, p. 56); this would be an active form of passivity because it requires an effort to not make the other into a theme within one’s own program.

## PRAGMATIST ETHICS

Philosophical pragmatism emerged in the USA in the late 19th century, with key figures such as William James, C.S. Peirce and John Dewey. Pragmatists focus on people’s practices (rather than on theories) and opposes all kinds of *a priori* assumptions or fixed ideas, e.g. concerning (false) dichotomies such as object-subject, fact-value or individual-society. Below, I will focus on texts by Dewey (1859-1952).

There is a growing interest in Dewey's ideas (Hickman 1998b; 2010; Hildebrand 2008), e.g. in relation to technology, engineering and design (Hickman 1990; 2001; Emison 2004; 2006; Melles 2008; Dalsgaard 2009). Key concepts in Dewey's pragmatism are experience, knowledge, change, communication and cooperation—which converge in his ideas on *inquiry* (Hickman 1998a; Steen 2009; Steen en Dhondt 2010).

A key theme in Dewey's work was his concern for creating productive relationships between practices and theories, and his advocacy for an 'empirical method' of moving back and forth between practices ('primary experiences') and reflections ('secondary experiences') (Dewey 1965, p. 36). He argued that knowledge is always provisional ('particular' and 'contingent', not 'universal' and 'necessary' (Dewey 1920, p. 78) and that one should continuously reconstruct knowledge based on experiences. Another key theme is his meliorism: 'the belief that the specific conditions which exist at one moment, be they comparatively bad or comparatively good, in any event may be bettered' (Dewey 1920, p. 178). He advocated communication and cooperation and positive change. More specifically, he advocated organizing processes of joint inquiry in which people jointly explore problems and develop solutions—which sounds similar to organizing PD.

It is important to note that Dewey always put moral experience and moral questions at the centre of his philosophy. When people act and experience, when they communicate and cooperate, they engage in ethics; acting, experiencing, communication and cooperation always have ethical qualities (Hildebrand 2008, pp. 63-93; Papas 1998). The ethics of PD occur when the people involved in such joint inquiry engage in reflection, deliberation, evaluation, communication, cooperation, choice and action.

Dewey envisioned inquiry as a process that fuses careful, reflective thinking and careful, practical experimentation, starting from a situation of perplexity ('an indeterminate situation') and moving towards some sort of resolution ('a unified whole') (1938, pp. 104-5). He conceptualized the process of inquiry as consisting of five phases (pp. 101-119)—which do not have to happen in that order but can be organized as an iterative process. Below, I will briefly outline phases 1 and 2 (problem exploration and definition), phase 3 (combining perception and conception) and phases 4 and 5 (trying out and evaluating possible solutions), and discuss the ethics of PD.

1. 'The indeterminate situation': A specific situation is experienced as problematic, without yet knowing what is precisely problematic about it, so that this situation becomes 'questionable'.
2. 'Institution of a problem': A provisional problem definition is formulated. It is important to be aware of the specific wording of the problem: 'The way in which the problem is conceived decides what specific

suggestions are entertained and which are dismissed; what data are selected and which rejected'.

Dewey stressed that active and creative engagement with personal experiences and emotions, and sharing these experiences and emotions, is critical: 'inquiry is not a purely logical process—feeling is a useful and orienting presence throughout each phase' (Hildebrand 2008, p. 57). E.g. story telling can be applied to express and discuss experiences. Please note that this approach is rather different from a 'scientific' approach to inquiry, in which people (supposedly) find 'facts'.

The ethics of PD occur in the ways in which PD participants express and share personal experiences and are able to empathise with each other. Ideally, there is room within a PD project for the expression and sharing of such experiences, so that these can indeed become starting points for inquiry.

3. 'The determination of a problem-solution': In an iterative process, the problematic situation and possible solutions are simultaneously explored and developed: 'Observations of facts and suggested meanings or ideas arise and develop in correspondence with each other'—which is, again, very similar to design thinking.

Dewey suggested that problems are best explored and defined using *perception*, i.e. one's capacities to see, hear, touch, smell and taste (what is there), and that solutions are best explored and developed using *conception*, i.e. one's capacities to imagine new situations (what could be there). Ideally, perceiving the problematic situation and conceiving possible solutions are productively combined. Different ways or more precise ways to perceive the problematic situation help to develop different or more concrete solutions, just like the conceptualization of different or more detailed solutions help to perceive the situation differently or more precisely. Promoting such perception and conception can require 'moral imagination' or 'dramatic rehearsal' (Fesmire 2003; Keulartz et al. 2004), which are both directly associated to moral experiences and moral questions.

Similarly, we can create room in PD to imagine and rehearse what the problematic situation feels like and what different alternative solutions feel like—by creating room for perception and conception, e.g. by engaging with visuals that relate to the problem and the people involved, or by providing tools that promote joint creativity (Sanders 2000; Sleswijk Visser 2009),

4. 'Reasoning': Relations between the problem-as-it-is-currently-defined and different suggestions-for-solutions are studied, e.g. by reasoning about how one of the solutions can help to solve the problem.

5. 'The operational character of facts-meanings': One tries-out practically how suggested solutions help to solve the problem, e.g. by conducting experiments.

In the context of PD, these phases are concerned with, e.g. creating and evaluating prototypes in practical

settings or organizing trials in which people try-out the products or services that are being developed. Moreover, because things become 'real', it is critical that the people involved cooperate productively in order to 'get things done'. Participants need to express their different—and sometimes conflicting—roles and interests, so that they can negotiate and can develop ways of working to practically cooperate.

The ethics of PD occur within these negotiations, in the ways in which participants deal with their own and with other participants' roles and interests, and in the ways in which they are able to cooperate productively and to learn from each other.

## VIRTUE ETHICS

Virtue ethics emphasizes a person's character, choices and actions, i.e. what he or she does and why and how he or she does that (rather than emphasizing duties, as in deontological ethics, or actions' consequences, as in consequentialist ethics). Virtue ethics is concerned with developing and practising virtues that enable one to flourish, i.e. to live a fulfilled and happy life (eudaimonia) in a just society (dikaiosunè). This school of ethics goes back to Aristotle—hence the Greek.

Virtue ethics implies a teleology, i.e. with ideas about what people are dispositioned to do, about their goal (telos). A knife is a virtuous knife if it does well what a knife is supposed to do, i.e. if it cuts things well. Likewise, a person is a virtuous person if he or she does well what a person is dispositioned to do: to flourish.

Alisdair MacIntyre, a virtue ethics advocate, defined virtues as 'dispositions not only to act in particular ways, but also to feel in particular ways. To act virtuously ... is to act from inclination formed by the cultivation of virtues' (2007, p. 149). A virtue is like a disposition and is based on previous choices and is aimed at choosing the appropriate mean or middle, which is always relative and dependent upon specific circumstances (Van Tongeren 2003, p. 57). This mean is often illustrated with the example of courage, which is an appropriate mean between cowardice and recklessness. If you see a man beating up another man in the street, it would be cowardice to do nothing. But it would be reckless to boldly interfere. Unless you are a trained fighter and can handle this situation—then this would be courageous. For most people, however, it would be courageous to do something in the middle, e.g. to attract the attention of others and to call 112.

Finding and choosing this mean 'demand judgment and the exercise of the virtues requires therefore a capacity to judge and to do the right thing in the right place at the right time in the right way. The exercise of such judgment is not a routinizable application of rules' (MacIntyre 2007, p. 150). One can find this mean, for a specific situation, by using practical wisdom (phronèsis) (op. cit., p. 154).

It is important to stress that this mean has nothing to do with mediocrity, but is related to excellence (aretè), i.e. with doing well what a virtuous person would do in this specific situation—doing well what one is good at, what one is dispositioned to do. Virtue ethics is not concerned with countering desire, but with developing and cultivating well-formed types of desires (MacIntyre 2007, p. 160; Van Tongeren 2003, p. 104).

If we turn to PD, we can discuss the two components of design thinking introduced above—generating ideas and developing knowledge and making decisions and creating things—and relate them to the virtues of *curiosity* (a desire to learn) and *creativity* (a desire to create), respectively (which are also mentioned at <http://www.virtuescience.com/virtuelist.html>). Other relevant virtues for PD would be virtues that are related to communication, cooperation, participation and emancipation—but these will not be discussed here.

Finding an appropriate mean for curiosity and creativity could involve considerations like this: If I had too much curiosity, I would e.g. approach a person in an interview merely as a means to satisfy my curiosity, without respect for him or her as a person. But if I had too little curiosity, I would, e.g. approach the other indifferently, and experience the interview as boring. Likewise, if I had too much creativity, I would, e.g. become preoccupied with my own ideas and ignore other people's contributions. But if I had too little creativity, I would, e.g. halt the creative process by making inappropriate objections.

A virtue ethics analysis of a specific situation could result in a characterization of a virtuous person and of his or her dispositions and actions in a specific situation (Harris 2008). This characterization can be related to MacIntyre's concept of narrative, with which he draws attention to 'the telos of a whole human life, conceived as a unity' (2007, p. 202). MacIntyre was critical about conceptualizations that focus on isolated behaviours, and instead argued that we should think of 'a self whose unity resides in the unity of a narrative which links birth to life to death as narrative beginning to middle to end' (op. cit., p. 205).

Virtues can be cultivated, e.g. by becoming aware of and questioning one's own practices: Which practice am I participating in? What is my role in it? What would be appropriate, in this situation? And how can I move towards a more appropriate practice? Let me give two examples (Steen 2008, pp. 194-5) of becoming aware of my own practice or narrative, of stepping out of my role, and attempting to act more in line with my telos.

Once I was hosting a workshop with older people, in which we discussed all sorts of issues related to mobile telephony. The conversation moved towards ringtones and how young people can spend too much money on these. Then one man remarked: 'But that's fine with you [addressing me]; you [possibly also referring to the telecom operator that commissioned the project] want to sell as much as possible' (paraphrased). I empathised



with the man and his concerns. I stepped out of my role and talked about my own unease with working for a client that seems to have different ideas from mine.

The other example is from in a workshop with call centre employees, in which we aimed to generate ideas for new applications for some novel technology. At the start of the workshop, I did not yet disclose this technology, assuming that this would help to generate creative ideas more freely. However, after 30 minutes, one participant said he found this unfair: ‘I feel as if you manipulate and use me. Why didn’t you just put your cards on the table?’ (paraphrased). I empathised with him and with his appeal to work more transparently, and stepped out of my role and discussed the workshop agenda with him and the other participants.

In the first example, I tried to find an appropriate kind of curiosity, trying to treat the workshop participants not as means to satisfy my curiosity, but trying to take their, and my own, curiosity seriously. In the other example, I similarly tried to find an appropriate kind of creativity, trying to treat the workshop participants not as material for my creative process, but trying to take their, and my own, creativity seriously. In both examples, my practice was questioned, in the here-and-now, which opened-up room for reflexivity (see below).

## CONCLUSIONS

I have argued that PD practices always have ethical qualities: PD is based on *encounters* between people, which, according to ethics-of-the-other are ethical encounters; PD is a *process* of articulating a problem and developing solutions, which, according to pragmatist ethics, is an ethical process; and PD participants’ attitudes, choices and actions are critical to PD, which, according to virtue ethics, involves ethical questions about one’s character. These conclusions are summarized in Table 1, in relation to two elements of design thinking: 1) generating ideas and developing knowledge (a perceptive, curious, inward motion); and 2) making decisions and creating things (a conceptive, creative, outward motion).

Table 1. Different forms of ethics in relation to design thinking, and the ethical qualities of participatory design (PD).

	<i>Generating ideas and developing knowledge</i>	<i>Making decisions and creating things</i>
<i>Ethics-of-the-other — encounter</i>	Tendency to <i>grasp the other</i> . Attempt to welcome the <i>other</i> (desire)	Tendency to <i>program invention</i> . Attempt to welcome <i>otherness</i> (passivity)
<i>Pragmatist ethic — process</i>	Joint inquiry, with <i>perception</i> , sharing of experiences and <i>empathy</i>	Joint inquiry, with <i>conception</i> , cooperation and <i>learning</i>
<i>Virtue ethics — character</i>	Cultivate an appropriate form of <i>curiosity</i> (mean or middle)	Cultivate an appropriate form of <i>creativity</i> (mean or middle)

Ethics-of-the-other can help PD practitioners to reflect on the *encounters* with others, e.g. with potential users of the products or services that we design. This occurs on the scale of face-to-face meetings, e.g. in workshop or interviews. Levinas and Derrida conceptualized encounters between other and self as ethical encounters. Moreover, they drew attention to our tendency to grasp the other (rather than being open towards the other), and to program invention (rather than being open towards otherness and letting things happen). Their philosophies also suggest ways to counter these tendencies by attempting to welcome the other and otherness. This may help us to organize workshops or interviews differently, e.g. with a more open mindset.

Pragmatist ethics can help to reflect on the *processes* in which PD participants define the problem and develop solutions. This occurs on a project management scale, e.g. over the course of several project meetings. Dewey’s ideas about organizing processes of joint inquiry can help to bring the ethics of PD to the fore: when participants express and share their personal experiences; when they perceive the problem and conceive possible solutions; and when they negotiate their different roles and interests. Reflecting on these processes can help to organize PD differently, e.g. more towards perception, sharing of experiences and empathy, and conception, cooperation and learning.

Virtue ethics can help PD practitioners to reflect on their own practices and to cultivate and practise virtues that are relevant for PD. This happens within a person, e.g. within the ways in which he or she thinks, feels, makes choices and acts. Virtues that are relevant for PD are, e.g. curiosity and creativity, and also virtues that are related to communication, cooperation, participation and emancipation. Virtues can be cultivated by attempting to find an appropriate mean for each virtue, dependent on each specific situation, and to concretely practise that mean.

These three forms of ethics—although they are very different—share some similarities: they are concerned with specifics, with concrete, practical and social practices (rather than with universals or general rules) they are based not only on reasoning but also on personal experiences and feelings, such as empathy; and they are likely to destabilize current practices because they tend to question rules and assumptions.

## REFLEXIVITY

Arguing that PD has ethical qualities is one thing. Taking these ethics into account when organizing, PD is another. This begs a number of questions: Why would PD practitioners want to or need to take these ethics into account? And, if they want to or need to, how can they take these ethics into account, practically?

If the reader is convinced that PD has ethical qualities, then a logical next step is to follow the tradition of PD, which has always embraced critical reflection on one’s own practices (Markussen 1994; Gulliksen, Lantz and

Boivie 1999; Beck 2002) and advocated finding ways to improve PD, e.g. by further developing and improving PD (Bertelsen et al. 2005). We need to examine our PD practices and become more aware of the ethics that are at play in our PD practices, and find ways to take these ethics into account. Because—to paraphrase Socrates—a PD practice unexamined is not worth being practised.

The assumption is that becoming more aware of these ethics can help to more mindfully cope with them. One way in which PD practitioners can become more aware of the ethics is by engaging with reflexivity, i.e. becoming more aware of what is happening here-and-now and of one's own involvement, roles and agency in what is happening. Moreover, the three forms of ethics discussed above offer different perspectives to become reflexively aware of the ethics involved: ethics-of-the-other draw attention to what happens in face-to-face meetings; pragmatist ethics draw attention to the overall process and project management; and virtue ethics draw attention to one's own character, choices and actions.

It would be strange to articulate a recommendation like 'Be reflexive!' because that would be an example of 'paradoxical communication' (a term of communication theorist Paul Watzlawick), an example of a mismatch between the message's content and its form. Simply demanding that a person is reflexive will not make that person reflexive. Rather, my proposal for promoting reflexivity would be to promote questioning. This proposal is similar to Rhodes' (2009) proposal for an 'ethical response to reflexivity ... that asks questions rather than provides answers; that refuses the hubris of generalizations; that provokes thinking rather than provides answers; that generates possibilities rather than prescriptions; that seeks openness rather than closure'.

Posing questions would be a way to promote reflexivity and would open ways to critically reflect upon and improve PD practices. Examples of such questions are the following: *What is happening here and now? What do I think? What do I feel? What do others do, think, feel? What could we do differently?* (general questions); *Am I open to the other? Am I open to otherness?* (ethics-of-the-other); *How do we perceive the problem? How do we conceive solutions?* (pragmatist ethics); and *How curious am I (mean)? How creative am I (mean)?* (virtue ethics). In order to promote practical application, these questions can be printed on a card, so these questions can function as reminders—see Figure 1.

In closing, let me explore some ideas to also take these ethics into account in education and in research. Many engineering and design courses include classes or workshops about ethics. However, education often focuses on the results of a project and on evaluating these results normatively (e.g. in terms of 'good' versus 'bad', 'what one should or should not do'). This is different from the perspective on ethics explored above, which focuses on the process, and on taking ethical qualities as a starting point for reflexivity, with as little *a priori* normative positioning as possible.

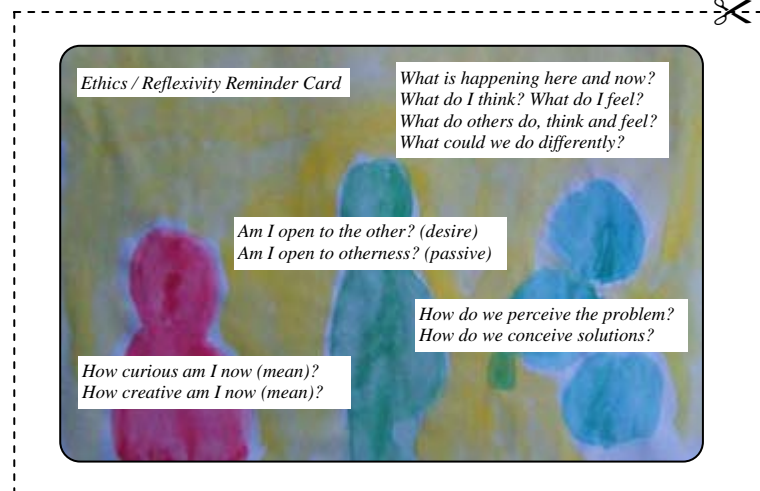


Figure 1: Ethics / Reflexivity Reminder Card

In a similar advocacy for more attention for ethics in education, Bucciarelli (2007) argued that students must be able 'to learn about the social, the organizational—even the political—complexities of practice' and that 'a major renovation of engineering education is required—one that goes beyond adding an ethics course to the curriculum.' Lloyd and Van de Poel (2008) provide an example of a design game in which students can engage in practical, ethical decision making. They developed a design game in which students can engage in role-playing, which enables them to (practically) 'feel' ethical concepts and decision making—in addition to training them to (theoretically) 'know' ethical concepts and decision making.

The matters explored above are relatively new, so it will not come as a surprise that 'more research is needed'. In particular, I can imagine research that sets out to evaluate the ways in which more awareness of the ethical qualities of PD and reflexivity help to reflect critically on PD and to improve PD. I speculate that there are benefits, but cannot articulate them yet. Furthermore, I can imagine research in which PD practitioners and scholarly researchers cooperate constructively—the former providing 'data', the latter providing 'concepts'—(Beech et al. 2010) or research in which students participate, e.g. by making explicit the ethics they find themselves in during design exercises or student workshops.

The overall goal of making these ethics in PD explicit and of becoming more aware of these ethics and of one's own role in how these ethics are coped with, would be to reinvent and update PD and to revitalize the values that PD embodies, in order to make PD relevant and vibrant in our current times.

## ACKNOWLEDGMENTS

I would like to thank my employer TNO and project managers for allowing me to engage in reflection in the margins of research projects, e.g. in Freeband FRUX, TNO MireCol, FP7 TA2 and AAL WeCare.

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# RESEARCH AND DESIGN PRACTICE – AN EXPLORATORY UPDATE OF DONALD SCHÖN

PETER ULLMARK

CHALMERS UNIVERSITY OF TECHNOLOGY

CENTRE FOR RESEARCH AND DESIGN,

KTH ROYAL INSTITUTE OF TECHNOLOGY

PETER.ULLMARK@CHALMERS.SE

## ABSTRACT

*The Reflective Practitioner* and *Educating the Reflective Practitioner*, the two most influential books by Donald Schön from 1983 and 1987, have so far been regarded as a self-evident platform for design research. The ideas put forward have been much discussed but not basically questioned. However, during the last years the conditions for design practice has changed fundamentally. To find out if the understanding of Schön can be developed to match the new situation or if other approaches are necessary, a new critical discussion is necessary. This paper is a first and explorative attempt to identify important issues for such an examination. It takes its point of departure in two of Schön's basic concepts, *reflection-in-action* and *repertoire* and makes use of two actual philosophers, *Cornelius Castoriadis* and *Elisabeth Grosz*, to find a new theoretical base for development of his understanding.

## THE DEVELOPMENT OF DESIGN RESEARCH

Design research has from the start been closely related to professional design practice. However, the point of departure has differed from internal ambitions to develop the specific qualities of design-based work to external demands for adaption of the design processes to new conditions.

The first generation of design researchers were deeply involved in the radical modernization after the Second World War. They were inspired by operation analysis and other science-based techniques to get from specified goals to optimal solutions more smoothly and securely (Churchman 1971, Cross 1977). This "Design Methods Movement" tried to combine a straightforward, evidence-based technical rationality with the art-based skills of designers.

The new and more formalized approaches were however met by scepticism in practice. And when the new tools were actually used, the results were questioned. Studies showed that people became more focused on timelines than on looking for innovative solutions. Broader social perspectives were also left aside. The critique coincided with some doubts even among original enthusiasts for formalized methods (Ackoff 1979).

New approaches that promoted more open-ended processes were asked for. Focus in the research work moved from methods and control to an interest for the designers' creative way of working. Still, the ambition was to find processes that could be transparent and methodologically re-producible and by that possible to educate about.

However, it was found difficult to identify and articulate the basic qualities. Even when the conditions seemed to be very similar, the single design processes were organized and carried through in different ways. When asked about their approaches and methods, the designers

also had difficulties to answer in a comprehensive way. The conclusion was that experience-based adaption to the specific design situation is of a more crucial importance for what happens than a consistent following of certain rules and procedures. It was also obvious that other people involved in design processes, both experts and users, mostly play a more decisive role than just as informers. The focus moved once again from the individual designer to the design process as a whole (Jones, Thornley 1963, Lawson 1980, 2005, Cross 2001, Laurel 2003, Nelson, Stolterman 2003, Krippendorff 2006).

At the same time studies in other fields showed that technical rationality was not a self-evident basis even for lawyers, physicians and other more prototypical professions. These practices were also largely based on well-trying experience and did not follow any given procedures. The approaches differed to fit the actual situations and problems. Scientific results were used but in a much more unorthodox way than expected.

However, the request for more controlled professional work processes and for evidence-based considerations and conclusions was still predominant in important parts of society. This resulted in a stronger emphasis on the scientific content at the expense of professional training in the higher education programs. The art-based design education was also questioned.

This contradiction between publicly prescribed and real forms of working resulted in a lot of confusion, not at least at the schools. The “scientification” of education was after a while also questioned by local managers. These critics meant that it takes too much time before engineers and other experts are able to solve practical problems at hand without guidance.

## SIMON AND SCHÖN

To cope with this contradiction it was necessary to actualize a more basic discussion about perception, understanding and creative work. Design research turned into a philosophical interest, inspired by thinkers as Ludwig Wittgenstein. It became obvious that different ways of handling complexity is a key question.

Most design processes are characterized by a large number of different variables that never can be fully acknowledged so that all connections can be identified. It is necessary to reduce the number of considered interdependencies even at the risk of dangerous simplifications. In science this dilemma is mostly faced by the assumption that there is a hidden and simple order to be found.

*Herbert Simon* with his background in the social sciences and mathematics said that in nature, “complexity, correctly viewed, is only a mask for simplicity”. It is possible to “find patterns hidden in apparent chaos” (Simon 1969).

But in difference to other scientists he noticed that something happens when human beings enter the scene

with their values and purposes and create artefacts by design. The mechanisms are of another kind and must be studied in other ways. He developed an understanding where the artefacts can be regarded as a meeting-point, an “interface”, between an “inner” environment, that corresponds to the purpose, “the substance and organization of the artefact itself” and an “outer” environment, the use and the context of the use.

A complementary science, a “Science of the Artificial”, that handles phenomena of “what should be” is necessary that cannot be subordinated the logic of the natural sciences.

Still, he did not accept a less systematic and controlled process and knowledge within this new science. He meant that the creation of appropriate artefacts basically is a question of articulating the functions properly in accordance with the means available and to be clear about the values. However, he understood that, in practice, this kind of processes cannot be fully controlled and result in optimal solutions. The solutions can only be more or less “satisfactory”. A judgment based on critical thinking is necessary to come to a decision.

This new approach had a large impact on theory and practice within management. Designers saw it more as a confirmation of the understanding of design as a unique kind of process. It was also a strong argument for development of design research as a discipline of its own.

*Donald Schön* had a background as pragmatic philosopher and had worked as a management consultant for a long time. During that work he had observed processes of change and the conflicts between the different perspectives for a long time. His ambition was primarily to show and upgrade the importance of the practical skill of professionals.

In difference to Simon, his basic assumptions were not much articulated. As other pragmatic philosophers he avoided thinking that could be regarded as metaphysical and did not show much interest for development of general understandings. He worked in a designerly way, focused on specific problematic situations and was looking for possible improvements. The developed understanding and the concepts he presented are close to the ones expressed and used in the actual practices. However, the conclusions were also well based on actual research in different fields.

Schön’s way of writing is characterized by reasoning rather than by the point analytics (Schön 1983, 1985, 1987). Other researchers have criticized the easiness by which he handles complex issues and have asked for a more clear account of his results.

Still, compared with other design researchers, he has had an enormous influence. His basic concepts are referred to in some way or other in most publications about the basic understanding of design. He has obviously succeeded in both coming close to how



design practice is experienced by people involved and to draw attention to crucial and earlier neglected parts of the process.

### REFLECTION-IN-ACTION

However, is his analysis and are his concepts still as valid as they have been? Are they able to take care of and give advice in relation to actual problems? What need is there for complements? In the coming sections I will present an exploratory analysis based on his main concept, reflection-in-action (Schön 1983, 1985, 1987). It is important to notice that this analysis does not try to cover the whole of the work of Donald Schön. The aim is primarily to relate his approaches to some actual problems and the ongoing changes of design practice.

The metaphor behind the concept of reflection is a mirror and the idea is that a look from outside may reveal features that differ from the expected. However, human beings tend to try to look for confirmation rather than for revisions. As the feminist researcher Donna Haraway says: "Reflexivity has been much recommended as a critical practice, but my suspicion is that reflexivity, like reflection, only displaces the same elsewhere, setting up the worries about copy and original and the search for the authentic and really real" (Haraway 1997).

This kind of risk for reinforcement of predominant perspectives is also actualized when Deleuze discusses dialectics (Deleuze 1991). He means that the antithesis is conceptually bound to the thesis. To change viewpoint, something different and unfamiliar has to be introduced.

Schön did not say much about the initiation of the reflective activity and about the possibilities to get a critical distance. He showed the use of metaphors in his cases but did not develop their ability and restrictions more generally. He also showed that an active use of the complexity of the design situation itself could be useful to open up the mind. By looking for incongruence and deviations from the expected, other viewpoints often appear. Reductions and simplifications can also be made more conscious which can result in new creative turns in the process. The complexity can be kept alive. He described that as "conversations with the situation". However, he kept this critical inquiry quite close to the concrete problems and did not show the fruitfulness of a wider perspective on the context.

He also showed that the effects of this way of using the design situation to avoid deadlocks can be even stronger if the dynamics is set in play as in action research. Kurt Lewin discovered that it is easier to find the decisive and critical characteristics of a situation if there is a possibility to make experimental interventions (Lewin 1946). These interventions in a design process can range from role-plays to more radical provocations.

### REPERTOIRES

However, even if it is possible to get rid of a number of prejudices and find a more multi-dimensional way of understanding the design situation by different kinds of reflection, the origin of the new and innovative ideas is still a fundamental mystery. From where and how do new ideas appear? Schön talked in quite general terms about repertoires of "cumulatively developed knowledge" to which the actual design situation is related. But he did not say much about how such a repertoire is acquired, structured and used. He regarded an inquiry into that as an "intriguing and promising topic for the future".

A repertoire may contain many kinds of referential material all the way from complete examples to single elements of knowledge. However, to work properly early in the design process the content must be possible to scan in a very direct and intuitive way. This means that the number and structure of entries must be manageable and that an advanced tool for matching is available.

As architect I use a tool-set that I call "formats". Formats of this kind are prototypical models that are structurally given but also possible to adapt in scale and proportions to a specific situation without losing their basic characteristics. They could be described as resilient. The kind of elasticity they offer can vary depending on the whole set of formats in the repertoire. There are both macro- and microformats. These formats must not be mixed up with the kind of pattern language that Christoffer Alexander developed (Alexander 1964). The formats do not constitute a general language. They are pragmatically created and used by the designer.

The basic quality of a format is a conceptual clearness and an ability to be generic. A elementary example is the basilica that has a distinct structure but, to a limit, can appear in different size and different proportions without losing its identity. Many formats are collective property among architects and are discussed e.g. in context with critique. Some of them may even be global. The architectural press plays an important role for the generation of new formats.

The practice of using formats is the kind of pattern matching that has been studied within neurophysiologic research during the last decades (Damasio 2003). It has for example been shown that reoccurring coherences often result in more or less permanent connections in the brain.

This matching process is intuitive and almost immediate and results in a starting-point that often works surprisingly. However, after a while, when it has been exposed to the many detailed demands and restrictions and adapted according to them, the specific topological rules tend to be overruled and it has to be abandoned and replaced by another more accurate one. By each loop in this process the designer learns more about the

design situation and is able to handle an increased number of demands and restrictions at the same time.

At last the architect has so much knowledge about the actual situation that she/he is able to try alternative formats or combinations of formats in a very quick and effective way. Sometimes this results in quite radical changes very late in the process that can be frustrating for the decision-makers as they, at that stage, often ask for stability.

## THE ROLE OF AESTHETICS

The holistic character of the set of entries in the repertoire has also, in my understanding, a close connection to aesthetics. Schön did not say much principally about aesthetics in design. One reason could be that he, like John Dewey, primarily related the concept to Fine Arts and by that did not find it so important for the design context (Dewey 1934).

However, the Fine Arts perspective is not self-evident. When going back to the introduction of the concept by Alexander Baumgarten in 1735, aesthetics is not just an internal concept for the Fine Arts but represents a different kind of knowledge.

He talked about a “Science of Sensuous Cognition”. This knowledge is not characterized by distinct statements but by “extensive clearness” and appears intuitively and immediately. It cannot be conceptualized like ordinary scientific knowledge. He used examples from Poetry to illustrate his reasoning and meant that if a poem is deconstructed and analyzed it will lose all its power. It can only be fully experienced by the senses. However, he did not restrict the use of the concept to the artistic field.

In difference to Baumgarten, Immanuel Kant took art as the point of departure for his understanding of aesthetics. In his book “Critique of Judgment” published in 1790 (Kant 1952) he connected aesthetics to his observation that the experiences of art are autonomous and independent of ethics and practical considerations.

However, even if this perspective has become very dominant, the more inclusive perspective on aesthetics has been re-actualized several times. One example is Ludwig Wittgenstein who, in one of his lectures, stated that: “Ethics and Aesthetics are one” (Wittgenstein 1969). He seems to have meant that artistic means is the only way to fully express the complexity of ethical considerations. To illustrate his view he compared the great and lasting impact of the novels of Tolstoy with the temporary effects of the many articles on social and political issues he also wrote.

Lately, the earlier understandings of aesthetics have become more or less obsolete even within the Fine Arts by new art forms. A wider and more generally applicable perspective, less connected to traditional expressions of beauty, is necessary to support the actual discourses. I mean that aesthetics now should be

reconsidered along the lines of a meaningful, surprising, expressive and comprehensive experience in general.

Such reconsideration would make aesthetics an important perspective in all kinds of design, not just the artistically oriented. It would be a question of how ethical aspects, complexity and contradictions can be expressed and communicated. Aesthetics may by that become a new platform for evaluation that complements the analysis of single qualities and problems by approaching the values of the whole.

This way of using the concept of aesthetics may also make it easier to understand how formats and other tools used in the repertoires of designers work. The designer’s ability to keep the clearness even when the early proposals are confronted with a lot of diverse and even conflicting demands becomes an important part of the skill.

## DESIGNERS IN CONTEXT

Schön focused his work on the individual designer. He did not discuss other participants and the need for different kinds of collaboration more than indirectly. This restriction has been criticised many times during the last decades. A wider perspective is obviously necessary even when concentrating on the skills of the designer.

The basic change is that standardized long-term solutions in design have become exceptions. There is a continuous request for adaptation to new situations even after the realization. The boundary between products and services has also more or less disappeared. At the same time the technologies have become more advanced and integrated so that many more specialists have to take part. A design process is not just a one-off. It has to go on in parallel with the use of the products, systems and environments.

This means that users do not any longer just take part in the design processes out of a right to influence one’s own daily life. Direct access to their experiences and values during the whole design process is necessary to secure the result.

This means that many more people with different backgrounds and with their own pre-understanding of the design situation take active part in the design work (Krippendorff 2006). By that, the professional role of the designer does not just involve production of virtual futures but also an advanced coordination of complex social processes.

One of the most important parts of that process is to make all the different perspectives alive for the participants. This is as complex as the design situation itself even if the aim is different. Still, it can make use of basically the same skill. It is a question of finding a conceptual whole by trial-and-error and prototypical models where all perspectives become related and the contradictions and dilemmas appear. To make the

differences more clear, provocative compilations can also be productive.

The ambition of the traditional designer to quickly come up with innovative solution must also be played down. Too concrete solutions at a too early stage can be dangerous. It may result in lock-ups where people feel forced to be for or against rather than to join in an effort to come to reasonable compromises.

## A STEP BACKWARDS TO MORE BASIC ASSUMPTIONS

It is obvious that the role of the designer has changed fundamentally. Still, it seems as if the traditional skill, so well described by Schön, could be the professional basis even in the new situation. Does this mean that a more comprehensive understanding of our existence, and society, that I earlier asked for, is not that necessary to get to a deeper understanding? Is design a neutral skill basically independent of political and social conditions?

It is no doubt that Schön was politically interested and active. He was eager to reach out and influence and well aware of the resistance his ideas were met by and how it could be handled. Still, he avoided all wider political and social implications.

Whatever the reason was for this avoidance, I mean that a further development of Schön's understanding of design cannot be carried through without a more general understanding of social change. Pragmatic philosophy is a useful base, but leaves, out of its avoidance of deeper articulations, too many questions unanswered.

There are numerous examples of attempts to create a solid philosophical ground for design. I will not go into any of these attempts now. By presenting the standpoints of two philosophers, Cornelius Castoriadis and Elisabeth Grosz, I hope to inspire the discussion in a more designerly direction.

*Cornelius Castoriadis* had a very mixed background, starting as a Marxist activist and later on rejecting Marxist theory and working as an economist within OECD for 20 years. He lived in Paris and was also involved in psychoanalysis.

The most relevant of his ideas in this context are the ones about society and change (Castoriadis 1997). He means that, "being is not a system, not even a system of systems". Nothing is determined. What occurs around us and frames what happens in our lives is fundamentally accidental. Society does not exist in an essential meaning. It is a "form" resulting from the historical creation of partial institutions in the broadest understanding as norms, language procedures and organizations. Some institutions are closed and strong, others open and informal.

Still, man exists only in and through this far from finished form. Notions as the individual, does not have any meaning outside a society. The understanding of

concepts as for example "reality" can only be given inside a society. Biology and physics are just conditions for life. What happens in for example the brain is a result of life, not life itself, that takes place in society. Society changes, mostly slowly, but keeps some basic qualities even when it goes through major crises. The institutions are sub-forms that create a web of different meanings that he call the "magma of social imaginary significations". Those meanings are not consistent with each other. They appear as sub streams in a flow that is impossible to characterize as a whole. All meanings are creations out of the actual institutional circumstances and do not correspond to any "rational" or "real" elements.

Consequently, each society follows its own dynamics even if there are many resemblances between different cultures, mostly based on concrete exchange. Some of the changes are possible to predict but the risk to presume too much of a logic or a continuity is always there. Significations are neither "distinct" nor "definite" and refer to each other in very specific ways. New forms at a societal level are mostly a result of long historical processes where the shifts of paradigms are not recognized before some crucial steps are taken. The importance of single events or personal interventions is often overestimated.

This does not mean that individuals or groups are unable to come up with ideas that can be developed into new sub-forms, e.g. institutions, physical artefacts and laws and in the long run even "re-instituting" society. Each individual has autonomy by its "closure". This autonomy has in the course of history developed from immediate and pre-programmed responses to outside threats into an ability to imagine new possibilities and make inquiries to realize them.

*Elisabeth Grosz*, who has a background in French philosophy and feministic theory, goes deeper into these questions about change and future in an explorative article about the openness of the future and the possibilities of real innovations (Grosz 1999).

Her understanding of our existence as something both given and unpredictable seems to be close to that of Castoriadis. She talks about "becoming" quoting Giles Deleuze (Deleuze 1983,1991). She means that we have to accept that the changes going on in both nature and society are emergent. They are both compelling and indeterminable and we cannot rely on trends to set out our future. To get a realistic start for design and innovation we have to look for deviations rather than for continuity.

All the same we cannot know anything for sure. All our understandings, even the historical, are virtual in the meaning that they are significations created under specific conditions and imprinted by that. They have to be judged out of the circumstances during the creation and the purposes; pronounced or underlying. And these constructions are not only dependent of time but also of space. They are situated in both aspects.

However, this basic insecurity does not mean that reality outside us cannot be approached. Even if there are a lot of different changes going on all the time there is always an “actual” reality (following Bergson). that we can refer to and conclude if a proposed change is possible or not. But even if the proposal is appropriate and realistic at the moment there are no guarantees for the future. The conclusion of this is that design cannot just focus on the artefacts but must prepare the users and stakeholders for a continuous reconsideration and redesign.

At the same time all design processes do not just change the future but also the present. The social imaginary significations develop. People involved in other changes have to regard it as a new part of reality. The production of virtual realities can at the societal level be regarded as a kind of exuberant reality.

It is important to note that both the creation of the virtual realities and the actualization are creative processes but in different ways. Normally, the virtual is dominated by a conceptual whole and coherent, while the actualization is a question of adapting without losing too much of the conceptual whole.

## CONCLUSIONS

What can be said about design research out of this attempt to critically examine, actualize and complement the ideas of Donald Schön? Design is obviously a very complex phenomena that cannot be understood by one theoretical approach. Like design situations it is necessary to keep a lot of different perspectives alive. It is also difficult to come up with recommendations of how to proceed in practice, as the power of design is the adaption to the local and specific. No situation is like the other and it is not only single moves and the order of the moves that differ. The whole approach is open.

The possible generalizations must by that stay at a comprehensive theoretical level. That calls for case-study methodology with or without experimental and other interventions (Yin 1984). The difficulty is to choose the situations to look into, as the resources are limited. Researchers using this method are expected to articulate their pre-understandings, to pay attention to unexpected data and to successively re-formulate their pre-understanding. Case studies never result in knowledge that can be used directly in other situations. It is a question of theoretical generalization.

What about the demand for rigor in this kind of studies that go deep into specific situations and even make interventions? The general answer is of course a thorough documentation that notes all differences between moments and cases. The difficulty is to be open enough to note the deviations from what was expected and not just get the pre-understanding confirmed.

The only way to secure this kind of watchfulness is to be related to other researchers with the same kind of interest and have to present and defend the position

taken. Many schools of design are small and do not offer a critical mass within research. Exchanges with other institutions and new institutions in-between the existing ones that can host seminars and workshops are necessary. NORDES is a good example of such an institution.

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# EXPLORATORY PAPERS





# MAGIC-MIRROR-SPIRAL: LOOKING INTO THE ROLE OF ‘DESIGN IDEAL’ IN INTERACTION DESIGN RESEARCH PROJECTS

NAVEEN BAGALKOT, ELENA NAZZI, TOMAS SOKOLER  
INNOVATIVE COMMUNICATION GROUP,  
IT UNIVERSITY OF COPENHAGEN, 2300 COPENHAGEN, DENMARK  
NLBA@ITU.DK, ELNA@ITU.DK, SOKOLER@ITU.DK

## ABSTRACT

There is an ongoing discourse arguing for Interaction Design Research to contribute to theory-about-interaction on one hand, and advancement of particular situation on the other. While there is an acknowledgement of the dialectic relation between theory and situation, however, pointers to embrace the dialectic during a research practice are missing. In order to embrace this dialectic, in this paper we suggest the formulation of a Design Ideal as the interface between theoretical concept and situation. We support our suggestion by a retrospection of our ongoing exploration of Magic-Mirror-Spiral, explicating the relation between theory, concept, design ideal, designed artifact, and situation.

We propose this formulation of ‘design-ideal-as-part-of-the-compositional-whole’ as a step towards an Interaction Design Research process that embraces the ‘theory-situation’ dialectic, and aims to contribute to, both, theorizing and advancement of situation.

## INTRODUCTION

In recent years the Interaction Design Research community has been engaged in an ongoing discourse for establishing itself as a discipline, moving away from the natural science leaning.

Mackay et al propose a model for research that aims to take into consideration a tension between natural science and design practice (Mackay et al 1997); however, they downplay the role of putting on display the design process itself as part of the contribution. Meanwhile arguing for a more designer oriented discipline, Binder and Redström propose a research approach where the contribution is defined by the expansion of a ‘design program’ brought about by a series of design explorations (Binder and Redström 2006). Further, Zimmerman et al set interaction design research as separate from the traditional HCI research, and argue for *design as a form of inquiry* in dealing with real world ‘wicked’ problems (Zimmerman et al 2007).

Thereby, this ongoing discourse can be summarised as being driven by the broader goals of:

- Setting a discipline that considers design as a form of inquiry, moving away from the natural science leaning of traditional HCI; and
- Articulating an Interaction Design research process that reflects the way we do research: being engaged in a dialectic relationship between theory and situation, and being explicit about it.

A core aspect of this ongoing discourse is to articulate what are the research contributions of such a research process. In this respect, there have been proposals that argue for contributions oriented towards advancing a particular situation to possible desired states on one hand, and contributions oriented towards theorising on the other.

Zimmerman et al claim that the main contribution of ‘research-through-design’ is to explore the solutions for a real-world problem through a series of alternatives forming a design space (Zimmerman et al 2008). Meanwhile, Stolterman and Wiberg argue for an interaction design research process that aims to contribute to advancement of ‘theory *about* interaction design’ (Stolterman and Wiberg 2010). They explicate concept-driven interaction design research as complimentary to the situation-driven interaction design research (see Figure 1). The concept-driven interaction design research is driven by a theoretically constructed concept and the design of an artefact (the Designed Artefact) that manifests the desired theoretical concept. The concept and the Designed Artefact form a ‘*compositional whole*’. This compositional whole is what constitutes a research contribution as an argument of possible new understandings of interaction thereby advancing the current theoretical understanding.

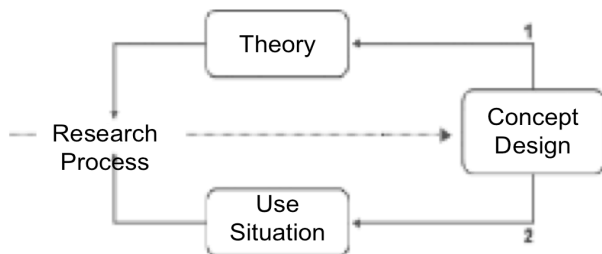


Figure 1: Two complementary cycles of interaction design research. Cycle 1 is concept-driven research; cycle 2 is situation-driven research (Stolterman and Wiberg 2010)

Stolterman and Wiberg, while acknowledging the dialectic relation between theory and situation, however, defer the discussion of the role of the compositional whole in advancing the current situation to preferred states.

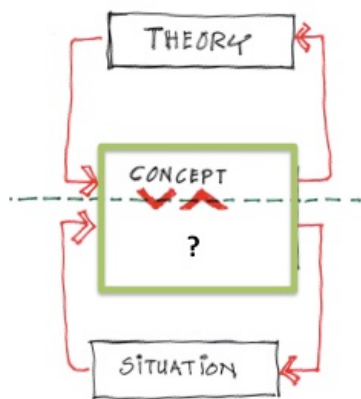


Figure 2: Need for a formulation oriented towards advancement of situation in the IxD research process

Meanwhile reflecting on MagicMirror, our on-going interaction design research project, we realized that we are enmeshed in the ‘theory-situation’ intertwinement, as emphasized by the above-mentioned work. Answering the call to describe our research process reflecting closely the ways we are engaged in it, we

found a need to formulate an interface between concept and situation; a construct that is oriented towards an advancement of situation, as is concept oriented towards advancement of theory (see Figure 2).

In this paper, as a solution to this gap in the compositional whole, we suggest the formulation of a *Design Ideal* as an interface between concept and situation. We understand it as the ideal driving the design situation from the current state to preferred states, but we explicate what is a Design Ideal by describing our exploration. In articulating the Design Ideal, we take from what Löwgren and Stolterman call as an interaction design *practitioner’s* ‘vision’: something that emerges when a designer encounters a design situation (Löwgren and Stolterman, 2007). The quality of the vision depends on the designer’s experience and repertoire, and drives the design process towards articulating specific preferred states. Similarly, the Design Ideal is the initial vision that emerges when the interaction design *researcher* encounters a particular design situation; the quality of the Ideal depends on the theoretical understanding of the researcher combined by reflection on previous experiences. While the design *practitioner* can be esoteric about how the vision emerged in a particular project, the *researcher* has a responsibility to make explicit, and put on display, the process of how the Design Ideal emerges from the interaction between theory and situation.

We expect that our formulation of ‘design-ideal-as-an-interface-between-concept-and-situation’ is a step towards embracing the ‘theory-situation’ dialectics; and towards articulating an interaction design research process that aims to contribute to both, theorising about interaction and advancement of particular situation.

Below we describe the MagicMirror exploration, explicating the relation between theory, concept, design ideal, designed artefact, and situation. We conclude by discussing how Design Ideal relates to the ongoing discourse, thereby pointing to the significance of our suggestion to the interaction design community.

## EXPLICATING THE ENGAGEMENT WITH THE DIALECTICS: MAGICMIRROR

MagicMirror broadly explores the design of digital technology to facilitate successful physical rehabilitation of senior citizens.

In MagicMirror the concept is Embodied Self-monitoring, which is informed by the theory of Embodied Interaction. The design situation is designing for post hip replacement therapy and the design ideal, Magic-Mirror-Spiral, drives our exploration by envisioning desirable future situations. Further, we briefly describe how we explored the design ideal through a process of sketching with therapists and senior citizens.

## THEORY INFORMING DESIGN

The MagicMirror exploration is informed by: theory about Embodied Interaction, and theory about successful rehabilitation of senior citizens.

Rooted in Phenomenology, Embodied Interaction is the nature of human interaction with the world through which people *make* meaning out of their actions (Dourish 2001). The theory about Embodied Interaction stresses the role of human body in the interaction with the world, the everyday practices within which this interaction is situated, and the nexus of equipment that the humans employ within these practices, in the meaning-making process. It provides us a holistic perspective on the situations of physical rehabilitation of senior citizens, and the direction for our research to explore the design of digital technology to be nested in these situations.

Simultaneously in the recent years, the field of physiotherapy is increasingly calling the attention of the therapists for a more holistic view on the nature of human body and its relation to the world. These recent works (Nicholls & Gibson 2010, White paper 2004, for e.g.) call for a shift in the therapists' perspective from the current occupation with body as a bio-medical phenomenon, to one that takes into consideration the fact that humans are actively involved in the everyday meaning-making through a bodily awareness built on an ongoing practice of interacting with the world. They also call for considering the holistic everyday situations within which the rehabilitation process unfolds.

## FROM THEORY TO CONCEPT: EMBODIED SELF-MONITORING

We construct the concept of 'Embodied Self-monitoring' from the above two theoretical understandings. In its current articulation, Embodied Self-monitoring is the embodied way of monitoring different aspects of engaging self with the world of physical rehabilitation. It focuses on three aspects:

- The prospects offered by the bodily awareness in providing immediate feedback while exercising,
- The ongoing practice of rehabilitation process,
- And the nexus of things—people, physiotherapists, family and friends, physiotherapy equipment, and other everyday things—within which the senior citizen's rehab process is situated.

The focus on these three aspects facilitates a more holistic self-monitoring opportunities for the senior citizens during their rehabilitation process. These Embodied Self-monitoring opportunities open up the possibilities for the senior citizens to be more aware of their progress and their situation. We speculate that this self-awareness further leads to a more successful rehabilitation process.

Thereby, at a broad level, we are exploring the role of digital technology to facilitate the concept of Embodied Self-monitoring in different situations of physical

rehabilitation of senior citizens, as way to promote a more successful rehabilitation process.

## THE SITUATION

The particular situation of the MagicMirror exploration is the physical rehabilitation of senior citizens after a hip replacement surgery. Currently the senior citizens after the surgery undergo a six-week therapy, during which, they visit the clinic twice a week to perform the exercises under the supervision of the therapists. Additionally, the senior citizens are recommended to exercise at home. However the therapists don't have much information on how the senior citizens managed to do these exercises, and the senior citizens don't have clearer instructions during exercising at home.

## FROM THE SITUATION TO THE DESIGN IDEAL: MAGIC-MIRROR-SPIRAL

This situation of isolated exercise practices led us to explore the possibilities that are opened up by the movement of the exercise data from the rehab centre to home, and back. We formulate the '*Design Ideal*' of Magic-Mirror-Spiral exemplifying these possibilities.

The spiral starts off at the rehab centre, by video recording the exercises the senior citizen performs under the supervision of the therapist. The senior citizen takes home this video and uses it as the 'reference' exercise to monitor self while exercising at home. During this the MagicMirror tracks the body movements, and overlays it on the instructional video, thus giving the senior citizen a self-referential video for exercising. The senior citizen takes back this home video to the centre to discuss the progress in detail with the therapist (see Figure 3).

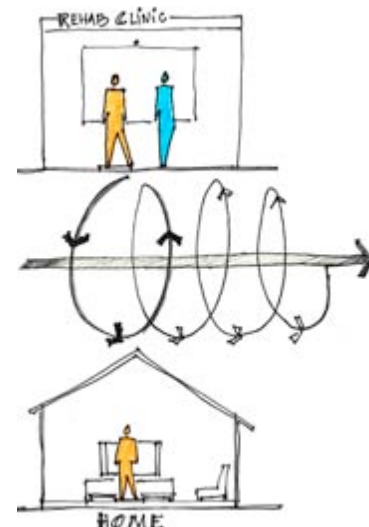


Figure 3: the Magic-Mirror-Spiral

As a Design Ideal, the Magic-Mirror-Spiral points to desirable future situations that we foresee the present situation could advance to. Specifically, we foresee how by engaging in the Magic-Mirror-Spiral may induce a

*collaborative articulation* of the rehab process between the therapists and the senior citizens, by recording and sharing the exercises between the centre and the home. We see this process as a two-way consultation between experts of each their kind. The senior citizens can let expertise on their own everyday lives meet with the expert knowledge on rehabilitation held by the professional therapist.

#### FROM THE CONCEPT TO THE DESIGN IDEAL

In this situation the Magic-Mirror-Spiral as *'Design Ideal'* translates the Embodied Self-monitoring concept to concrete pointers for desirable future situations. From the abstract understanding that facilitating Embodied Self-monitoring promotes a more collaborative rehab process, the 'Magic-Mirror-Spiral' design ideal drove our exploration by pointing to concrete possibilities for facilitating a collaboration between senior citizens and therapists, through the exchange of recorded data in the spiral between rehab centre and home.

#### SKETCHING AND CO-EXPLORING THE DESIGN IDEAL

We further explored the possibilities brought forward by the Magic-Mirror-Spiral design ideal through engaging in a process of sketching and co-exploration (see Figure 4) with a group of 4 physiotherapists and a senior citizen.

From our initial discussion with the therapists we identified the three 'key' things the therapists want to monitor during the exercise process: the vertical body position, balance of weight on feet, and knowledge about hip muscle activity.

We sketched a 'balance board' with pressure sensors measuring the weight balance, a belt with an accelerometer for vertical position and a digital counter for counting the number of exercises (see Figure 5A). All these sketches were connected to a laptop with a

webcam. The laptop video recorded the exercises, and displayed the sensor information over the video in real time. This immediate feedback enables the senior citizens to monitor their exercise while practicing.

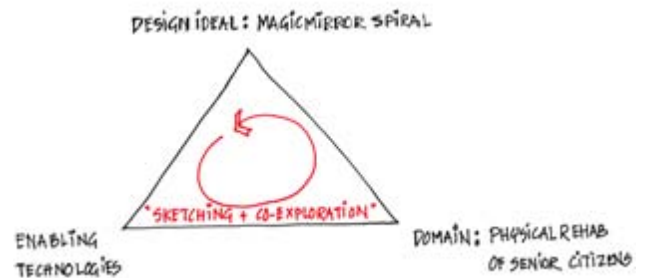


Figure 4: the Process of Sketching and Co-exploring

We co-explored the sketches in a mock enactment of the first cycle of the Magic-Mirror-Spiral: recording the exercises at the rehab centre, exercising at home, and discussing the home exercises back at the rehab centre (see Figure 5 B, C, D). We then summarized the three-part exploration in an extended discussion with the citizen and the therapists.

#### FROM DESIGN IDEAL TO DESIGNED ARTEFACT

Acting on the insights from the initial co-exploration, we are currently exploring the sketch of 'MyReDiary', a personal device for the senior citizens (Bagalkot and Sokoler, 2011a, 2011b). We envision it as a *tool for collaboration*, providing the senior citizens a language to share with their therapists their recorded exercises practices from home (see Figure 6).

While the in-detail description of the process is not in scope of the paper, in the next section we summarize the reflections on the MagicMirror exploration.



Figure 5: Sketching and Co-exploring the Magic-Mirror-Spiral



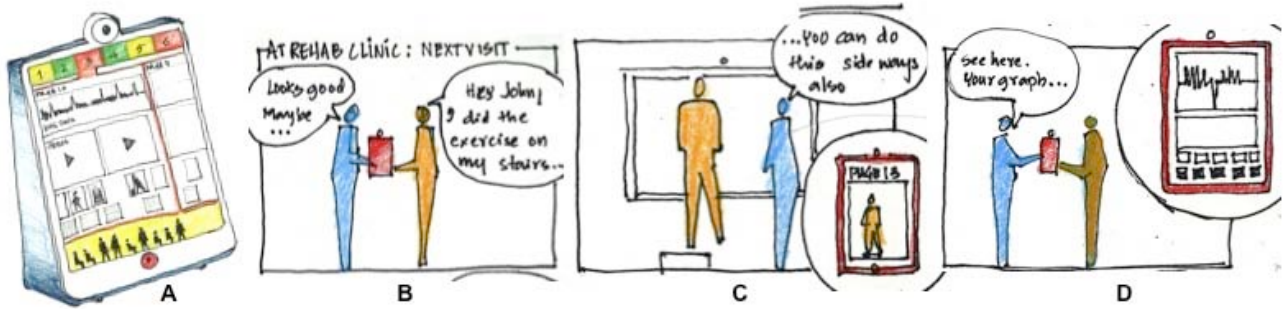


Figure 6: MyReDiary, a Personal Device of senior citizens for collaboration

## REFLECTIONS: THE DESIGN IDEAL AS AN INTERFACE

In the above retrospective description we have highlighted the role of the Magic-Mirror-Spiral in driving the research process. We now reflect on how this design ideal acted as an interface between Embodied Self-monitoring concept and the situation of rehabilitation post hip replacement.

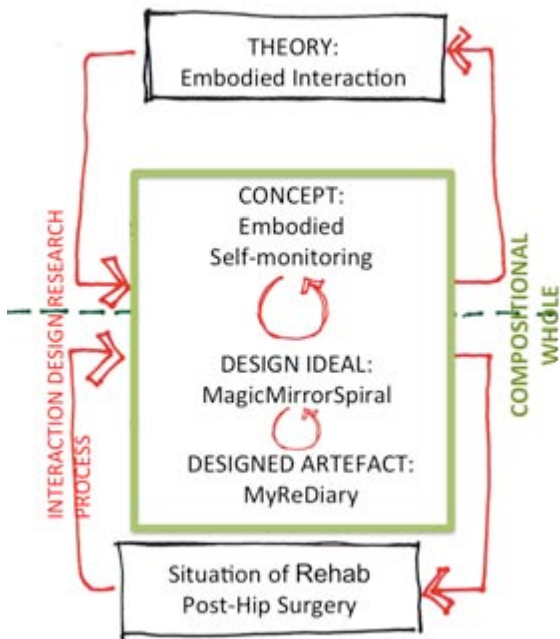


Figure 7: The Compositional Whole from MagicMirror Exploration

Looking back, we find that Magic-Mirror-Spiral design ideal is a *situated manifestation* of the Embodied Self-monitoring concept. When the more abstract articulation of Embodied Self-monitoring concept faced the concrete situation of senior citizens' rehabilitation post hip surgery, it led to the formulation of the Magic-Mirror-Spiral design ideal. The Magic-Mirror-Spiral holds both:

- The intent of advancing the present situation to a desirable one of a more collaborative articulation of the rehabilitation, as experienced by the therapists and the senior citizens; and,

- The intent to further the articulation of the Embodied Self-monitoring concept, and its role in promoting a successful rehabilitation process.

Further on, exploring the first cycle of the Magic-Mirror-Spiral led to MyReDiary, a concrete Designed Artefact.

In Figure 7, we summarize this inter-relation between Embodied Self-monitoring concept, Magic-Mirror-Spiral design ideal and the MyReDiary designed artefact, as a *compositional whole*. In the next paragraphs we explicate how this compositional whole contributes towards, both, an advancement of the situation, and an enhancement of the concept pointing to theoretical advancement.

## COMPOSITIONAL WHOLE FOR AN ADVANCEMENT OF THE SITUATION

The initial exploration of the first cycle of the Magic-Mirror-Spiral lead to some concrete initiatives pointing to an advancement of the situation from the current state to possible desirable states. During the co-exploration, we found out that:

- While the therapists were actively involved in exploring the sketches and setting up the exercises for the citizen in the first round, they were not so impressed by the amount of time it would take to go through the home videos of the citizens. The therapists rather found the sensor data to be more useful than the video material. The sensor data was more close to their expert language and they could relate to that closer than the video.
- However, the citizen also stated that recording her exercises at home to show it to the therapists would mean that she has to commit herself to the practice. This would mean an external motivation for her to be engaged in the process: a "whip" in her terms.

Both these reflections highlight the fact that while the therapists have an established language to talk about physiotherapy, the senior citizens lack this. This throws up the possibility of providing a language for the senior citizens to talk about their experiences of exercising at home with their therapists, thereby increasing their role in the articulation of their rehabilitation process.

As mentioned above, this led us to sketch 'MyReDiary', a concrete manifestation of the possibility of giving a language for the senior citizens to engage in a more collaborative rehabilitation process.

#### COMPOSITIONAL WHOLE FOR AN ADVANCEMENT OF THE CONCEPT

During the exploration

- The citizen expressed that the video from the rehab clinic would help her in reflecting on her progress. While, the senior citizen was not comfortable with the overlap of exercise videos from the rehab clinic over the live video while exercising (as was manifested in the sketch), she suggested that she would rather look at the videos from clinic separately for reflection on her progress.

This suggestion pointed us to the possibility that this period of reflection could help the citizen to prepare for the meeting with the therapist, by making notes, selecting specific parts of the video to highlight achievements and problems, etc.

Thereby, Embodied Self-monitoring may also support a more reflective way of monitoring one's progress, along with providing immediate feedback while exercising. The Magic-Mirror exploration provided a refinement in our understanding of the concept, offering a concrete example of a reflective aspect of Embodied Self-monitoring for promoting a more collaborative rehabilitation process.

#### CONCLUDING REMARKS

In our retrospective account of the MagicMirror exploration, we explicated that the Design Ideal is a situated manifestation of the concept, acting as an interface between the concept and the situation while doing interaction design research. We further explicated how the Concept, the Design Ideal, the Designed Artefact and their inter-relation are brought together in a *Compositional Whole* (see Figure 7). We embraced the 'theory-situation' dialectic through this compositional whole where the concept facilitates towards an advancement of the theory about interaction, the design ideal facilitates towards an advancement of the situation.

Thereby we added the Design Ideal to the compositional whole as articulated by Stolterman and Wiberg (Stolterman and Wiberg 2010). We propose that this formulation of 'design-ideal-as-part-of-the-compositional-whole' is a step towards an interaction design research process that embraces the 'theory-situation' dialectic, and aims to contribute to, both, theorising and advancement of situation. In general, we expect that this formulation is a step towards describing

a research process that reflects the way we engage in interaction design research.

#### ACKNOWLEDGEMENTS

We thank the therapists and the senior citizens from the Gentofte Commune for being integral co-explorers. We thank the *Danish Enterprise and Construction Authority* for funding the MagicMirror pilot project.

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# SLOW FOOD SLOW HOMES - EXPANDING THE ROLE OF ARCHITECTURE IN THE NORTH AMERICAN HOUSING INDUSTRY

JOHN BROWN

FACULTY OF ENVIRONMENTAL DESIGN

UNIVERSITY OF CALGARY

BROWNJ@UCALGARY.CA

## ABSTRACT

The North American city is dominated by suburban sprawl, that vast formless, center-less, fragmented urban structure that the Sierra Club calls the ‘Dark Side of the American Dream.’ These places are like fast food. On the surface they appear cheap, and cheerful. However, this marketing veneer masks a world of thoughtless design and construction that is bad for both us and the environment. In the same way that fast food disrupts the historically rich context of cooking; these fast homes replace the deep potential of urban dwelling with a standardized product. The ‘Slow Food Movement’ provides an interesting antidote to the dilemma of fast food. It promotes individual empowerment through the use of natural ingredients, thoughtful preparation, and a renewed culture of the table. This paper critically surveys the current problems with the North American Housing Industry and proposes the potential for a ‘Slow Home Movement’ to generate a renewed role for the architecture profession within this milieu and to begin to make design matter again.

## INTRODUCTION

In the past decade the term ‘McMansions’ has entered the English lexicon as a short hand descriptor of the pervasive oversized mass produced house. Like fast food, these fast houses pervade the North American landscape as standardized, homogenized commodities designed to maximize the short-term profits for the industry that creates them, with little regard for the long-term costs to our health and well-being.

Both fast food and fast houses are shaped by one of modernism’s core philosophies – to make life better by making it easier. This powerful promise continues to capture the imagination of the majority of people, despite the fact that almost every other pillar of modernism has been felled over the past sixty years and in the face of mounting evidence of just how much harm it has wrought.

Most of the development created by the fast housing industry has resulted in environmentally unsustainable, culturally homogenous neighbourhoods of single family detached houses and strip retail malls. 70% of the population resides in this seemingly endless landscape of suburban sprawl largely “unaware of the subtle and not-so subtle ramifications of its presence in their lives.” (Leach, 1999)

According to Dolores Hayden, North America,

“has a housing crisis of disturbing complexity, a crisis that, in different ways, affects rich and poor, male and female, young and old, people of colour and white Americans. We have not merely a housing shortage, but a broader set of unmet needs caused by the efforts of the entire society to fit itself into a housing pattern that reflects the dreams of the mid19<sup>th</sup> Century better than the realities of the 21<sup>st</sup> Century.” (Hayden, 2002)

The impact of the fast food industry is equally disturbing. McDonald's has about 28,000 restaurants worldwide and opens almost 2,000 new ones each year. It is responsible for 90% of the new jobs created each year and an estimated one out of every eight workers in North America has at some point been employed by McDonald's. Within a 30 year time span, fast food's low paying service sector has become a major component of our economy.

According to Eric Schlosser, "during a relatively brief period of time, the fast food industry has helped to transform not only (our) diet, but also our landscape, economy, workforce, and popular culture. Fast food and its consequences have become inescapable, regardless of whether you eat it twice a day, try to avoid it, or have never taken a single bite." (Schlosser, 2001)

This world of ever expanding girth, of both our waistlines and our cities, is a testament to modernism's broken promise. Easier is not better it's just easier. Moreover, in examining the consequences of this broken promise, easier actually brings us to the opposite of better. Like fat free instant chocolate cake, abs without exercising, learning a second language in your sleep, or becoming the next pop star without really knowing how to sing, the fast suburban home exhibits "the traits of a commerce with reality where the rootedness in the depth of things, i.e. in the irreplaceable context of time and place, has been dissolved. (Borgmann, 1984) In many cases these post- industrial commodities are popular for the very fact that they *can* be enjoyed as a mere end, unencumbered by means, making little demand on our skill, strength, or attention.

According to Eric Schlosser,

"Fast food has changed not just what Americans eat, but also how their food is made... A fast food kitchen is merely the final stage in a vast and highly complex system of mass production. Foods that may look familiar have been completely reformulated. What we eat has changed more in the last forty years than in the last 40 thousand... Much of the taste and aroma of American fast food, for example, is now manufactured at a series of large chemical plants off the New Jersey Turnpike." (Schlosser, 2001)

In the same way that fast food unravels the deeper cultural context of cooking and dining, the fast housing industry has transformed us from a nation of home-makers into one of home-buyers, all too ready to blindly consume the latest marketing image of a super-sized idyllic dream home as a vision of individualization. In such a world of strictly limited choices "notions of self and happiness are thus prone to disappear into categories of consumer products." (Archer, 2005)

## DESIGN QUALITY SURVEY

To gain some sense of the dimension of the fast house problem in the North American new housing market a survey of design quality was undertaken during a nine

month period in 2010 (Brown and North, 2011). The project involved more than 100 volunteers from across Canada and the United States who participated in a mass collaboration effort to identify and evaluate the design quality of new residential projects in nine cities - Toronto, Philadelphia, Atlanta, Miami, Chicago, Dallas, Denver, Los Angeles, and Vancouver. This virtual community searched the web for new residential projects in three housing categories -- apartment/lofts, townhouses, and single-family houses. A standardized evaluation form was used to evaluate design quality across 12 different areas of the home. The results were posted to a web site and then analysed by the researchers

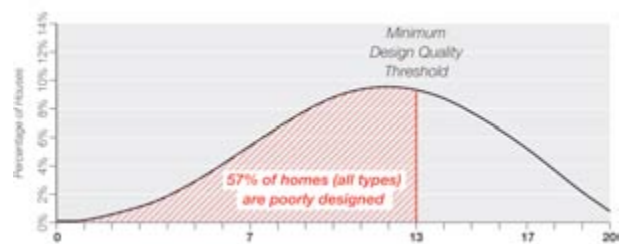


Figure 1 – Design Quality Result Summary by all House Types

Over half (57%) of the more than 4600 new home projects analysed in the survey failed to achieve a score of 13/20 or greater on the evaluation. This was considered to be the minimum design quality threshold, and properties that did not attain this score were classified as fast houses.

When broken down by house type, more than three out of every four (78%) of the single-family houses surveyed failed to meet the minimum threshold. The level of design quality was slightly better for townhouses, with just over half (57%) failing to meet the minimum threshold for design quality. Interestingly, apartment/lofts scored much better, with only 38% of projects receiving a failing grade.

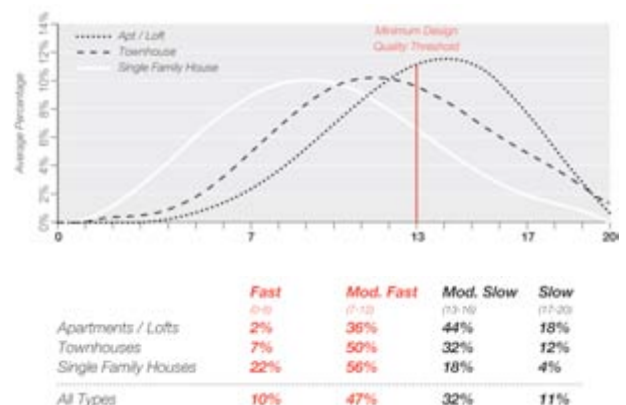


Figure 2 – Design Quality Result Summary by House Type

On the other end of the scale, a mere 11% of properties in all house types achieved a score of 17/20. For single-family houses, the percentage of these exceptionally well-designed homes dropped to just 4%. For townhouses, the number was 12%, and apartment/lofts

again fared the best, with 18% of the properties surveyed achieving top marks for design quality.

The higher level of design quality in the apartment/loft category can be attributed to the fact that, unlike single-family houses and low-rise townhouse developments, many apartment/loft projects are large, multi-storey buildings that require the services of a professional architect for their design.

The level of design quality also varied substantially over the nine cities in the survey. Vancouver had the best overall level of design quality, with 64% of properties in all house types exceeding the minimum design quality threshold. Miami was the worst of the nine cities, with only 29% of the properties in all house types receiving a minimum pass or better on the evaluation.



Figure 3 – Design Quality Result Summary by City

## DESIGN AS MARKETING STRATEGIES

The fast home industry uses sophisticated strategies to market its cookie cutter houses and instant neighbourhoods with a combination of “theatre, show business, seduction and fashion. Like clothing lines, new houses are sold through the seductive power of “models” – or, in the sense of the luxury home, supermodels, tricked out in fashionable and flattering outfits” (Garber, 2000)

In addition to these overt marketing tactics, a detailed analysis of the survey results revealed four design strategies that kept recurring in all house types and sizes. They were found across all price ranges and in all nine of the cities that we surveyed. It is hypothesized that these strategies are being employed by the fast house industry for marketing purposes rather than to make the house better to live in.

In other words, these strategies are designed to catch our attention, ignite our desire, and give us the illusion of value in much the same way that the dramatic photography, juicy description, and supersized ingredient list seduces us into buying a triple cheese bacon burger. Despite the allure of their first impressions, we buy houses that contain these features at our own risk.

The first designed-to-be-sold strategy identified was the use of colliding geometries to catch the attention of a buyer when they first walk into a house. They result whenever walls, stairs, kitchen counters, and fireplaces

are organized on a 45-degree angle to the orthogonal geometry in the rest of the plan. Our eyes notice things that are different from their surroundings, and advertisers have long used this fact to attract potential buyers. The foreign geometry collides with the rest of the house and makes it stand out and look more dramatic than it really is. However, this strategy can cause significant long-term problems when applied to the design of a home. Dramatic visual devices such as this usually end up fragmenting the spaces in a floor plan, causing serious disruptions to the way the rest of the house works.

17% of all house types contained some form of colliding geometry. They were most prevalent in single-family houses (32%).

The second designed-to-be-sold strategy identified in the survey was the use of redundant spaces. They are employed to ignite desire by artificially inflating the allure of a home with extra rooms and functions. The fast house industry counts on the fact that most people give very little thought to the usefulness, or even necessity, of these extra spaces at the point of purchase. Unfortunately, the lack of actual value that they provide soon becomes apparent when you move in and realize that these spaces are redundant, difficult to furnish, and perhaps even unpleasant to be in.

Redundant spaces were found in 23% of all of the properties in the survey. Multiple dining rooms were the most common example of redundant spaces across all house types.

False labeling was the third designed-to-be-sold strategy to be identified in the survey results. It makes a house look better in the sales brochure than it is in reality in order to ignite desire with the promise of a great feature. The problem is that false labeling of spaces in a fast house can mask significant design deficiencies that might not become evident until after you have moved in. Perhaps the most common falsely labeled space is the “study” or “home office.” In many fast houses, any wasted bit of space can suddenly be defined as a “study” on the floor plan. Too often these spaces are just too small, too dark, or too oddly shaped to function effectively

False Labeling was observed in 36% of all the properties surveyed. In single-family houses and townhomes, the most common falsely labeled spaces were. In apartment/lofts, falsely labelled study/office spaces were the most prevalent.

This was attributed to the fact that the addition of a study often raised a unit into the next higher price category, regardless of the quality, or even utility, of that space.

Supersizing was the final, and perhaps most common, designed-to-be-sold strategy identified in the survey. Bloated house sizes, over-sized rooms, and over-scaled fixtures such as bathtubs and staircases are used to give an illusion of value. The intent is to convince

homebuyers that the house they are considering is just too good a deal to pass up. It seduces the buyer with the offer of more product at a cut-rate price. In reality, it trades off quality for quantity. In most cases, however, the functional value of these supersized elements is much less than the more reasonably scaled versions.

Supersizing was noted in 37% of the properties reviewed. These ranged from individual elements, such as bathtubs and staircases, to oversized spaces such as garages, bathrooms and master bedrooms. The so-called “trophy kitchen” was a type of Supersizing found almost exclusively in large single-family houses. The multiple islands and large floor areas typical in these kitchens often resulted in ineffective and awkward kitchen layouts. Oversized master bedrooms were the most prevalent forms of Supersizing across all housing types.

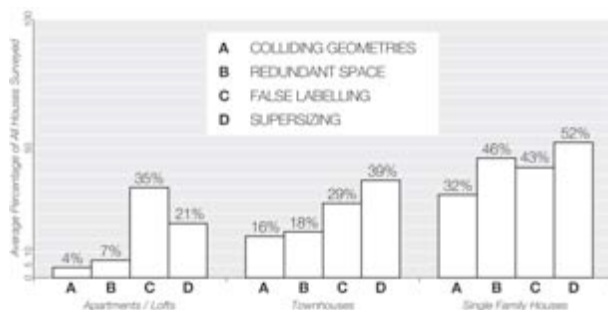


Figure 4 – Incident of Marketing Strategies by House Type

## SLOW FOOD SLOW HOMES

Fortunately, in food, there is a critical alternative to the pervasive fast food industry. The Slow food movement, as the name suggests, “stands for everything that McDonald’s does not; fresh local, seasonal produce, recipes handed down through generations; sustainable farming; artisanal production; and leisurely dining with family and friends.” (Honore, 2004) Founded in Italy by Carlo Petrini in 1986, slow food is an international movement with a membership of over 100,000. Its mandate “opposes the standardization of taste and protects cultural identities tied to food and gastronomic traditions.” (Petrini, 2006)

Slow food is an attempt to reverse the infantilization that occurs with fast food. It promotes a re-engagement with the culture of the table through individual everyday involvement with the selection, preparation and enjoyment of food.

Slow food is the discipline of creating and enjoying our daily meals, however humble, as an act of individual engagement. Replacing the superficial consumption of a commodity with a practice promotes a more intentional, directed way of being in the world and begins to counteract some of the infantilization we have suffered from an overdependence on market driven consumption.

According to Carl Honore,

“Fast and slow do more than just describe a rate of change. They are shorthand for ways of being. Fast is “busy, controlling, aggressive, hurried, analytical, stressed, superficial, impatient, active, quantity over quality. Slow is the opposite, calm, careful, receptive, still, intuitive, unhurried, patient, reflective, quality over quantity. It is about making real and meaningful connections – with people, culture, work, food, everything.” (Honore, 2004)

The fast house industry is based on the fast idea that the American dream can be purchased as a ready to move in commodity package. But this “not only masks the larger ideological contests that are at play. It also denies the complexities of domestic life.” (Archer, 2005) Drawing on the precedent of the slow food movement, a slow home is a potential antidote to the fast houses and communities churned out by the development industry. A slow home would foster a re-engagement with the culture of the house by directing attention to the house as the focus of a practice to be lived rather than as a product to be consumed. This process would create a more mature, less infantilized, role for the homeowner as they assume more responsibility for both the way in which the house is acquired and the manner in which it is lived in.

This does not mean, however, that we must all take a year off from work, buy a set of tools and physically construct our own house. The realities of 21<sup>st</sup> Century society make withdrawal from the present commodity economy inconceivable if not impossible. According to Archer, “Individually we do not have the opportunity to negotiate the categorical terms in which our dreams are realized. Rather, we choose from an array of options that our culture affords us.” (Archer, 2005)

A slow home would expand that array beyond the choice of one complete package of commodities or another and towards a more distributed and complex set of real decisions. At the same time, it would transfer control and responsibility for these choices away from big business and back to the individual. A slow home would create a system in which decisions can be made by individual homeowners based on a mature understanding of the real cost of home ownership to the environment, our cities and ourselves.

The slow home philosophy would also curb new suburban development by encouraging the creative re-use of existing structures. In the fast world of commodified housing, used homes quickly lose their lustre in comparison to the newest model of dream home. In a slow world, these older properties become opportunities for creative intervention.

The slow home is more than an operational strategy. It is as much a political statement as it is an ideological one. It promotes a shift in the underlying structure of one of the largest components of the American economy. It is a redefinition of the dream house into a process that enables each of us, as individuals, to

explore the intricacies of an adult oriented selfhood rather than an infantilized image.

It recognizes that suburbia is,

“... a social terrain in continuous process of production, a material artefact in which and by which people negotiate the resources and skills that they can marshal, the opportunities that their lives present and the various dreams and aspirations that they may choose to pursue. To approach suburbia in such a fashion is to recognize that, like everything in life it is a messy artefact, always incomplete and full of inconsistencies.” (Archer, 2005)

The slow home could be a first step towards creating a cultural condition in which the deeper potential for livable communities could emerge. The question of whether it is an achievable option, however, rests with the attitude of society rather than the mechanics of the system.

According to Waxman,

Those things that make us lesser cooks are not very different from those that are impairing the quality of much of our lives – insufficiencies of the right kind of education, an unwillingness or an inability to move beyond the superficial, a reluctance to endure risk, and a stupefying laziness for anything but long hours at our jobs.” (Waxman, 1996)

Given the current state of North American culture this is a question that very much remains to be seen.

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# DESIGN FOR CO-CREATION WITH INTERACTIVE MONTAGE

BIRGITTA CAPPELEN

OSLO SCHOOL OF ARCHITECTURE AND DESIGN

BIRGITTA.CAPPELEN@AHO.NO

ANDERS-PETTER ANDERSSON

INTERACTIVE SOUND, KRISTIANSTAD UNIV.

ANDERS@INTERACTIVESOUND.ORG

## ABSTRACT

Montage in cinema means to mount images and sounds from different sources, that are interpreted together and whose oppositions drive the story further. In this paper we develop the montage concept further for co-creation in interactive, tactile, spatial cross-media. As case we use the design of the interactive, tangible, cross-media installation ORFI. ORFI is developed to facilitate collaboration and co-creation between children with severe disabilities and their care persons. In this paper we focus on how we have designed for interactive montage. We present two main types of interactive montage, *close* and *shifted* in three dimensions (spatial, temporal and actorial). With the first we mean spatial and temporal closeness, depending on the roles users take and the interpretations they make during interaction. With *shifted* we mean how to use spatial and temporal shifting and distance between the media elements in space and over time, depending on the users' roles and interpretations. All this to encourage co-creation over time, between a variety of users in different situations.

## INTRODUCTION

Ubiquitous Computing, Tangible User Interface (TUI) and Tangible Interaction are a growing field within Interaction Design. It is a field where people with

different practical and theoretical backgrounds and competencies cross, extend and expand the boundaries of the field. Computers, sensors, output devices and software are embedded in everyday objects, traditionally designed by industrial designers and architects. This challenges our understanding of what the things are and how they should be used (Oulasvirta 2008). Wireless and multimedia capabilities can be integrated, and they all eventually become part of our everyday life, where we interact with intelligent and other everyday objects in a mixed reality environment. This opens up new and challenging areas to be explored.

Many have discussed design of tangible computational objects. Some have focused on the difference between atoms and bits (Weiser 1991, Ishii 1997), where others have focused on the aesthetical potential in *composites*, in the relation between the material and the computational (Löwgren 2004, Vallgård 2007, Wiberg 2010). These are important issues, regarding the design of the sensorial interface level of the tangible object.

Our focus in this paper, however, are cross-media relations *over time*, between many, tangible objects in the *use situation*. And the design of possible relations between different media elements like (light, graphics, music, tactility, etc.) to motivate collaboration between many users. Collaboration where users *create something third* together we call *co-creation*. This is an extended, socially motivated experience compared to *play*, where several people just act simultaneously, and *collaboration* where they act towards a common goal.

The designed *possible relations* between media elements, programmed in software, are realised as a *montage*, experienced by the users.

In this paper we discuss a tangible interactive installation developed to facilitate collaboration and co-creation between disabled children and their care persons. We focus on the use of different media types and the relation between these in order to motivate the users to collaborate and co-create together.

## RELATED WORK

The original vision for Ubiquitous Computing was formulated by Mark Weiser (Weiser 1991). The



computers should be disappearing and the interaction seamless. This ideal has later been criticized, especially by researchers with an artistic background, arguing for the need of what is the opposite of seamlessness, that what is, *seamful design* (Chalmers 2004), where the seams are important for the experience of the design, together with, ambiguity, heterogeneity, conflicting images (Andersson 2000, Gaver 2003) such as it is used in a montage.

#### CROSS-MEDIA AND INTERACTIVE MONTAGE

Montage was originally a film editing technique used to manipulate emotional responses by joining one moving image shot to another in a linear sequence. This was often made through violently contrasting, juxtaposing effects, with media elements from disparate sources (Eisenstein 1949). The New Media theorist Lev Manovich calls the traditional graphical user interfaces *anti-montage*, because the interfaces communicate the same message through more than one sense (Manovich 2001), using several media types with the same content like in multimedia or multimodal interfaces. For instance as one does in a news article, when presenting a text, pictures and video from the same event.

Some video games use a form of Interactive montage as an important and motivating functional part of the gameplay (Nitsche 2005), e.g. shifting angles or point-of-views from first person to third. Others have used montage to describe multimedia as the combinations of different media types in “multi modal spati-temporal montage” (Skjulstad 2008). Here montage, still a designer's technique, creates unity and coherence on a "textual macro level". In games through interaction the user dynamically constructs the montage, his experience and narrative (Liestøl 1994). When leaving the frame of the screen, moving out into the tangible space, montage changes fundamentally. Meaning is created cross-media through interaction, between diverse media types and over time, space and depending on what role the user takes on (Signer 2006, Gislén 2008).

#### METHODICAL FRAMEWORK

In this paper we answer the question, how to design potential relations between different media elements to motivate co-creation, by evaluating a design case based on an analytical model for mediation and shifting.

The research leading to the cross-media installation ORFI has develop over a period of 10 years, with different interfaces, media types, target groups, and contexts. We have taken the knowledge, design and technologies developed in our research, and applied it in the field of “Universal Design”, with extreme challenges regarding user situation and the users’ specific abilities.

For this paper, families and children with severe disabilities was studied, while using ORFI at a usability lab rebuilt to simulate a home environment, and at a large rehabilitation centre at a hospital.

#### SHIFTING

“Shifting” is this paper’s conceptual framework of analysis. It is borrowed from sociologist Bruno Latour and related to his studies on use of physical and technical things (Latour 1996). Latour showed how things can act, not only as neutral objects or tools, but as active actors, with abilities to influence scientific results and everyday life. He developed theories on how humans create relations to things, and how things mediate human actions and meanings. We use Latour’s theories when designing and investigating relations between media elements and user interaction.

The term *shifting* comes from semiotics and originally explains how a reader is motivated by the text to identify with the texts’ main character. The reader, or in our case the user, can shift from identifying with the main character to a more peripheral character. Latour calls this *actorially shifting* (Latour 1999). The users can also be motivated by the rhetoric's of the text, or in our case by the design, to shift position in *space* to another location and to another time. Like an old picture of Paris can make us imagine being in Paris in the old days, even if we are in London in 2011. Latour calls this *spatial* and *temporal shifting*.

What Latour recognized was that when including interaction with *physical* artefacts, yet another type of shifting takes place, where the user of the artefact not only think about shifting. Instead the user delegates meaning and actions to the artefact by using it. The user *shifts down* to the artefact and by doing that he also shifts role from being a more passive observer to an immersed interacting user, or player.

#### ORFI - A CROSS-MEDIA FIELD

Our case in this paper is the interactive installation ORFI. ORFI is a tangible, cross-media installation (see Fig. 1).



Figure 1: The ORFI landscape, the modules and the dynamic video projection.

It consists of 20 tetrahedron shaped soft modules, as special shaped cushions. The modules are made in black textile and come in three different sizes from 30 to 90

centimetres. Most of the tetrahedron has orange origami shaped “wings” mounted with an orange transparent light stick along one side. The “wings” contain bendable sensors. By interacting with the wings the user creates changes in light, video and music. Two orange tetrahedrons contain microphones. ORFI is shaped as a hybrid, a hybrid between furniture, an instrument and a toy, in order to motivate different interpretations and forms of interaction. One can sit down in it as in a chair or play on it as on an instrument, with immediate response to interaction. Or one can talk, sing and play with it, as with a friend and a co-musician in a communicative way, where ORFI answers vary musically after some time.

Every module contains a micro computer and a radio device, so they can communicate wireless with each other. The modules can be connected together in a Lego-like manner into large interactive landscapes. Or, the modules can be spread out in a radius of 100 meters. So one can interact with each other sitting close, or far away from each other. There is no central point in the installation, it is like a field (Cappelen 2003). The users can look at each other or at the dynamic video they create together. Or one can just chill out and feel the vibrations from the music sitting in the largest modules as an immersive, ambient, experience.

The installation has a 4-channel sound system that makes listening a distributed experience. ORFI consist of several music genres, which the user can change between. Some of the genres use sound files that can be combined, following musical principles for layering and sequential ordering. In other genres the music and the dynamic graphics is based on programming code, making it possible to order content in layers and sequentially, based on how the users interact. Every sound node is designed, so that each can be composed together with others, following musical rules.

The many possibilities, such as many, mobile modules and many genres to choose and negotiate between, reflect our goal to facilitate collaboration and communication on equal terms, between different users in different use situations.

## DISCUSSION AND OBSERVATIONS

The ORFI installation has been evaluated and user tested in many ways, and on different stages throughout the design process. After finishing the installation we have done several sessions of user observations in a usability lab with families and other user constellations, in order to control and verify our findings and observations.

Five families, with disabled children, spent between one and two hours at our “home look-alike” usability lab, while we were sitting behind the glass walls observing and filming from 4 angles, recording video material for later analysis. After the test period we made in-depth-interviews with all family members present. We also made additional user testing at a hospital rehabilitation

centre where patients made weekly visits at Multi Sensory Environments. Here 12 users experienced ORFI for one hour, twice, with a week in between. The observations were recorded, with two fixed and one motor-controllable video camera. Together with the therapists we moved the camera during sessions and watched what were happening on a TV screen from a neighbouring room. Before the session we had introduced the therapists to ORFI on a technical level. All users were brought by their professional care person or a family member, and they spent the hour together in the ORFI room. In this paper we present one relevant and representative user story collected from our observations and tests. This in order to argue for the papers theoretical point in design of interactive montage. In future papers we will present more results from the testing.

## CLOSE AND SHIFTED

In the cross-media installation ORFI, the different media types (music, sound, light, graphics, colour, vibrations, texture, structure) are designed to continuously invite the users to co-create in several ways. ORFI creates a montage of media elements, as response to the users’ interactions and the designed rules. The *relation* between the media elements in the actual montage are of two main types, *close* and *shifted*. This means that the user can get *direct* (close) or *shifted response* to his interaction. Using Latour’s concept further, we can say that the relations between media elements can be *close* or *shifted*, *spatially*, *temporally* or *actorially*.

The relation between the media elements are *spatially close*, when the user gets response from the system, *near* by where the user is interacting. And the relation is *temporally close* if the user gets an *immediate*, temporally close, response to his interaction.

The relation is *actorially close* when the user is the one driving or *controlling* the action sequence, the narrative. This means that the user is interpreting and acting, as he is using an *instrument* or a tool, which gives direct response to every user interaction. But ORFI also gives *shifted response*; For instance by lightening up *far away* from the user, and thereby moving the focus from the user to the light. This is what we call *spatially shifted response*. Further ORFI gives *temporally shifted response* by giving a more complex varying musical answer *after some seconds*, like if it was an improvising co-musician in a band. This shifts the roles actorially, from being a self focused user, controlling an instrument, to a co-musician listening carefully to the other before playing along. In this way the media elements and their potential relations represent a potentiality for users to interpret and act in different ways.

During our observations we found five different strategies and roles, actorial positions. Those strategies depended upon the users’ background, ability, knowledge about ORFI and interests. One strategy is

treating ORFI as an *instrument* or a dead toy. Another, as a friend and *dialog partner*. A third, as a *mediator* between different users. A fourth, as an improvising *co-musician* who creates surprises. A fifth strategy is treating ORFI as an *ambient and immersive environment* to be in.

These diverse communication strategies we have observed, varies over time. But after a while, we observed that some interpretations and positions were established and maintained, depending on the relations between the users.

Five year old Tom was resting on an ORFI cushion module on the floor in one room (actorial: ambient resting, spatially close). In the room next door, Tom's mother sat in a sofa built from many modules. Both mother and son sat on cushions with speakers in them. Both had a microphone module laying next to them (spatially close). Tom played with the wing. He let the module "fly" as a bird (actorial shifting from ambient to playing games). He bent the wings. The light in the wings blinked directly and created a sound (spatially and temporally close). He became aware of the changes in colours in the room next door, where his mother was. Invited by the colour changes he got curious and looked up. He rose and walked into the other room and up to the large projection (see Fig. 2) that covered one of the walls (shifting: spatially from shifted to close, actorially from ambience to playing).



Figure 2: Interacting in front of the projection.

Tom held the "bird" in his hands while playing on it, as on an instrument (actorial shifting from playing to controlling an instrument).

The graphics responded and changed immediately (spatially and temporally close). The cushion he was laying on in the first room, now answered in sound (spatially shifted). He turned towards the sound, ran towards it and threw himself onto the big cushion (see Fig. 3). He felt the tactile vibration from the speakers in the module (close spatially).

Then his mother spoke into her microphone. Tom looked up. His mother watched how the sound of her voice was "filled" in one of the cushions, as the light stick started to glow (spatially shifted, temporally close).



Figure 3: Diving into the tactile field.

She got up and took the cushion, and then sat down and started to "play" with the sound of her own voice. She recognised the melody of her voice. Surprisingly, ORFI had cut-up and shifted the voice to a higher pitch. She sounded like "Daisy Duck" (actorial shifting: the pitch and the meaning from the mothers role to a "cartoon-like" character). Tom listened to his mother and started to laugh. He walked towards her. Sat down next to her in the "module sofa" and bent the wings in a fast rhythmic movement. The voice of the mother sounded like Daisy Duck again, and the more he interacted, the more dramatic and contrasting the shifts became. He laughed as he continued.

## CONCLUSIONS

In this paper we have presented and discussed how to design interactive montage. With this research we wish to contribute to the field of tangible interaction, and how to encourage users to co-create in interactive, tangible cross-media environments.

When interacting, the user creates a *montage* of media elements, and thereby drives the *narrative* and sequence of actions further. The user interaction is based on the action possibilities that the designer has designed into the medium. The more media elements that can be related rhetorically interesting to each other, in layers and sequentially, the more action possibilities the user have. And the more possible montages and narratives can be created.

We have presented two main types of relations the media elements can have to each other, *close* and *shifted* in three dimensions; *spatial*, *temporal* and *actorial*.

The *close* relation is a direct response on interaction in one or *many media types*. This can strengthen the user's abilities to focus and experience to master the medium. While the *shifted* response invites the user to shift position spatially, temporally and role based, actorially, during the interaction. The possibilities to shift at all times, makes it possible for the user to dynamically choose activity level, and role to play, no matter if he wants to be the person driving the action further on, or to take a more relaxed spectator role in an ambient physical environment. These possibilities is what makes co-creation continue for a long time, because it doesn't, as is the case in gaming experiences, need the same level of intensity all the time.

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# EXPLORING HEAT AS INTERACTIVE EXPRESSIONS FOR KNITTED STRUCTURES

DELIA DUMITRESCU

THE SWEDISH SCHOOL OF TEXTILES,  
UNIVERSITY OF BORÅS. DEPARTMENT OF  
COMPUTER SCIENCE AND ENGINEERING,  
CHALMERS UNIVERSITY OF TECHNOLOGY,  
GÖTEBORG

DELIA.DUMITRESCU@HB.SE

ANNA PERSSON

THE SWEDISH SCHOOL OF TEXTILES,  
UNIVERSITY OF BORÅS. DEPARTMENT OF  
COMPUTER SCIENCE AND ENGINEERING,  
CHALMERS UNIVERSITY OF TECHNOLOGY,  
GÖTEBORG

ANNA.PERSSON@HB.SE



## ABSTRACT

This paper describes a practice-based research project in which design experiments were conducted to explore how knitted structures can be designed with particular emphasis on various interactive heat expressions. Several heat transformable structures, able to both sense and react to human touch, were developed in the textile collection *Knitted Heat*. The designed textiles serve as references to reflect further on the role of interactive textiles as materials for potential designs. Specific scenarios defined by *shrinking, breaking, stiffening, texturizing* and *warming* expressed by the textile transformations exemplify and discuss their potential as complementary for other design processes.



## INTRODUCTION

The last few decades have shown an extreme development of the textile material as the area of interactive, or smart, textiles has influenced the fields of industrial design, architecture and of course, the textile industry (cf. [Berzowska and Coelho, 2005; Braddock Clarke and O'Mahoney, 2005; Colchester, 2007; McQuaid, 2005; Seymour, 2008; Ramsgaard Thomsen, 2007] etc). Compared to "non-interactive" textiles, the concept of smart textiles primarily describes textiles whose qualities have been enriched by technology. In this context, textiles can be defined as physical materials with transformable behaviors, the materials are "augmented with the power of change and have the ability to perform or respond" (Verbücken, 2003).

Due to technical developments within computer technology such as the miniaturization of electronic components, the possibility of integrating textiles and electronic components has been demonstrated through material research and development projects. As a sequel to the concept *Tangible bits* - the notion of seamlessly coupling the worlds of our physical environment with cyberspace (Ishii and Ullmer, 1997), soft material interfaces such as *Super Cilia Skin* (Raffle, et al., 2004), *Sprout I/O* (Coelho and Maes, 2008) and *Bosu* (Parker and Ishii, 2010) have been developed as alternatives to traditional screen-and-keyboard interfaces. By sensing and reacting to physical touch, these interfaces have a kinetic memory, are transformable and engage new sensibilities. Consequently, the interest to develop new design tools that help designers to relate virtual and physical media has emerged. Projects such as *Skin* (Saakes, Stappers, 2009), *Cabinet* (Keller et al., 2006) or *SandScape* (Ishii et al., 2004) open the interaction design field to novel creative processes.

The concept of smart textiles opens new discussions about the role of the material in the design process and the need for bridging various design disciplines. By introducing concepts such as interaction and transformation as essential features in textiles, the textile practice faces new challenges.

This paper describes *Knitted Heat*, a collection consisting of the previous projects *Touching Loops* (Dumitrescu and Persson, 2008) and *Designing with Heat* (Dumitrescu and Persson, 2009), with a particular emphasis on how interactivity can extend a textile's expressional properties as the use of conductive yarns in an advanced knitting design makes a textile become both sensitive and reactive to human touch. Knitted Heat explores possibilities to design for tactile and visual interaction as the textiles encourage a close and sensitive interaction with knitted textile material both by touching and sensing.

This project is made within the Smart Textile Design Lab at the Swedish School of Textiles and takes on an experimental approach in which design examples explore the aesthetics and emerging expressions of

smart textiles rather than technical functionality (cf. [Redström et al. 2005; Worbin, 2010]).

## KNITTED HEAT

*Knitted Heat* is a collection of several design experiments in the form of interactive textile samples, and unites two experimental projects, *Touching Loops* and *Designing with Heat*. Both projects uniquely explore the integration of heat as the focal point of the surface design.

## TOUCHING LOOPS

In *Touching Loops*, heat is used to transform a textile surface's structure. The outcome is three different interactive textiles able to change structure both visually and tactilely. When one touches the textile by hand, the textile becomes hot and structure changes are made. The design examples show different kinds of structural changes in three different textile designs; *shrinkage*, *breakage* and *stiffening*. The following scenario refers to all three examples, with a difference in *how*, the structure is changing:

*I touch the textile with my hand and it reacts immediately by shrinking (Structure 1) by breaking (Structure 2) or by stiffening (Structure 3) since it is programmed to generate heat as soon as it senses the presence of my skin. The textile reacts in the same area as it is being touched upon. Once it has been touched, the heat is on for 15 seconds which is considered to be enough time to make the surface react in a way that is perceivable.*



Figure 1: detail -knitted pattern Structure 1

## Touching Loops: Structure 1 (Fig. 1 and Fig. 2)

The surface is designed as a combination of two different tactile patterns. Its texture is based on the mix of a plain knit with a ridge pattern. Fine rows of conductive yarns separate the areas of the textile surface sensing and transmitting the information as heat.



When current is applied, the knitted patterns change size by *shrinking* in relation to the amount of heat and the surface area where heat appears.



Figure 2: detail -structure transformation Structure 1



Figure 3: detail -knitted pattern Structure 2

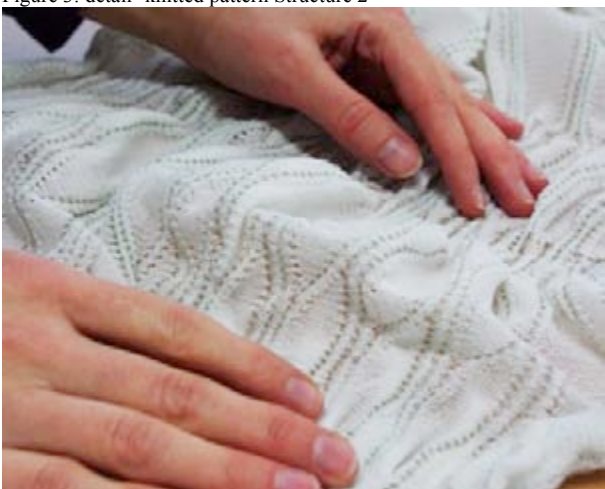


Figure 4: detail -structure transformation Structure 2

Touching Loops: Structure 2 (Fig. 3 and Fig. 4)

Rows of ridge patterns are interlaced on the surface design building its texture as a structural frame. In this case, the surface does not change texturally, as it did in the previous design experiment. Instead, applying heat through the conductive yarns on the material's ridges produces a transformation in the surface from soft to hard- by *stiffening* specific areas.



Figure 5: detail -knitted pattern Structure 3

Touching Loops: Structure 3 (see Fig. 5 and Fig. 6)

The pattern uses a Jaquard 2X2 net technique. The rows of Jaquard are separated in a computer program to control the placement and size of the breaks in the material. When exposed to heat, the transformable yarns melt, leaving the loops of conductive yarns. The rows of conductive yarns sustain the shape of the loops transforming the textural effect of the surface from a two dimensional to a three dimensional pattern by *breaking*.



Figure 6: detail -structure transformation Structure 3

## DESIGNING WITH HEAT

Designing with Heat consists of two design examples

developed with a focus on heat changing properties. When someone touches the textiles with their hand, the surface becomes hot in a comforting way. The textiles show two different kinds of heat design, where temperature changes produce two types of tactile patterns.



Figure 7: shaping by heat various knitted pattern in Structure 4

Designing with Heat: Structure 4 (Fig. 7 and Fig 8)

This structure uses the same principles as the first design experiment but implements a different pattern design. The knitting technique in this design experiment is based on yarn inlays. The conductive yarn is inlaid in patterns instead of being knitted into the structure. Consequently, having less points of contact in between the conductive yarn and the shrinking yarn, produces a larger range of transformations in the surface design when heated. The effect appears both in shape and in size of the patterns by *texturizing*.



Figure 8: close up -structure transformation Structure 4

*I touch the textile with my hand and it reacts by changing texture since it is programmed to generate*

*heat as soon as it senses the presence of my skin. The textile reacts in the same area that it is being touched. Once it has been touched, the heat is on for 10 seconds which is considered to be enough time to make the surface react in a way that is perceivable.*

Designing with Heat: Structure 5 (Fig. 9 and Fig. 10)



Figure 9: detail -knitted pattern Structure 5

The conductive yarns are partially knitted to form three-dimensional geometric shapes creating the texture of the surface. The conductive texture changes temperature. According to which area heat is activated and the planned time sequence of the change; new heat patterns can be created as a second layer of the surface by warming the hands.

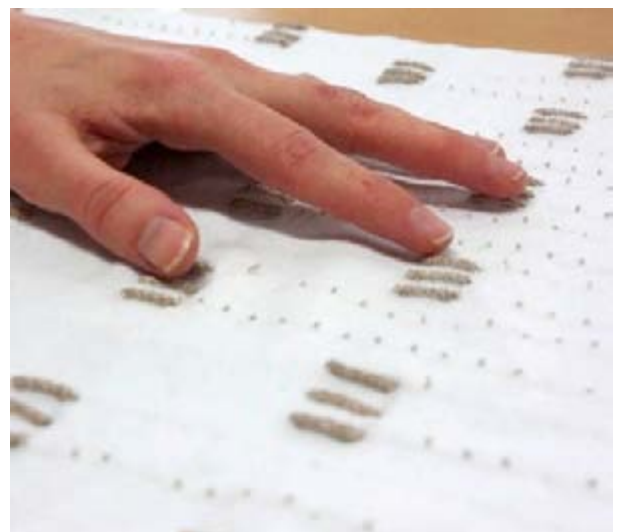


Figure 10: detail -structure transformation Structure 5

*I put the palm of my hand on the textile surface and the textile reacts by becoming warm. The textile becomes heated in six different areas and the heat moves around to warm my hand. The textile senses the location of my hand, and heat is generated in areas around that spot.*



*The textile reacts kind of slow and once it has been touched, the heat is on for 5 seconds in each heating area. This keeps the heating areas from cooling down as long as my hand is still touching the textile.*

## KNITTED HEAT

In Knitted Heat, we talk about knitting in terms of structure and texture where both elements are expressed by aesthetic and tactile qualities of the knitted surface. The experimental projects resulted in the creation of various interactive knitted patterns where the design variables of the basic knitted surfaces were enriched by computation. The design of transformations in the surface and the interaction with the surface are relating in the subtle changes that appear as material design. The knitted surfaces in Designing with Heat and Touching Loops are complex textile constructions capable of embedding various layers of information, as they are able to both sense and react.

Heat is integrated into the textiles as a means to shape new patterns or to produce changes in the surface structure. The relationship between the amount of heat and the exposure time in the conductive yarns is the key factor in shaping the material design.

Various expressions of transformation are explored in the design of knitted surfaces. Each of the examples of textile surfaces represents a specific relationship between structural pattern and the placement of conductive and transformable yarns. The patterns, the texture and the shape of the textile surfaces are designed to allow further transformation of the knitted structures. According to the type of pattern used, the type of transformable yarn, the placement of the conductive yarn on the surface and the time settings in the computer program each of the structures allows for various states of transformation.

## KNITTED HEAT AS DESIGN MATERIAL

Knitted Heat aims to advance upon new dialogues in the design process between designers and interactive textiles as material for design. That is to initiate a space where the textiles function as a meeting point between the virtual and physical design prototyping spaces. In Knitted Heat, the experiments by design combine the concreteness of the textile material with computation to create different types and scales of expression of physical and visual transformation- by *breaking, stiffening, shrinking, texturizing or warming*.

The expressions of heat transformation represent flexible relations in the textile surface relative to pattern, texture or shape leaving the knitted surface open for further change when placed as a material for various design processes. Accordingly, the examples are not an end design product; the result is a collection of knitted textiles whose changing behavior can be used as

an open platform for surface explorations in knitted design.

Expressions of *shrinking, breaking, stiffening, texturizing or warming* can be further enriched when the knitted textiles are supposed to be related to various products or scales of design. Therefore Knitted Heat opens the design parameters of the textile surface design, such as shape/texture/pattern, bridging shape to material exploration in one process.

The experiments show potential ways of exploring the relationship between surface/shape, pattern/shape, tactile/visual etc. in initial stages of the design process through the direct manipulation of the material when the scale of prototyping is the real world scale (that of the knitted material). In this context, Knitted Heat can be described as an expressive prototyping tool presented in real world scale.

### *re-texturizing*

Structure 4 is an open knitted design that when placed in a 3D modeling context, allows the designer to play with the placement or scale of the pattern on the desired shape of the garment or object (Fig. 11). Through tactile interaction Structure 4 is able to express various types of patterns- opening possibilities for multiple relations in between its texture and form.



Figure 11: exploring pattern placement by physical manipulation of Structure 4.

On the right side, Structure 4 is a plain knitted surface. The conductive yarns are placed in fine layers on the wrong side to produce a transformation on the plain knitted side via heat. Depending on the location of touch and how the fingers are placed on the material the conductive yarn creates various types of tactile patterns on the right side of the material.

### *re-shaping*

The knitted surface as in Structure 2 is shaped by

physical manipulation (Fig. 12). In this context, the physical manipulation of the surface and its transformation generates new relationships in between designing form using textiles and exploring the surface knitted materiality.



Figure 12: exploring surface shaping by physical manipulation

Due to heat and tactile interaction, the soft textile surfaces can change properties by stiffening. According to which conductive lines are pressed and how much the hands are pressing the material and on which areas, its surface can be three dimensionally shaped by varying its softness. The textile material in this example is seen as a means to transform a soft surface into hard shape and to explore them simultaneously by physical manipulation of the material.

#### *re-scaling*

Relating the experiments with heat patterns to larger scales of design, such as architectural design, various relations based on the relation between visual and tactile patterns can be created. The experiments with heat patterns expose the potential for new tactile expressions in space design. The textile surface in Structure 5 has a static visual pattern that relates to the dimension of space. The heat pattern is activated only in the near field when the textile surface is touched (Fig. 13).



Figure 13: Near-field scenario - exploring textiles as tactile expressions in architectural space, Structure 5



Figure 9: field scenario- exploring textiles as visual expressions in architectural space

New dynamic relationships in between textile scale and space design can be envisioned, where different scales of expression interact on one surface starting from the near field of the textile structure up to space. In this case the interactive tactile surfaces can complement the digital tools of prototyping by material exploration at real world scale, bridging new relationships between CAD applications and the concreteness of textile materiality.

By questioning the relation between human interaction and surface exploration in the design process of form making, Knitted Heat presents multidimensional forms that can be further transformed by the designer in form, texture, interaction, etc... This offers a new perspective in the context of interactive materials, providing open expressional tools for further designs, since textiles act as materials by and for design. The examples indicate various ways of exploring the surface's textural effects at different scales in the initial stages of prototyping, while retaining the textile as reference dimension.

The role of an interactive material for design, in this context, is to integrate various design processes leaving certain aspects open-ended for further experimentation with the textile texture.

By proposing alternatives to shaping, texturizing and scaling we aim to question the textile role in the design process for various fields and engage new dialogues where the textile and interaction can materialize design thinking. Consequently, the textile becomes both a tool and a material for design blurring clear distinctions in between material *by* design and *for* design; where the basic variables of design bridge various steps in the design process from material "*fabrication, application and appreciation*"(Doordan, 2003).

## DESIGNING WITH INTERACTIVE TEXTILE EXPRESSIONS

Adding sensing and reacting properties to a textile extends its expressive possibilities and brings new challenges to the area of textile design. The relation between the textile material and the interaction can be seen as interactive textile expressions. A textile's interactive expressions should be seen or experienced in a textile over a period of time; they are both spatial and temporal in their nature (cf. [Hallnäs and Redström, 2006, 2008]). For example, examples of interactive textile expressions in the Knitted Heat collection are those of shrinkage, breakage and stiffening. The collection also shows examples of expressions that are purely tactile and in the form of temperature changes (as heat).

The two collections were designed with a focus on their interactive expressions, and are meant to exemplify ways of designing with these materials. They are meant to show the potential of how to reflect upon and understand the expressional tools these kinds of constructions and materials provide. This is made by both envisioning *specific* designs but also by opening up the design process to create new designs that use the same interactive expressions with another scenario.

A specific design example exemplifies *one* way of interacting with the textiles (as an example, see Structure 3). The scenario described is simple. Still, multiple choices have been made when designing this specific interactive expression. In this way, the design examples allow for further designs with the same materials (Fig. 15):

*The specific example breaks in one area. The breakage occurs after I touch the textile, and is sustained for 15 seconds. The resulting expression is clear.*



Figure 15: interaction scenario- breaking patterns in Structure 3

For further design, we can ask ourselves:

When touching the textile, *where* should it break

- On several areas or one area
- On the opposite side from where I touch or on the same spot
- As a whole stripe or as a part of a stripe
- Etc.

When touching the textile, *how* should it break

- Fast or slow
- In a subtle or clear way
- In a small or big area
- Etc.

When touching the textile, *when* should it break

- Directly or with a delay
- Once, or as a chain reaction
- As long as I touch it or within a range of time
- Etc.

All issues above are part of an interactive textile design and cannot be ignored. While issues considering *how* and *where* the textile should break are closely related to the material design, issues considering *when* to break are more related to the design of the computer program. The material design (the textile design, choice of yarns, electronic design etc.) and the design of the computer program function together and cannot be overlooked.

## INTERACTIVE TEXTILES BY/FOR DESIGN

Through our design explorations, we were able to define knitted expressions for surface transformation on *shrinking, breaking, stiffening, texturizing and warming* when textile and interaction design form a common ground.

Describing design scenarios relating human interaction to surface exploration in the design process of form making, or extending the textural expressional registers of architectural space design with tactile patterns, we aimed to initiate new questions on textile materiality when placing Knitted Heat in the context of materials for design.

The design scenarios illustrate potentialities in a design space where the textile material is placed as a generative tool for new processes and expressions; a potential design space where textile materiality give computation a tangible dimension in the design process. Therefore the concept of interactive textiles for design uses the effects of heat as a prototyping method for object shaping or as a medium for interaction in the architectural space.



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# WHY DESIGN MATTERS MORE TODAY THAN EVER BEFORE

HÅKAN EDEHOLT

OSLO SCHOOL OF ARCHITECTURE AND DESIGN

HAKAN.EDEHOLT@AHO.NO

## ABSTRACT

Sciences have certainly done their best to blow the whistle, warning for an escalating climate disaster. And today seemingly powerful leaders also start to talk boldly about the present need of profound and radical changes. Still, too little seems to change in the directions proposed and if it changes at all, these changes seem to be far too small, far too inconsistent and far too slow to meet the requirements specified by the scientific community. Why is this so? And what could design and design research possible do about it?

This explorative paper gives an outline of the matters underpinning two initiatives (D-side and Shaping Futures) taken at the Institute of design at the Oslo School of Architecture and Design (AHO) in Norway. It is an illustration on the importance of utilizing design competences in what sometimes is labelled Discursive Design by merging different design methods with Foresight and Radical Innovation. The intention with the paper is to call out for a long overdue debate about- and actions that urgently needs to be taken towards the seemingly pretentious, but still designerly, vision of a different, prosperous and 'better' future world.

## BACKGROUND

Today there is a growing number of very pessimistic future scenarios that are forecasting that ever-escalating 'Climate Wars' probably are the most likely among all possible outcomes (Dyer 2008, Welzer 2008). Notably, they are not pessimistic because – *technically speaking* – it would be impossible to avoid climate crisis or wars. They are pessimistic because it seems very unlikely that *in due time* we will be able to unleash ourselves from the path we currently follow. For instance, in Dyer's scenario – "Northern India, 2036" – he speculates how the already tense relation between India and Pakistan might escalate when the Indus river system fails to deliver enough water to Pakistan (Dyer, 2008, pp 113-23). In this scenario the processes of climate changes results in an unfortunate trajectory of events that eventually ends with a nuclear war no one really wants or gains from. According to another scenario – "the year of 2045" – Scandinavia will probably face corresponding challenges. According to Dyer this might happen when the EU collapses and reorganises itself in an attempt to protect the Northern part of Europe from the overwhelming migration pressure coming from both a very dry Mediterranean and from elsewhere (Ibid pp 1-2).

Even though these are projected scenarios, they still reveal one of the most perilous path dependency ever faced by humankind; we envisage here a predominant path that profoundly depends on a continuous economical growth that primarily is fuelled by lifestyles that seems to require an ever increased consumption of finite resources (Jackson, 2009). This is a path dependency that most experts claim we urgently need to overcome *on a massive global scale* in order to avoid a disastrous social situation that even might occur long before Climate Change makes certain areas completely uninhabitable.

## PRESENT APPROACH

Science and technology are often seen as both containing the reasons and the solutions to our societies' present predicaments. Knowledge and mindsets from these domains are therefore also predominant when we try to address the social and environmental problems Climate Change cause. But as the research director Knut H Alfsen (2009) at CICERO says; "This is well and good [...but...] what's sad and entirely wrong [in the 2010 Norwegian governmental budget] is that the investments in technological and scientific research not are followed up by corresponding investments in order to achieve a better understanding on how new technologies and changed behavior can become accepted and implemented in our societies".

Arguably, "understanding" is just one precondition for making the research community fit to address these urgent problems. This particular case obviously also require a *public* "understanding" of the needs of new behaviors and technologies. So in a less linear approach between *research and society*, we might *also* see it as a necessity to nurture a more mutual dialogue between these two domains. Elisabeth Gulbrandsen (2009) points us to Demos (2005) who claims that it rather is about: "moving away from models of prediction and control, which are in any case likely to be flummoxed by the unpredictability of innovation, towards a richer public discussion about the visions, ends and purposes of science. The aim is to broaden the kinds of social influence that shape science and technology". Andy Stirling (2008) follows suit by advocating the need of diversity in robust systems and to make distinctions between the different and specific requirements needed for 'opening up' vs. 'closing down' in social appraisal and justification of technology, i.e. between finding new alternatives vs. choosing the best alternative among those already available.

## SUGGESTED NEW APPROACH

With this backdrop this explorative paper suggests that we bring together knowledge from different design, scientific *and* public domains in order to develop means facilitating discourses that not only are reacting on scientific results as they are, but also are able to 'open up' new additional alternative solutions to some of the seemingly dead ends of the paths followed by our present societies. The actual approach we suggest is fairly humble and straightforward. In fact, we just suggests that we make a temporary deviation from the typical analytical and linear step-by-step production and implementation of scientific knowledge, by making a conscious leap from what we know today to where we possibly would like to envision us to be in the future. We are not talking about any grand utopias but rather "*Design[s] for Micro-Utopias; making the unthinkable*

*possible*" (Wood, 2007); i.e. several possible "micro-scenarios" that are presented in ways that are 'opening up' present discourses by inspiring, provoking and triggering an intense and rich public discourse about the opportunities inherent in the knowledge (creation) of science and technology.

Compared to normal analytical forecasting the intention is therefore to be slightly more detached from current beliefs and trends in both the scientific and the public realm. We call it Foresight, others have referred to this as doing back-casting (Burns, 1999) as it rather back-cast future visions than fore-cast present trends. Regardless the term used, the most salient feature of the process is probably that it's rather driven forward by alternative *conjectured solutions* than by strictly sticking to analyses of *identified problems*. This means that we actually talk about *complementing* the normal problem driven forecasting with a counter-force of solution driven back-casting. As a consequence, it means that we primarily need to integrate competencies and mindsets from two profoundly different domains of knowledge, ideal-typically described by the late Nobel laureate Herbert Simon (1969) who claims that "... natural sciences are concerned with *how things are ...* design, on the other hand, is concerned with *how things ought to be ...*" (italics added).

However, those who see upstream design engagement as a means of just providing persuasive illustrations of solutions based on peoples' tacit wishes, in a manner resembling a marketing campaign, are missing the point. This is because inherently in a solution driven approach lies the ability to 'open up' the 'iron cage of technical rationality' (Weber, 1905) within which science and society otherwise might be stuck. Tim Jackson (2009) claims that progress crucially relies on the construction of *credible alternatives*. *Design cannot do that alone*, but has on the other hand a rather unique competence that seems fit to *complement* scientific knowledge and *credibility* by – *albeit in concert with science* – developing and bringing *alternatives* to our public agenda. Design's assumed strengths will therefore both be: (i) its potential ability to bridge justifications and appraisals of science, from science on one side, to society, on the other, *and* (ii) to move required changes beyond mere technology- and knowledge transfer by 'opening up' the 'space of solution' and spark the development of entirely new concepts and ideas.

The table below gives a very brief summary and overview, demonstrating why the approach is so utterly crucial and why design probably matters more today than ever:

Table 1: Some fundamental statements and assumptions underpinning our approach

	Statements	Assumed challenges
<b>Climate</b>	Climate Change <i>might quite soon</i> get out of control and thereby threaten the survival of human kind. Step-wise adjustments will in that case neither be sufficient nor, as it used to be, the safest approach.	In order to reduce the risk we promptly need to implement radical changes on a massive scale. But this has proved to be extremely hard to achieve, not least, in democratic countries, let alone on a global scale. So how to simplify this process without applying totalitarian measures?
<b>Global</b>	The climate change is global but also unevenly distributed in kind and time. Thus, it initially creates both losers and those who will gain. If not addressed, this trend of polarization will escalate.	Such change will cause an extreme stress on global solidarity and tax our ability to avoid Climate Wars. So how to promote and facilitate an ethical standard that seriously advocate global fairness instead of a regional self-protectionist attitude?
<b>Development</b>	The development path of the western world is inherently unsustainable. The global transfer of this path to e.g. China and India makes the time frame at hand for changing this path <i>much</i> shorter.	We urgently need to find an alternative path that is more equal and instantly rewarding for people, societies and the environment <i>as a whole</i> . So how to create real capabilities for people to flourish in less materialistic ways without creating socio-economic chaos?
<b>Time lag</b>	The inertia in the Climate System requires that actions need to be taken decades before the full effects can be experienced by those acting.	This makes it hard for people to realize the magnitude of possible effects due to behaviours employed today. So how are we to make both <i>future</i> opportunities and threats more concrete and intelligible already today?
<b>Science</b>	The scientific mindset has key words like knowledgeable, rigorous and analytical as their highly respected hallmarks. Typically, scientific works are driven by well-defined and rational problems.	However, other domains of justification, whose actions often are underpinned by entirely different and <i>seemingly</i> less rational sets of justification, are often detached. So how may we get these completely different domains to interact in a creative manner?
<b>Design</b>	Design has a more speculative mindset as its hallmark. Its methodologies are primarily driven by conjectured solutions that also try to address users' seemingly irrational behaviour.	Design has proved instrumentally effective to persuade consumers to consume more and more; arguably doing so it also facilitates unsustainable economical growth. So how are we to utilize similar measures to promote less and more sustainable consumption?

Our ultimate goal is to address these challenges with a long-term effort that utilize design and some of its tools to spur a creative public debate of our coming future, i.e. what sometimes is labelled 'Discursive Design'. Arguably, our approach can be considered as a Designerly Foresight where the innovation Process, both time- and solution-wise, is taken to the far end. This implies that we rather are talking about spectacular and radical alternatives to the solutions already existing today, than incrementally developed (or optimized) ones with only minor changes. However, in order to nurture debate, proposed solutions should still communicate and connect to issues that is relevant for people and our way of living today. So, with other words, we suggest to integrate Design, Foresight and Innovation because:

**Design** has a long tradition of discussing future use-situations by suggesting products that not yet exist. Arguably, this could even be considered as the core component of a designer's competence and toolbox. However, usually the timeframe is limited to the next product release.

**Foresights** have, as a contrast, a longer time-frame when discussing possible future scenarios. However these foresights are still often based on the path we seem to follow today (i.e. it's rather a forecast than foresight). In addition, the professions usually involved typically lack the designerly tools needed to make the scenarios experience- and graspable; and thereby they also become less debateable.

**Innovation** or radical change implies that we don't accept seemingly for given taken premises. Instead it means that we question these premises by investigating other, radically different, alternatives. However, experience shows that both companies and society in general have severe problems to embark on entirely new paths (Narula, 2002).

#### WORK DONE SO FAR

Obviously we –as a global society- urgently need to change the way we live, consumes products and natural sources. Therefore the integration of design, foresight and innovation seems, to us, utterly appropriate. At our institution (IDE/AHO) we therefore explore different

opportunities to do that within both teaching and research. In the master-course “Shaping Futures” architect and design students work with foresights that have a time-horizon far beyond the next product release. For example, this year the theme is Oslo 2100. Within that frame we expect the students to come up with creative foresights, scenarios and products based on a simple given forecast claiming that Oslo 2100 has, due to climate immigration, grown 20 times in population and that Norway (as everyone else) no more can rely on fossil resources like oil and natural gas. As an example, alternative views on mobility and the kind of transport systems it might involve, then become typical issues to scrutinize. Other interesting issues are to rethink the underlying assumptions for work and the tools it might require. In a society with an abundance of labour force the quality of work and the kind of social interaction it might facilitate might e.g. be much more important than the pure efficiency it gives each worker. This will of course influence how the tools we use are designed.

In research we have several projects running that scrutinize the conditions for innovation, or radical change. Especially the D-side project is occupied with new tools for making it easier for companies to take more radical leaps by developing and integrating different means of prototyping. We call it an Integrated Prototyping Environment (IPE); an environment that *integrate* physical and interactive prototypes with new technologies for scenario-telling.

However, we see these examples merely as initial steps in a direction we hope many design (research) environments will follow. In that effort we are open for both critique and suggestions of feasible kinds of cooperation within both education and research.

#### ACKNOWLEDGMENTS

To my colleagues and students in the master course ‘Shaping Futures’; thanks for all inspirational discussions. Special thanks to; Børre Skodvin who believed enough in it all to use the budget at the institute of Architecture to facilitate the course and to Bellona for inspirational inputs (e.g. Bellona, 2009). To my colleagues and partner companies in the research project D-side, thanks for the opportunities achieved to scrutinize and get ‘inside’, insights, concerning the bumpy road to real radical change. Special thanks to the Norwegian Research Council, who made the project possible. Finally, to Andrew Morrison and Martina Keitsch, thanks for your comments on earlier drafts concerning some of the topics I here briefly try to convey.

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# MISSING LINK – DESIGNING FOR DEPENDENCY

EVA ERIKSSON  
CHALMERS UNIVERSITY OF TECHNOLOGY  
GOTHENBURG, SWEDEN  
EVA.ERIKSSON@CHALMERS.SE

PETER LJUNGSTRAND  
INTERACTIVE INSTITUTE, GAME STUDIO  
GOTHENBURG, SWEDEN  
PETER.LJUNGSTRAND@IIL.SE

ANDREAS LYKKE-OLESEN  
KOLLISION  
AARHUS, DENMARK  
ANDREAS@KOLLISION.DK

DAVID CUARTIELLES  
MALMÖ UNIVERSITY, K3  
MALMÖ, SWEDEN  
DAVID@CUARTIELLES.COM

## ABSTRACT

In this paper, we investigate aspects of interaction design related to the appearance and context of dual-natured design objects, meaning artefacts with physical form and digital behaviour. In interaction design of today there is a focus on isolated artefacts/objects, but does not involve the context in the sense that it is a vital part of its design and expression. We argue for interaction designers to take respect to the dependency of computational design objects to their context in greater extent. We would like to ask interaction designers to look at their work as part of a whole, where their creations will influence / be influenced by the rest. A workshop method named ‘Missing Link’ used in teaching is proposed here. The workshop confronts questions on how to give up control of your design and at the same time in a creative way exploit the available rules of the bigger system.

## INTRODUCTION

We argue that information technology can be viewed as a material for design (Löwgren & Stolterman 2004, Hallnäs & Redström 2006). This material is both

abstract and concrete, both imaginary and material, both software and hardware. It manifests its expressions in the spatial, physical realm through displays of various sorts, but the true nature of this material is primarily temporal, as the dynamic motion of executing program code is its essence. This material allows for precisely controlled dynamic behaviours, communication, as well as adaptation to new or local conditions. This material is central to the field of interaction design. However, it is not sufficient for successful interaction design on its own. Other materials are needed as well, to form and shape the things we will come to use and live with. These “other” materials are primarily physical, such as plastic, metal, glass, wood, textile, even though we also need more abstract things such as ideas, organizations, economy, etc.

In this paper, we focus on designed things, or artefacts, that are made of several materials, but where the central material is information technology. In a way, such things can be said to be made of a *composite* material, in analogy to how carbon threads are used to reinforce Kevlar. Kevlar is much more powerful than its constituents on their own, and the same thing is true for these computational things. Things built with this composite material have a dual nature, they are of course physical, but they also have a computational, or virtual, part to them. This *dual nature* will be central to this paper. We believe that existing approaches to design, engineering or software development tend to focus on only one of these aspects, or perhaps one after the other in a development cycle, but it is rare to consider both physical and computational design simultaneously, equally important, feeding into and depending on one another.

Today, with Weiser's future scenario of ubiquitous computing a reality (Weiser 1991), when the design paradigm has shifted towards a theory and practice of

physical interaction with digital materials, it has become time to take the next step, to take respect to the dependency of those design objects to their context. We understand context as the combination of the social fabric and the physical location where the object will be placed. As design object we understand the outcome of the interaction designer's work, a mixture between aesthetically valuable artefact and service, dependant to a certain extent on existing infrastructures. The potential connection among dual-natured artefacts should also be informed by means of spatial aspects (physicality matters) as well as the digital ones, and remain in control by humans. In contrast to automation the human should stay in control, not be controlled. Note that we separate control from autonomy, our design objects are part of a system, and have to be able of relating to it. We – as users – with our devices are dependant on the existence of other users and infrastructures interacting at the same level and with the same tools. We are dependant; therefore we should *design for dependency*.

Our statement will be exemplified through a workshop held with master students in interaction design from two different universities. The intentions, setup and results of this workshop will be discussed based on our idea about the importance of designing for dependency. Artefacts that are dependant on in what way they are connected to the environment and to other artefacts. They have inputs from the users and outputs to the world, inputs from other systems/infrastructures and outputs to those. They act as transceivers, retrieval servers, information sources, or data black holes. They are not simply self-contained things, objects must contain mechanisms allowing them to consider and be able to take advantage of other (nearby) objects to greater extent than today. Our considerations move towards the standardization of means of relationships among devices, meshed strategies of data retrieval that could provide us with alternative, even aesthetically beautiful unexpected representations of flows.

Not just communication standards, such as UPNP, JINI, Bluetooth, IEEE 802.15 (PAN), etc. but also standards that take physical space into account should be developed. It seems that with the introduction of the mentioned standards, the qualities in the potential of properties from the physical world have been forgotten. And this is maybe our main statement; we want to get back to the qualities in property from the physical world inside the interaction design discourse. Our tools, physical computing and architecture, are a cocktail in study at many different places. Our experiment and its results are the first brick of our staircase to the understanding of the dual-natured design object.

## SYSTEM DESIGN

Within engineering's work methodology exist mechanisms dedicated to simplify the way how to approach problems. It is the separation of problems into pieces and the establishment of communication protocols what allows teams to work simultaneously in

the development of integrated circuits. There are more similarities between the activities of designing a CPU (Central Processing Unit, part in a circuit dedicated to the realization of numeric operations, process control, etc) and the management of an airport than one can imagine. The design of a complex system is based in the assumption that all the other parts will do what they are expected to do and will provide us whatever we expect when making a certain request.

This kind of activity requires the realization of a strong abstraction process where the designers start to look into the objects as if they were a magician's collection of black-boxes. The design activity is then reduced to a small portion of the whole system. Taking again the example of designing an integrated circuit, there we find many different parts: the ALU (Arithmetic-Logical Unit, dedicated to operating pairs of numbers), the BUS (it is the transmission line, or channel over which the information will be transmitted), the registers (memory cells, with direct access from the other parts), the interfaces to different peripherals (examples are USB - Universal Serial BUS - interface, UART - Universal Asynchronous Receiver-Transmitter, etc), ADC/DAC (Analog-Digital Converter/ Digital-Analog Converter), and other parts. Just by mentioning the former parts one can understand that due to the state of the art of technology microchip design is not a one-man activity.

Airports present very similar issues, there are many simultaneous processes happening in parallel that cannot be controlled by a single person. The success of the different operations performed in such an environment is the result of endless additions of operations and actions (Bødker 1991) performed by the distributed intelligence of hundreds of people collaborating at the same time in many different levels. For example, the bus driver waits for a command before he goes out in the landing area to look for the passengers coming in a certain flight. His work is independent from the one done by the luggage carrier, but both are equally relevant for the task of bringing the passenger and his goods to his destination.

The black-box design approach implies that the different actors involved in the design activity agree on a certain set of rules on how their different parts of the total system will interact with each other, but they will not enter to discuss how each one should solve his/her own specific tasks. We cannot say we invented this work methodology, but we would like to apply it to the field of interaction design and ask the designers to look into their work as part of a whole, where their creation will influence/be influenced by the rest. We believe that important aspects within interaction design are to be able to cooperate, admire and respect other solutions that constrain your own design in certain ways, both physically and digitally. To exemplify our theory, we made a workshop, which will be further presented here.



## THE MISSING LINK WORKSHOP

The workshop “Missing link – designing for dependency” was a two day set up (Missing Link web). The workshop addressed the concept of bottom-up design where several groups have to work with designing components that will be combined in a number of unforeseen ways, creating an interactive light installation. The workshop participants were Master level students in Interaction Design with various backgrounds from two different universities, and the four workshop leaders represent three different research institutions in interaction design and architecture in Denmark and Sweden. Basically it was a hands-on workshop dealing with the design of interactive light components that are interfacing with other components both hardware- and software wise.

### BACKGROUND

The work of an interaction designer is often limited by constraints set up by i.e. a boss, an employer, a budget, a platform or the rest of a system. A common task for an interaction designer is to investigate, improve or design a system of some kind, and very often this is limited to the functionality and interfaces of the rest of a larger system. It is up to the interaction designer to make sure that the different parts have an interface and react, link, communicate to/with each other and to the user.

During the education, interaction designers are pushed to work with projects, from small scale to large scale, and to develop them from concept to implemented prototype. Most often meaning that constraints are quite low, and that each project is a standalone system. As the Missing Link workshop was a part of the education of our students, it aimed to widen their horizon and with this practical exercise bring in new aspects into the minds of the future interaction designers.

### COMPONENT VS SYSTEM

The aim of the workshop was to design and develop a component that works within the rules of an overall system interface. Each component is supposed to work on its own and at the same time be able to be a part of a full scale system, in which it reacts to the other and totally different components of the system. Sometimes the larger system is a software system and sometimes it is physical and tangible. In this workshop the total system contains twelve different components that are related and depending to each other. The components are represented by a wooden frame cube, which sets the boundary for the physical design space.

Each component is to be designed as an interactive light/lamp. The component can work as a stand-alone but must be able interact with other cubes, and react and provide feedback to and from other components. As soon as the components are connected they are no longer in control but must obey the rules of the system as a whole. This task confronts questions on how to give up control of your design and at the same time in a creative way exploit the available rules of the system.

Each group was supposed to work within a spatial domain of a cube. In this domain the group has to design a light installation that deals with the challenges of making the cube function both as a stand-alone component and as a component of a larger system, dealing, negotiating and communicating with its unknown neighbours, see concept in Figure 1.



Figure 1. Concept of the Missing Link Workshop

The workshop started with an introduction to the workshop leaders, the students, and different projects framing the idea of the workshop, the technical matters, and a small inspiration to what different qualities light has. The groups were given a space frame cube, a basic electronic kit and code for the communication protocol to start out with. In the workshop space different materials were supplied but groups were welcome and encouraged to explore and buy other materials within the budget. The groups worked hard and intensively during the two days. After each component had been finished the cubes were assembled and connected via the serial protocol that was available on each side of every cube. Not all cubes functioned perfectly but you got the impression that the different components acted and behaved very differently, see Figure 2.



Figure 2. Result from the workshop

### LIGHT

Light was chosen as the design medium, to put focus on interaction both through technology and physicality – both contained in the boundary space. Light can be controlled in various ways with technology and as well by creative use of materials. However these two ways of working with and understanding light should be combined and used to create a dual nature component that takes advantage of both physical and digital properties. To exemplify working with light approached from two perspectives, namely a physical and a digital/electronic approach - the light source of each cube could be controlled e.g. by reflecting light in a

certain direction with a reflective material; program the microcontroller to switch the light on and off; or by mounting the reflective material on a micro controlled servo motor and by combining the physical and digital properties establish a potential for very varied behaviour that both take the physical boundary space and the digital properties into account.

## DISCUSSION

The groups had to document their work by taking pictures and writing an abstract explaining their idea and its background. In this text the students had to define the expression and behaviour of their cube, both physically meaning appearance and reaction to input from sensors, and digitally, meaning if information was sent out or just accepting and reacting to other boxes. This small piece of text, accompanied by pictures, was an important part of the reflection work of the students. The text and the pictures were uploaded on a website during the last hours of the second day, and contributed to the eager of trying to go through and accomplish the task they had set up for themselves. The documentation became their description of their total system, and thereby their goal which they struggled to reach.

The result of the workshop were twelve stand alone boxes that all had an individual expression, and when brought together to one physical unit, they reacted to each other and the expressions of the boxes changed, because digitally the boxes kept their individuality. The cubes were, for instance, a heart beating calm and white on its own, but faster and red when it got neighbours, or an ice cube start melting when people or other cubes approach it, but when it receives digital information it gets angry, cool and shouting.

An interesting and unexpected phenomenon during the workshop was that none of the participants sneaked around the other groups to negotiate around the physical coherence of their pieces. This is relevant to the outcome of the workshop, since it implies that they focused more on the technological coherence of their things than their spatial. The final cubes did respond to communication and to other cubes, but more adjusted to the order of the cubes, how they were gathered, not to which one. This shows the student's ability to negotiate via the digital infrastructure but unfortunately also their missing ability to exploit and use the physical potentials in the cubes as physical boundary spaces. This does not imply that they missed the point of the workshop at all, rather proving our work methodology that the black-box design approach implies that the actors involved in the design activity agree on a set of rules on the interaction of their different parts of the total system, but they will not discuss how the responsible for each unit should solve their own specific tasks.

In this workshop, one explanation to that the negotiation was suppressed is that there was a lack in time, and that the communication protocol was not clear to them, it was too complicated. Another aspect contributing to the

result of the workshop is the background of the students. The physical and digital expressions of the boxes varied according to the competences found in the groups. If the students would have been of e.g. pure architect background, then there would probably have been a different result, with more focus and interest in trying to explore the spatial and physical aspects of the boxes relation to each other.

The fact that there were no restrictions or constraints to what material the students were allowed to use probably had an effect on the result. With increased restrictions and budget, one could steer the focus away from the material and into exploring the qualities of the materials at hand, especially to light. More important, added restrictions could lead to deeper focus on the communication and expression of the different parts.

The workshop can be used as an eye opener, a first hands-on exercise, which can open up for the second iteration. The time plan of two days was too short, but even so the workshop participants emphasized the general idea of the workshop – that different designer corporate to create a common design with a life that is somewhat unpredictable and larger than the sum of the components. Deriving from discussions around the results from this workshop, a second creation could be created, which would deepen the focus of the dual nature understanding, and push the students to take advantage of that.

## CONCLUSION

The interaction designer needs to be trained in paying attention to both the digital and physical context surrounding the computational object, to have it pay attention to its neighbors in many different levels, to determine its place in the overall system in the real world that it is dependent on and be able to take advantage of other nearby objects in their context to greater extent than today. We suggest a practical workshop method training students in thinking their design as part of a bigger system.

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# FACILITATING SERVICE CO- PRODUCTION: A DRAMATURGICAL PERSPECTIVE

ZAGROS HATAMI

AALTO UNIVERSITY SCHOOL OF ART AND  
DESIGN

ZAGROS.HATAMI@AALTO.FI

## ABSTRACT

Unlike products, the production and consumption of service occur simultaneously with service users acting as co-producers of service. This role is significant as the quantity, quality and experience of service is often reliant on the quality of user efforts. Thus, service designers need to consider the co-productive roles various service actors are required to play at the time of service consumption. This awareness allows designers to facilitate this role taking process by setting the stage for users as well as other service actors to successfully play their part in the production of service. As service interactions are dyadic social interactions, a dramaturgical perspective can inform service design in design, staging and facilitation of service actor roles in service co-production. This perspective highlights the importance of the definition of situation and user ability in role performance. Attention to user roles and privileges, the presence of other service actor roles, the ability in fulfilling desired roles, the setting, required tools and service evidence can inform service design process in facilitation of user participation in successful service co-production.

Further investigation is needed to evaluate the adoption of this perspective in design of services.

## INTRODUCTION

The design of services demands different considerations due to the characteristics that distinguish them from tangible goods. Highlighted in the services marketing literature (Fisk, Grove & John 2008; Rathmell 1966; Regan 1963; Shostack 1977; Zeithaml, Parasuraman & Berry 1985), these characteristics are: *intangibility*, *inseparability*, *heterogeneity*, and *perishability*. Among these, *inseparability* explains the best the participatory nature of service production.

Unlike tangible goods, the production and consumption of service unfold simultaneously. This inseparability makes the service users integral to service production:

*The person being served (the client or consumer) is inevitably part of the production process, if there is to be any production whatsoever. Therefore, the resources, motivations, and skills brought to bear by the client or consumer are much more intimately connected with the level of achieved output than in the case of goods production. The output is always a jointly produced output (Garn et al. 1976, p. 1214).*

To describe this joint production, Elinor Ostrom, the 2009 Nobel laureate in economics, coined the term *co-production* in the 1970s. To Ostrom and her team, co-production “involves a mixing of the productive efforts of regular and consumer producers. This mixing may occur directly, involving coordinated efforts in the same production process, or indirectly through independent, yet related efforts of regular producers and consumer producers” (Parks et al. 1981, p. 2).

The term co-production has been used in other contexts as well. Normann and Ramirez (1993) discuss the *co-production of value* in relation to their proposed value constellation model. The notion of user role in value creation is also highlighted in service-dominant logic

where value is viewed to be “always co-created, jointly and reciprocally, in interactions among providers and beneficiaries through the integration of resources and application of competences” (Vargo, Maglio & Akaka 2008, p. 146). Boyle and Harris (2009, p. 3) define co-production as an “equal partnership between ‘providers’ and ‘users’ of services” that “affords equal value to different kinds of knowledge and skills, acknowledging that everyone has something of value to contribute.” Their paper focuses on “full co-production” where both professionals and users equally partake in both activities of service design and delivery. This paper, however, does not address value co-creation or service co-design. Here, the focus is the co-productive role of service users at the time of service consumption as highlighted by Ostrom’s definition.

User participation in service co-production provides several opportunities and challenges. On one hand, it facilitates the offering of customized services, on the other hand, it makes services vulnerable to the quality of user input (Zeithaml, Bitner & Gremler 2009). In dealing with these challenges, two approaches are noted. Some have advocated a separation between production and consumption of service, where possible, to limit direct user contact with service production allowing operation in peak efficiency (Chase 1978). Others have called for the utilization of the productive capabilities of users considering them as “partial” employees of service organizations (Mills & Morris 1986).

Increasingly, the second approach is gaining attention as many services, such as self-service, personal development and collaborative services, demand high levels of user participation making users responsible for the quality, quantity and experience of service (Zeithaml, Bitner & Gremler 2009). This highlights the importance of service co-production efforts in the service encounter. Services marketing and management disciplines have traditionally focused on service processes, however, Morelli suggests that “the focus on customers’ participation moves the centre of service processes much closer to the customers” (2009, p. 3) where the service design focus on service encounter can compliment the services management perspective.

Holmlid (2009) highlights the shared tradition of both service design and participatory design in engaging users in the design process to achieve participatory, cooperative and emancipatory objectives. These methodologies participate users in *design before use* whereas service co-production deals with the user participation in *use after design*. Thus, new approaches need to be explored to inform designers of the use context and interaction so that the desired co-productive roles can be designed with the aim of service co-production facilitation.

As service encounters are dyadic human interactions (Solomon et al. 1985), the understanding of the service interactions can greatly inform service design and

provide the required framework for staging effective co-productive roles. A dramaturgical perspective can provide such understanding since service is often likened to theatrical performances (Grove & Fisk 1981; Grove, Fisk & John 2000). Fisk et al.’s Service Theatre Framework (2008) views the total service performance as the dynamic interaction of actors, audiences and the service stage. Understanding these dynamic interactions from the perspective of dramaturgical sociology might provide designers with the necessary insights to approach service co-production facilitation.

## LITERATURE AND THEORY

### MEANING, SELF (ROLE) AND OTHER ROLES

Dramaturgical sociology is a perspective rooted in symbolic interactionism. Brissett and Edgley (1990) suggest that the accomplishment of *meaning* in human interactions is the main concern of dramaturgy. According to them, meaning, on one hand, is a “behavioural outcome of human activity” (1990, p. 2) as it emerges out of what people do, and on the other hand, it defines the characteristics of the social act. It is important, however, to note that meaning is established in this perspective. As they explain, it is not simply a reflection of either cultural/institutional arrangements or psychological/biological realizations. As meaning emerges out of social life, the “how” of people’s doings is focused instead of the “what” or “why.”

In dramaturgy, human behaviour not only happens to occur in situations, but also it is fully *situational*. As meaning emerges from human behaviour in social situations, it is situationally relative. However, “situations do not simply define themselves. They must be constructed by symbolic communication and hence social life must be *expressive*, whatever else it might be” (Collins & Makowsky 1972, p. 207). According to Brissett and Edgley (1990), the expressive/impressive dimension of human activity highlights the dramatic nature human behaviour leading the dramaturgists to view life as a theatre in which people behave in accordance to life situations when interacting with others. These expressive means allow individuals to define, influence or adjust to situations while presenting themselves in favourable ways.

What is interesting in dramaturgy is that self itself is a meaning and thus, situationally relative. Goffman (1959, pp. 252-3) argues that self cannot be abstracted from the individual’s social situation:

*This self itself does not derive from its possessor, but from the whole scene of his action, being generated by that attribute of local events which renders them interpretable by witnesses . . . this self is a product of a scene that comes off, and is not a cause of it. The self, then, as a performed character, is not an organic thing that has specific location . . . [The individual] and his body merely provide the peg on which something of collaborative manufacture will be hung for a time. And the means for producing and maintaining selves do not*

*reside inside the peg; in fact these means are often bolted down in social establishments.*

Thus, situations provide the context and opportunity for the emergence of the self, or role, played in social interactions. Brissett and Edgley (1990) emphasize that role playing is not a simple conformance to a set of prescribed acts by merely taking roles and fulfilling expectations. Instead, as people are expressive in their actions, they play with their roles and engage in the role making in accordance to the definition of the situation presented to or defined by them. A combination of explicit and implicit information, signs and symbols establish the definition of situation and provide the cues on how to behave and what to expect from others in the course of social interactions. Moreover, as roles allow people to relate to one another in given situations, without one or more relevant “other-roles,” “self-roles” cannot exist (Turner 1990). For example, the role of “parent” will have its meaning only in relation to that of a child. Therefore, other-roles present in situations have great importance in emergence of self-roles.

#### THE DEFINITION OF SITUATIONS AND THE FRONT REGION

To better understand the establishment of the definition of situation, Goffman (1959) proposes three regions for human interactions: *front*, *back* and *outside*. Among these, the front region is the most significant for a given performance since this is where the definition of situation is established and the performance takes place in front of an audience.

According to Goffman, The front itself has two components: the *setting* and the *personal front*. Setting provides the physical environment or the “scenic parts of expressive equipment,” involving “furniture, decor, physical layout, and other back ground items which supply the scenery and stage props for the spate of human action played out before, within, or upon it” (1959, p. 22). The personal front refers to the expressive equipments identified with the performers themselves: “insignia of office or rank; clothing; sex, age and racial characteristics; size and looks; posture; speech patterns; facial expressions; bodily gestures; and the like” (1959, p. 24). Unlike the setting elements that are usually fixed and immovable, the sign vehicles of the personal front are movable, transitory and can change from one instance of performance to another. Goffman divides the elements of personal front further into *appearance* and *manner*.

The combination of the setting, the personal front elements of appearance and manner as well as the expressions given and given off work together in fostering the definition of situation from which the human behaviour, self (role) and meaning emerge during social interactions. The understanding and utilization of these elements in a coherent manner can facilitate role establishment and performance.

#### ABILITY

While dramaturgy highlights the significance of situations in emergence of roles, ability cannot be neglected. For no matter how calm the lake, how sunny the sky and warm the weather, if one is not capable of swimming, the role of a swimmer will not be filled. Of course, the existence of the right conditions will enhance the performance when one has the capability of performing the task:

*we might go on to claim that it is just because the activity can be seen as an image of that sort of activity that it allows room for considerations of style, for an aesthetic dimension. That a man fills the role at all is not usually a question of style; to be a surgeon at all is mainly a question of ability, or qualifications. Or what he usually does to the patients confided to his care. Doing the job is a technical matter; but the surroundings in which the job is done offer the chance to do it in style rather than merely. In something like surgery, style is very much the man - bound up with how an individual manages the demands on him; but it is also an element in the role, in the sense that an account of the style in which a role can be filled is one of the things we would want to know about any role before we felt we understood it (Ryan 1978, p. 74).*

#### IMPLICATIONS FOR SERVICE DESIGN

The dramaturgical perspective highlights the definition of situation as well as ability. These can translate to various service encounter elements such as the setting (the servicescape), the personal front (appearance and manners of service representatives and other present in the social environment), and the user capabilities in performing desired roles. This perspective not only makes designers aware of the impressions formed through the above mention elements, but also provides a list of areas that can be influenced by design in order to shape user impressions and facilitate the emergence of desired co-productive roles.

#### THE SERVICE CO-PRODUCTION FACILITATION CHECKLIST

The following checklist is proposed as a guide for designers to consider when designing and staging desired co-productive roles:

- User role and privileges
- Other roles
- Ability
- Setting
- Tools/evidence

*User roles and privileges* explicitly specify the role of the service actors and their privileges at a given instance in the process of service co-production. These could include task-oriented and functional roles or transient metaphoric roles and awarded privileges. The *other roles* include all other service actors who have a collaborative relationship with the user in service co-

production. These can include the service provider, other customers, online users and the community. This recognizes the collaborative nature of service co-production. It also provides the required contextual information for the establishment of the desired role. The *ability* raises the importance of any training, tools or information required for the staging of the desired roles. Ability can be internal and/or external to the user. The *setting* points to the elements of servicescape where the service co-production takes place. Finally, *tools/evidence* supports any required tools or tangible artefacts that can support the performance and staging of a desired service performance.

A checklist, comprised of these five elements, provides service designers with a snapshot of the elements required for the establishment of the desired service roles. This promotes a comprehensive understanding of the elements influential in the establishment the definition of situation and the emergent roles in the co-production of service.

A simple example illustrates the potential use of this checklist.

#### EXAMPLE

Imagine a new security procedure introduced in an airport. The efficiency of the user participation in service co-production is essential to the passenger flow as well as their service experience. Due to the recent enforcement of this security procedure, most passengers are first-time users. This procedure involves digital fingerprinting of passengers. Passengers are permitted to proceed to the secured zone after obtaining security clearance.

Table 1: Service co-production checklist for a passenger in the airport security example

Checklist item	A service design team's considerations
User roles and privileges	Orderly line-up and compliance to instructions; self-administration of digital fingerprinting
Other roles	Airport security personnel, fellow passengers and others present in the area
Ability	First-time users with no prior knowledge of the procedure or devices used.
Setting	Airport security check, waiting area, counter and the gate to secured zone
Tools/evidence	Fingerprinting device, signage and signals guiding passengers through the procedure

The service co-production checklist, filled out from the perspective of a passenger, can draw a snapshot of the service co-production landscape (see Table 1). This enables the design team to actively consider and define the desired co-productive roles of the user in a given service encounter. This also promotes a systematic and

consistent treatment of all the essential ingredients necessary for the establishment of the definition of situation in the staging of the desired service roles. Attention to user ability ensures that both the internal and external dimensions of ability in role performance, such as the user self-efficacy and the usability of the present elements, are considered.

#### DISCUSSION

Dramaturgical perspective on social interactions can provide a good starting point for research on service co-production facilitation. Further research is required to evaluate the adoption of this perspective in service design. The implications of dramaturgy for service co-production facilitation are most evident in face-to-face services. The application of this perspective in digital services needs to be explored in future studies.

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# RECOGNIZING PARADOXICAL IDENTITIES OF DESIGN MANAGERS

ULLA JOHANSSON

SCHOOL OF DESIGN AND CRAFTS

UNIVERSITY OF GOTHENBURG

ULLA.JOHANSSON@GRI.GU.SE

JILL WOODILLA

SCHOOL OF BUSINESS, ECONOMICS AND LAW

UNIVERSITY OF GOTHENBURG

JILL.WOODILLA@GRI.GU.SE

## ABSTRACT

There is a need for designers with knowledge in business as well as business people with knowledge in design. All over the world master-level education programs are growing for this “in between” area. We argue that this knowledge and the identity of being “in between” are essential but also problematic. There is a danger that, similar to the relation between man and (wo)man, the business way of thinking becomes the common ground for (design) management, and the designerly characteristics become decoration, rather than another ground. In order not to suppress the one or the other, we argue that a paradoxical identity of being simultaneously both the same and different is needed. This paradoxical identity of both acknowledging the differences and at the same time looking away from them is theoretically anchored in the postmodern project – and earlier studies of one of the authors shows that it seems easier to embrace in practice than in (modernist) theory. Here we present a theoretical frame of reference and some empirical notifications from students in a Masters program in “Business & Design” at the University of Gothenburg. We will also present an ongoing empirical study.

## INTRODUCTION

There is a need for designers with knowledge in business as well as business people with knowledge in design because this helps make the working relationship productive and satisfying. While some designers work smoothly with business people, especially when they follow guiding protocols (cf., Anderson 2000, Ashley

2007, Lindgaard 2004), others have different experiences. For some time we have been puzzled by problems in relationships between designers and business people when they work together. Johansson and Svengren (2008) observed that relationships between designers, engineers and marketers/managers are complex and fraught with frictions, and Johansson and Woodilla (2008) investigated epistemological underpinnings of differences among the various professionals in their approaches to work conducted together. The differences are of such a character that we sometimes think of designers and managers as belonging to quite different worlds, or at least two diverse discourses. The problems at hand do not seem to be “simple” communication or misunderstandings but rather belong to epistemological differences; differences in value systems and the way values influence the professional work.

Learning together about each other’s ways of working and sense making is one way to promote increased knowledge and respect between designers and business or management professionals (we use the words interchangeably), and master-level education programs for this “in between” area are becoming quite common. We consider this knowledge and the identity of being “in between” as essential but also problematic. The danger is that the business way of thinking becomes the common ground for (design) management, and the designerly characteristics become “decoration”, rather than another ground. In order not to suppress the one or the other a paradoxical identity of being both the same and different simultaneously is needed. Our reasoning begins from the observation that relationships between managers and designers can be similar to those between men and women, where it for a long time has been problematic to be “in between” the stereotyped dichotomy of men and (wo)man. We therefore suggest that a theoretical gender perspective might inform and also deepen our understanding of the dichotomous relationships between designers and managers.

In many ways design and management are like two different worlds, suggesting that the relation should have a dichotomous character. However, that is not the case. There are both groups in-between and great

differences within the groups. Any dichotomization represses the individual differences within the two categories and the spectra of both similarities and multiplicity of differences becomes invisible and turned into stereotypes. From gender research (Tong 2009) we have learned that the dichotomizing and stereotyping sense-making that is prevalent both in society and in many types of gender research is not liberating but rather preserves the situation. So, in order to find out more about this dichotomy of designer and manager - that is not a dichotomy - we now turn into the area of professional identities and look for how students construct their identities within educational programs where students are accepted with preparation or foundational knowledge in either design or management.

### THEORETICAL FRAME OF REFERENCE

In this section we summarize theoretical perspectives that form the grounding of our study, namely, symbolic interactionism, feminist studies, and recent trends in organizational and cultural studies. We conclude with research into professional identities, paying particular attention to other empirical work that may help guide our research process. We have not taken research into organizational identity into account (cf., Harquail & King 2010, Hatch & Schultz, 2002). These may originate in the same perspectives but create frameworks that are at the organizational level of analysis with no connections to the individual level.

#### SYMBOLIC INTERACTIONISM AS AN EPISTEMOLOGICAL FRAME OF REFERENCE

The symbolic interactionism (SI) perspective starts with the notion that all people create meaning. If we did not do so the world would be fragmented and totally chaotic. Symbolic interactionism takes social constructionism (Berger & Luckman 1967) more or less for granted and focuses on the meaning-creating process. An object in this frame of reference is an entity with a meaning and could therefore be symbolic as well as physical (Blumer 2000).

The founder of SI, George Herbert Mead, was much concerned with the development of “I and me”, a dynamic development view on a social psychological level. He described how the “I” coming from the inside of a person interacts with the “me” that is the surrounding family and society’s picture that becomes internalized (Mead 1934). The dynamic between the “I” and the “me” is ongoing throughout life.

The concept of “role” in SI is related to a dynamic and constant work called “role making”, whereas roles in many other sociological traditions are treated as preset properties that an individual adjusts to or enters (Hewitt 2003). The concept of identity did not originate in SI, but became a strong concept in sociology after World War II when American society was confronted with the world outside, and the identity of the US people in relation to other nations became a focus of research

(Hewitt 1989). During the last decades identity has become a strong concept within organizational studies as part of the cultural turn. We regard identity as the way an individual or a group talks and thinks about themselves in relation to other people, that is, as the result of an integration of the “I” and the “me” dialogue. Consequently, the identity can be weak or strong, coherent or splintered, important or not so important, and so on. These characteristics, as well as what the identity is about, interest us.

#### FEMINIST STUDIES OF IDENTITIES

Identities – or dissolving identities – take many paths within feminist studies. Simon de Beauvoir (1949) wrote about the female sex as “the other”, a suppressed shadow of the male one. The man was the yardstick in the society, the one that counted and that everyone else had to refer to. Men, according to Beauvoir, were like the golden metre: the reference against which everything else (read “women”) was considered deviant or inferior. The analogy between women in the men’s world and artists and designers in the managerial world is striking!

Gilligan and Chodorow, in the 1970s and 80s, each in her own way, tried to highlight and focus on the female identity. Gilligan, as a moral psychologist, saw that what was formerly considered as “gender neutral” in moral development in fact only related to male development, and therefore focused on what she called “women’s voice” (Gilligan 1982). Her aim was to give voice to what had not been heard of or recognized and to articulate specifics. Chodorow (1989), on the other hand, theorized around the differences between boys and girls’ identity development and found that boys tended to be “over-separated” in their identity while girls tended to be “over-dependent”. The ideal development, according to Chodorow, is a paradoxical relation between the self and the society where you are separated and integrated at the very same time. It could also be phrased in the following way: a mature person is part of a holistic situation that is more than him/herself and yet simultaneously a specific and separated person. What we find interesting is that it is the paradoxical self that is the joint norm, whereas paradoxical thinking in academia has been abolished in the modern project and only praised by postmodernity. Many modernist philosophers regard paradoxes as weeds that must be pulled out of academia.

One of the authors (Johansson 1998) built on the paradoxical perspective of Chodorow in her ethnographic study about responsibility in organizations. In order not to fall into the dichotomous trap of differences between men and women (that would have hidden the interesting results) she constructed three sexes or role figures when she described patterns of sense making: (1) John, who stood for statements and activities that could only be associated with men, and (2) Mary Ann, who stood for what could only be associated with women, while (3) Mary John, stood for

statements that were possible to associate with both sexes. She also noticed that specifically Mary John seemed to have a paradoxical view upon gender, being able to both see and see away – or see (away) from gender dimensions – sometimes both at the same time in an ironic or humorous way.

Another way of describing traditional and dualistic patterns of behavior through which patterns of doing design management can be understood is using the analogy of an invisible screen that is always present in the background, as also described in gender studies by Johansson (1998). If we do not take into account the roots of the dualistic/separate identities of designer and manager, we are not able to grasp and understand the situation at hand when “design-management” identities emerge. To ascribe someone who works in the “in-between” area as taking on a new and distinct identity diminishes that person’s capacity. The “invisible screen” that is always present reminds us what is being looked-away-from as new or shifting identities are assumed.

Both Gilligan and Chodorow could be classified as what Tong (2009) labels as the second wave of feminism. This categorization has been strongly criticized for its dichotomization, and the subsequent repression of differences both within and between the categories. The third wave of feminists – with its combination of post modernists (cf., Holvino 2010), post colonialists (cf., Diaz 2003) and queer theorists (cf., Jagose 1996, Tierney 1997) - has the aim of dissolving the notions of both men and women as an important category of social classification.

#### PROFESSIONAL IDENTITIES/IDENTITY WITHIN CULTURAL AND ORGANIZATIONAL STUDIES

In recent years, professional identity has been a topic of interest in research on professional disciplines. For example, in education, with its strong foundation in ethnographic research, studies on identity when becoming a teacher (cf., Hamman, Gosselin, Romano & Buunan 2010) or counsellor (cf., Gibson, Dollarhide & Moss 2010) build on psychological concepts and generally consider “the professional” as an asexual object. In design, interest in “identity” predominately focuses on the designer’s ability to craft an identity of the object or service, not on the construction of the identity of the designer his or herself. Exceptions exist, for example, work by Schwier, Campbell and Kenny (2004) that takes a social construction perspective but relates men and women participants (sic) to their communities of practice.

Recent studies on identity published in management and organization studies journals reveal a variety of theoretical and methodological approaches. For example, working from the assumption that professional identity is the social “fact” of how a person defines him or herself in the context of organizational life, Pratt, Rockmann and Kauffmann (2006) detail processes through which medical residents “customize” their

identity during periods of work and study. Mainstream management theories in careers, role transitions and socialization contribute to understanding the “identity work” or dynamics of “identity construction” of 11 medical residents (4 women, 7 men) over a six-year period.

In another in-depth investigation, Sveningsson & Alvesson (2003) consider the case of one senior manager working in a complex environment where her “identity work” was more or less continuously ongoing. They take a discursive approach, with a conceptual platform that builds on Mead’s concepts of “I and “me” while taking distance from perspectives embracing impersonal sources of identity work such as organizational discourses, ideologies, social identities and roles. Their results reveal the subject as a location of contradictory discourses, and they argue for identity work as a struggle involving discourses, roles and narrative self-identities coming into play as individuals strive for comfort, meaning and integration, and some correspondence between a self-definition and work situation.

Not all studies of identity consider a meaning-making perspective. For example, narrative identity work has been theorized by Ibarra and Barbulescu (2010) in the context of work role transitions, with the conclusion that people (sic) develop a narrative repertoire that they draw on in social interactions and then save or revise depending on whether the variant of “one’s story” appeared authentic. We find this mainstream explanations insufficient to account for the several perplexing situations involving designers and managers that we have observed.

#### HOW GENDER STUDIES CAN HELP US RELATE DESIGNERS AND MANAGERS IN A MORE NUANCED WAY

The worlds of designers and managers are rooted in different epistemological paradigms, the managerial being mainly rationalistic and the designers being rooted in the artistic creative and emotional world. Both theoretical and practical evidence underpins such a claim. Not noticing these differences would be to do something similar to when men claim, from their platform, that “we are all equal”, suppressing the differences in epistemological foundation between themselves and women. Yet, it is also easy to find both theoretical and practical examples that refute the claim of lack of differences. Recent narrative and postmodern streams of organization theory problematize the rational foundation of managers and the business world (cf., Czarniawska-Jeorges 1997, Hassard 1994) and studies of what constitutes entrepreneurship (Hjorth and Johannisson 2003, Sleyaert and Hjorth 2003) demonstrate anything but a rational ground. In fact, Hjorth (2003) relies on artistic epistemology and replaces *homo economicus* with *homo ludens*. In the other direction, Johansson, Sköldberg and Svengren (2003) in their discussion of the epistemological ground

of designers find that they are a product of modernity but alien to the rationale of modernity. Instead, they say, designers are born in the cradle of modernity but remain alien to the logic of modernity with its split between art and technology.

Our thinking needs a paradoxical frame of reference where we can see (away) from the differences. Such a frame of reference allows us to recognize a spectrum of identities rather than a dichotomy – but at the same time it is a frame of reference that allows us to understand the existing dichotomy without being caught in it.

In brief, we believe that changing roles and identities of designers also require changes in business/management professional's roles and identities, which is why we theorize and research both identities. We recognize the problematic area of being “in-between” which we describe as a paradoxical identity. By analogy with research in gender studies, we suggest that this identity may allow the designer to both see him/herself as a designer and, at the same time, to “see away” from the designer identity towards a business/manager identity. The complex nature of these identities and ways in which they are expressed need an ethnographic study that appreciates gender differences as well as professional differences.

The changing and paradoxical nature of designer's and management professional's identities are illustrated by findings from our pilot interview study of students with design or business/management backgrounds enrolled in the Masters in Business and Design at the University of Gothenburg. In addition, results from a second study, to be conducted in late April and early May will further elaborate our position.

### A FIRST LOOK: A PILOT STUDY

In autumn 2010 we held a series of small group interviews with students from the first two cohorts in a new master program in business and design. Each group interview took a little longer than an hour and used a series of questions to prompt conversation around issues of interest to the researchers, including reasons for joining the program, entering professional status, critical incidents during the program of study, and career aspirations following graduation. The interviews were conducted in English, with both researchers jointly leading the conversation. The interviews were recorded and transcribed. To preserve anonymity, students are identified below by a code.

From the first two interviews, one with students from the first cohort in the program (now recent graduates), and the other with one of the project groups from the second cohort (entering their second year), three “stages” in the identity process were apparent.

Students entering the program directly from their first degree did not think of themselves as a “manager” or a “designer”, but as students of the joint program “Business & Design”. They therefore were surprised –

and even shocked – when other students and instructors labelled them in this way. As one said:

*I would never have regarded myself as a business person until I entered the program and everyone started telling me everyday that I was a business person and that meant something about my personality and that was really weird for me. (C2-W1: 100928)*

Another student was more comfortable with the situation.

*It is clear we have different points of view ... as we work it's hard to stay a designer. I don't mind if I lose the identity I never had. (C2-W2: 100928)*

Later, when working in cross-disciplinary groups, students noticed a difference in work habits, and this served as a distinguishing feature of the other.

*Before, even if it wasn't group work, evenings, weekends, we were always working. We were doing projects and in each other's projects, helping out in different ways. And the biggest difference when we started here was, OK people, go home now. We've done all the work. (Laughter) That was huge. I'm still struggling with that, working 8 to 5 and I'm trying to adopt that way of working, and it is hard. (C2-W2: 100928)*

*That's the way people work. (C2-M:100928)*

By the end of the program, recent graduates seemed to be quite secure in their own sense of professional competence, but they were unable to find a label to describe themselves. They handled this situation with different strategies.

One former student said she had “taken time off” in her identity work, which indicates that it troubled her quite a lot earlier and maybe will also do so in the future:

*I have just been thinking... Oh I need to do a business tabloid of myself and what am I actually doing and how is this coherent and so on... I just decided to give it a rest for some while. And keep on working with the project I am doing. And it would only take some time out of the projects I have. I have projects. And I am able to sell them. Sell myself. (C1-W2: 100927)*

Another former student had invented an identity with help of a label – he forthrightly called himself “a design strategist” – and made sense of the situation for himself:

*I have been thinking about this a lot. And I have realized that I am not an ordinary designer, but playing on this design strategic ...you know...it depends on what day it is. I am doing what I am doing and I like what I*

*am doing. It does not matter to me what I call myself or what other people call me. The problem is that if I call myself a design strategist, people will always ask what that is. So it does not matter what I call myself because I will always have to explain. So the important is that explain thing when people get to know what I am doing.* (C1-M1: 100927)

Structuring the different paths as models of identity, however, would easily turn into new stereotypes. Instead we turn to the intuition we both had as researchers, a feeling of understanding individuals with an entrepreneurial spirit and a sense of “always in the process of becoming something as yet undefined”. This elusive perspective that emerged from the data is espoused in critical theory and needs to be elaborated and experimented with intellectually. Therefore we decided to expand our investigation and work within the premises of a critical perspective. Identity cannot be dichotomized into that of “the designer’s identity” and “the manager’s identity”, or stabilized as the final identity of a hybrid design-management professional.

## ONGOING RESEARCH

The investigation due to begin in late April is based in a critical feminist perspective and demands a multifaceted research design. We start with three different kinds of research questions:

1. Empirical questions: How does participation in a cross-discipline master program influence identity creation and its continuous re-creation, etc? Are original identities kept throughout the program or what happens to them? If they fade away what sort of replacement processes occur during the program? At the end of the program do the students have a unified identity related to the program? If not, what do have?
2. Theoretical question. What ways can we find to describe patterns in identity processes that do not suppress the one or the other identities?
3. Practical question. What changes in the program might we suggest to ease friction in relationships based in differences in identities?

Three primary data collection methods will be used: (1) focus interviews with students in each cohort to engage in conversations and hear in their own words about their experiences and feelings; (2) collection of stories from teachers to hear their narratives of the education context; (3) observations of project groups to witness interactions between students. In addition we will document our own reflections as researchers to note our biases and emerging interpretations. The study design is flexible to allow for changes and additions depending on the data collected in the ongoing process. Throughout the process we will be mindful of issues of trustworthiness and ethics (Marshall & Rossman 2010).

Both authors have had considerable experience in analysis of data of the type we will be collecting in this study. We will start with “grounded theory inspired coding” of interview transcripts, narrative analysis of stories, and thematic analysis of field notes from observation and reflections. We will keep journals during the data collection and analysis processes that include theoretical memos detailing our emerging assertions. We also know from experience that we cannot anticipate the level of detail or particular aspects of data analysis.

We anticipate results in terms of identity-related themes illustrated by quotes. We also anticipate that an interpretation of the results from critical perspectives will give us frames of references that are useful for the University of Gothenburg and similar Master’s programs, and maybe also for other activities in the intersection of business or management and design. In addition, we will interpret the data relevant to professional identities from feminist perspective and anticipate finding examples of paradoxical identities.

## CONCLUDING REFLECTIONS

One way in which designers’ identities are changing is through the use of “in-between” knowledge when they work directly with business or management professionals, who also gain in-between knowledge. From an exploratory interview study with students in a Masters in Business & Design we observed that participants engaged in “identity struggles”. We suggest that these offer tentative support for our claim that the area between design and management requires a paradoxical identity of both looking towards and looking away from the foundation of the original identity. Feminist identity theory elaborates on this position.

Empirically, we realized that the situation was more complex than we initially anticipated in our interview study. Consequently we have designed a more comprehensive research protocol. We hope that our results will contribute to both theory and practice. By surfacing and investigating underlying problems in interactions between practitioners in design and business, we will have frameworks with which to understand the ongoing processes of indentity(ies) construction, and suggestions for ways to take a more nuanced view of each other and processes of identity work.

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# PRACTICE THEORY AND HUMAN-CENTERED DESIGN: A SUSTAINABLE BATHING EXAMPLE

LENNKE KUIJER

DELFT UNIVERSITY OF TECHNOLOGY, APPLIED  
ERGONOMICS AND DESIGN

S.C.KUIJER@TUDELFT.NL

ANNELISE DE JONG

DELFT UNIVERSITY OF TECHNOLOGY, APPLIED  
ERGONOMICS AND DESIGN &

INTERACTIVE INSTITUTE, DESIGN RESEARCH  
UNIT

A.M.DEJONG@TUDELFT.NL

## ABSTRACT

Within sustainable design, researchers and practitioners are developing novel approaches equipped to influence domestic resource consumption in a variety of ways. However, as it turns out, the outcomes of these approaches in terms of their actual effects on sustainability are not quite as desired. This is often taken to be a consequence of rebound effects or unpredicted user behaviour. In an attempt to overcome these limitations, this paper explores the implications of the combination of two research strands, practice theory and human-centred design that may assist designers by going beyond behaviour change and towards gaining an understanding of use practices. Rather than single interactions or activities, practice theory takes socially shared practices as its main unit of analysis; human-centred design works closely with potential future users. The translation of these two starting points in a design approach was explored in a still ongoing exemplar project on bathing that is elaborated on here. The paper closes with a reflection on how the theoretical instruments manifest themselves in the project.

## INTRODUCTION

Designers are becoming more aware of their role in the current problems society faces, like for example resource depletion and climate change. They want to take responsibility and as a consequence a range of novel design approaches has come to life, such as Ecodesign (Van der Ryn and Cowan 1996, Brezet and Van Hemel 1997), product-service system design (Manzini et al. 2001) and design for sustainable behaviour (Lockton et al. 2008, Lilley 2009).

As some of the outcomes of these design approaches reach the market, it turns out that achieving desired change through designed interventions can be quite a challenge. There are rebound effects (Hertwich 2005, Herring and Roy 2007), where efficiency gains are counteracted by increases in consumption. Additionally, behaviour oriented methods have difficulties accounting for changes in behaviour or social context. They tend to focus on single product-user interactions and specific moments in time, while in reality design interventions end up in complex social environments that constantly evolve (e.g. Shove 2009).

Our aim in this paper is to provide an exemplar hands-on-approach for the design community to assist design research and practice in grasping and working with the complex relation between design(s) and desired changes in society.

In the paper we will elaborate first on two strands of theory: practice theory and human-centred design. This is followed by an explanation of an ongoing project on bathing that tried to incorporate ingredients of these theories in its approach. Finally, we will reflect on how the ingredients of the two strands have thus far helped to understand use practices and find design opportunities for desired change.

## PRACTICE THEORY

Theories of practice or practice theory is a group of theories from sociology. It takes practices, like bathing or cooking as its main unit of analysis. In practice theory, these routine types of behaviour consist of several interconnected elements (Reckwitz 2002). These elements can be grouped in different ways, but a grouping useful for designers, both for its simplicity and explicit inclusion of material elements is the grouping of images, skills and stuff introduced by Shove et al. (2007). Important for understanding practices is to realize that these elements are socially shared; they form loose cultural structures that partly shape (and are shaped by) our ways of living.

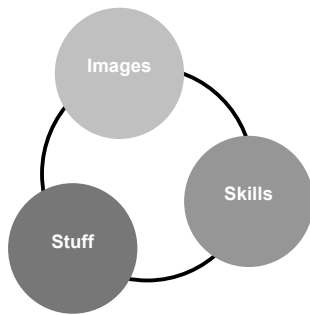


Figure 1: Simplified model of practice with interrelated elements of images, skills and stuff (Shove et al, 2007)

Images are elements that give meaning to the practice, reasons for doing, including ideas of what is normal (and what is not). They are socially shared within a cultural group and often implicit.

Skills are learned bodily and mental routines, know-how, levels of competence, ways of knowing and desiring. They are socially shared through imitation, media, education, informal social interaction and so on.

Stuff groups material elements, including human bodies and human-object hybrids. They are socially shared through (mass) products.

### *An example of the practice of 'storing vegetables'*

*Images: Vegetables are healthy, one needs to eat vegetables to stay healthy, rotten vegetables are bad and make people sick, perishable things stay good longer when cooled, etc. But also, ideas of what is a normal or acceptable amount of vegetables to store and eat, when it is too little or too much.*

*Skills: Ways of cooking and cutting, knowledge of recipes, preferences of tastes, ways of stock management, ways of judging whether the vegetable is still 'good' or not (feel, see, smell, read expiry date), feelings of disgust towards rotting parts, knowing which vegetables 'belong' in the fridge and which not, ways of shopping, etc.*

*Stuff: Fridges and freezers, packaging (plastic, paper, can, glass, ...), hands, noses, shelves, basements, cupboards, bags, knives (human-knife hybrid) and cutting boards, etc.*

Clearly the elements making up a practice are related, for example images of the purpose of cooling relate to routines of storing in the fridge (skills) for which of

course fridges (stuff) are required. Viewed the other way around, the wide introduction of fridges has changed habits of storing and images of what is the proper way to store.

Some qualities of practices are interesting to take into account for design:

- Compositions of elements change over time, new elements are integrated and others are phased out;
- Compositions of elements can vary greatly within and between different (cultural) groups and situations;
- Different compositions of elements can result in strongly different resource requirements for the practice;
- Practices are related to other practices.

### *Examples for storing vegetables*

#### *Change over time*

*With trends of urbanization, globalization, the introduction of freezers and refrigerators, the storage of vegetables has strongly changed. Today for example fewer people know how to pickle vegetables (skills), tools for pickling are difficult to find (stuff) and pickling is now considered eccentric or old-fashioned (image) while it used to be a normal thing to do. On the other hand the relatively recent introduction of avocado's (stuff) has led to skills of judging its ripeness and knowledge on recipes to use them in together with an image as something special but available.*

#### *Variety*

*Indians have very different ways of storing vegetables than Inuit, storing vegetables was different in the 1930s compared to now, someone in a small apartment in the city stores vegetables differently than someone in the countryside with their own vegetable garden and you store vegetables differently than your neighbor.*

#### *Differences in resource requirements*

*To speak in extremes, the resource requirements for storing a precut cabbage from China in a plastic packaging in the fridge (and letting it expire before it is eaten) is quite different from the resource requirements of storing a home grown potato in the basement.*

#### *Relations between practices*

*The practice of storing vegetables is closely related to practices of buying, preparing, eating and disposing vegetables; it can be considered as part of a practice of storing food at home or as a practice of food management. It is related to gardening, working, relaxing at home and so on.*

## HUMAN-CENTERED DESIGN

Human-centred design (HCD) aims to get a better 'match' of a designer's anticipations with the real world by doing research about and/or closely cooperate with people expected to be future users of the product. Steen et al. (2007) have composed a categorisation of six HCD approaches depicted in figure 2. The horizontal

axis represents the difference between approaching users as subjects on the one hand and approaching them as experts on the other. The vertical axis represents the different orientations within the methods with regard to their descriptive, i.e. looking for problems in current situations, or generative character, i.e. exploring opportunities in future situations.

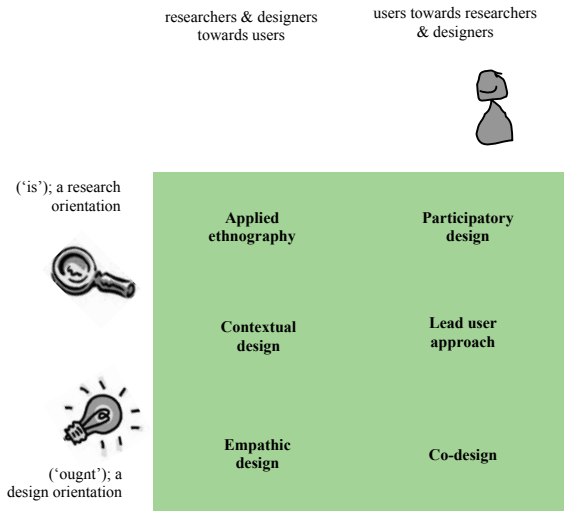


Figure 2: Different HCD approaches (Steen et al. 2007)

Important in applying HCD is to keep in mind that end-users may have trouble speaking reliably about their future needs or future products. Finally, for any successful HCD, Steen et al. (2007) mention essential ingredients to be conversations between designers and future users, multi-disciplinary teamwork and iterations in design and evaluation.

### BATHING PROJECT

These two leads of practice theory and HCD were combined in an ongoing project on the practice of bathing. Now completed are two ‘experiment’-studies, in which participants experimented with their bathing practice at home (Scott et al. 2009, Kuijer and De Jong 2009), one detailed cultural inquiry about bathing in India, Japan and The Netherlands (Matsuhashi et al. 2009) and a design project in cooperation with an industry partner (Karakat 2009) (Table 1). Based on intermediate conclusions, the next phase of the project will be an iterative prototyping process. The next section will elaborate on these studies.

Table 1: Overview of completed studies (all elements took place in participants’ own homes, except for the group sessions)

Study	No. part.	Duration, timing	Elements
Experiment-study I	10	2 weeks, summer ‘08	Workbook, experiments, blog, group sessions
Experiment-study II	16	2 weeks, fall ‘08	Workbook, experiments, idea

			forms, group session
Cultural inquiry	8	1 week, Spring ‘09	Workbook, action cards, interviews
Industry project	6	2 days, Summer ‘09	Rough concept testing with existing products

### EXPERIMENT-STUDIES I & II

The two experiment-studies had a similar set-up but a slightly different focus. The first study placed emphasis on the dynamics of practice change in the small community that was created for the study, while the second study, although also creating a community of participants, paid specific attention to informing design. At the core of both studies were ‘experiments in practice’ (Scott et al. 2009: 6). Participants of the study were first stimulated to unravel their own bathing practices according to the elements of images, skills and stuff, in which they were guided by a workbook to be used at home (figure 3). After this deconstruction exercise they were challenged to come up with and try out different ways of bathing in their own homes during two weeks. Some of these bathing styles entailed radically different configurations of elements and actions compared to conventional showering. Examples include washing from a bucket or taking a sponge bath.



Figure 3: example page from one of the workbooks about a bathing experiment involving a bucket (Kuijer and De Jong 2009)

### CULTURAL INQUIRY

The cultural inquiry explored bathing in three different cultures: Japan, India and The Netherlands. Participants’ bathing routines were described in detail on the basis of self-observation studies by two or three participants in each country. Participants were again guided by a workbook and a set of detailed action cards (figure 4).



Figure 4: cultural inquiry study workbook and action card example (Matsuhashi 2009: 4)

The study resulted in rich insights into different ways of bathing: the Indian seated basin wash where water is scooped and splashed, the Japanese seated soaping ritual preceding an extended soaking in a hot bathtub and the Dutch standing-up shower. An important conclusion in terms of sustainability was also that these styles differed considerably in the amounts of warm water they required, with the Indian way by far the least resource intensive (figure 5).

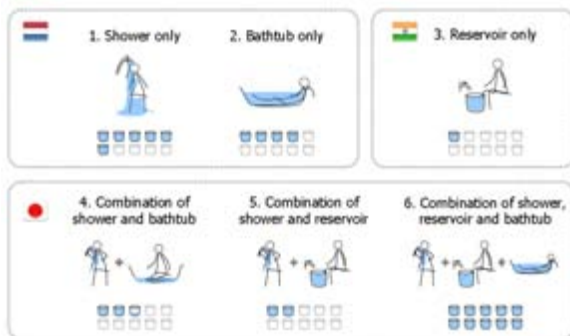


Figure 5: graphic comparing different ways of bathing and their water use in The Netherlands, India and Japan (Matsuhashi, 2009)

#### INDUSTRY PROJECT

The industry project was executed together with a bathroom producer and distributor. The project took the results from the preceding three studies as a starting point and eventually worked out two concepts. One concept was the ‘Scrub’, a dry-wash, allowing partial and quick washing at the sink in a wet space like the bathroom with a washcloth or sponge (figure 5). The second was the ‘Splash’, involving a basin containing warm water, a seated position and a ritual of splashing water over the body with a scoop. Both concepts were tested and evaluated by users in their own bathrooms using readily available products like buckets, stools, cups and washcloths. These tests informed further development of the concepts into detailed designs of supporting products.



Figure 5: storyboard of the Scrub concept (Karakat 2009: 40)

#### INTERMEDIATE CONCLUSIONS

The study started with an analyses of current bathing practices, which showed that they are highly resource intensive and moving into directions that are increasingly so. Major culprit in this unsustainable practice is the paradigm of continuously flowing water. The dominant way of bathing in The Netherlands is showering. Of course taking a shower is a very pleasant activity, offering qualities like caring for one’s body, waking up, relaxing and getting warm. However, water from a shower touches the body only for seconds and then disappears down the drain, still warm and practically clean.

By diving into bathing in history and in other cultures, we found that although daily showering is normal(ised) in The Netherlands, it has become so only during the past fifty years and is not so common in other modern cultures like for example Japan. Furthermore, when experimenting at home, study participants came up with ways of bathing that abandoned the shower paradigm partly or even completely. From these studies we can conclude that showering is not the only possible way of bathing; people are willing and able to bathe in different ways.

One of the potentially pleasurable and considerably less resource intensive ways of bathing resulting from the study was the ‘Splash’ concept, where water is contained in a basin from which it can be splashed over the body from a sitting position. Study participants experienced this way of bathing as rewarding, effective and relaxing. However, they also reported discomfort, mainly because this way of bathing is currently not supported by Dutch bathroom designs. Therefore a series of supporting products was worked out for Splash (figure 6).

In terms of energy and resource consumption, the Splash concept is clearly different from existing products in the market that aim to reduce water consumption of bathing. These existing products are either technology oriented products like water saving showerheads and recycle showers or behaviour oriented products like timers and feedback on water and energy use (ISH 2009), but all take the concept of showering for granted and require sacrifices on its pleasures. For



Splash, estimations show potential for warm water savings of up to 90%.



Figure 6: Splash concept and supporting products (by Harish Karakat in cooperation with Sealskin BV)

Now the question remains if, and if so to what extent does Splash have potential to be an acceptable alternative for daily showering? And importantly, does it then lead to reduced water and energy consumption without negative side effects nullifying these achievements? To answer these questions, the next step will be evaluating the Splash concept in an iterative prototyping process.

#### ITERATIVE PROTOTYPING PROCESS

The process will have two cycles of testing, redesign and prototyping and will end with a long term test (figure 7).

The first test will take place with an existing real-size foam model (figure 8). This mock-up will be used to make a physical simulation of a bathing process that involves splashing/sponging imaginative water and sitting down by a variety of test persons, thus generating a wide variety of different use scenarios. Because the set-up requires both rich imagination and low inhibition, the study will recruit participants with experience in improvisation theatre (test 1).

Next, a second, rough prototype will be made that can be used with water. The bathing process will be tested as realistically as possible, but test persons will wear bathing suits. Test persons will be connected for the study as a community, for example through group meetings and a blog. Participants' experiences will be evaluated afterwards in an interview and the amounts of water and energy used will be measured (test 2).

Finally, another re-design will lead to the final, working prototype. The working prototype will allow longer term testing of one to three months in an actual household situation where volunteer participants will use it in their daily life. Special attention will be paid to

exchanges of experiences between different members of the test community. Their actions with the product, their experiences of Splash bathing and the development of novel bathing practices will be monitored together with the overall water and energy consumption of the household (test 3).

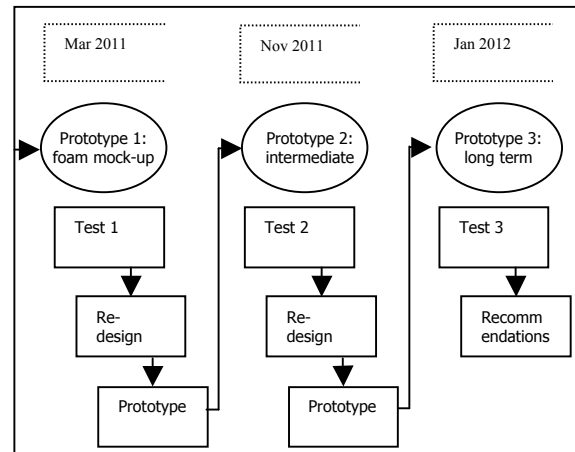


Figure 7: Iterative prototyping process for Splash

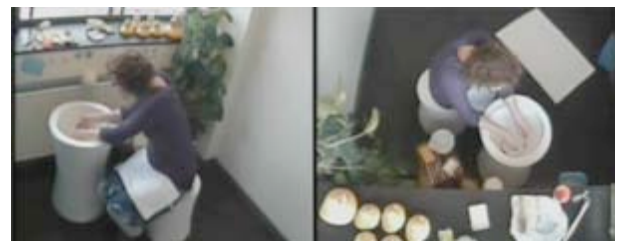


Figure 8: Real size foam model and model with test person in simulated bathroom space

#### REFLECTION

Having explained the completed and upcoming studies, we will now explore how the ingredients of practice theory and HCD manifested themselves within the approaches taken in the bathing project.

#### PRACTICE THEORY

Focusing first on practice theory, ingredients presented earlier can be summarized as: the images-skills-stuff framework, change over time, variation between cultural groups, differences in resource consumption and relations between practices.

The images-skills-stuff framework was especially used for unravelling current bathing practices; both in the experiment studies, where the framework was intended to guide participants in unravelling mundane routine like bathing, and in the cross-cultural comparison.

No systematic study was conducted into the historic career of bathing, but some literature on the topic was consulted (e.g. Hielscher et al. 2008). Also in terms of changes over time, the iterative prototyping process particularly addresses the Splash practice and design as co-evolving.



Variety in practices was specifically studied in the cultural inquiry, but also emerged in the different experiments of participants in the first two studies. Analysis of variety in practices found clear differences in resource consumption when compared to daily showering.

Finally, although bathing as a practice is clearly related to other practices like for example laundry care, cleaning or having breakfast, the study of these relations remains underexposed in this project.

#### HCD

From the perspective of Steen's overview of HCD, a variety of approaches were employed or combined. Ingredients can here be summarized as: 'is' or 'ought' perspectives, current or future orientation, reliability of participant's future accounts, conversation, multidisciplinary and iteration.

The experiment-studies contained both 'is' and 'ought' perspectives. Additionally, an interesting mix was made between users as subjects or as experts. By asking users to observe and unravel their own practices, they were both (their own) subjects and experts gaining insights from their observations.

In terms of the categorisation of Steen, the cultural inquiry was a form of applied ethnography in which participants were instructed into self-observation of their current bathing routines and the industry project entailed co-design (Steen refers to Sanders, e.g. Sanders and Stappers 2008), because here participants were asked to creatively test two new bathing concepts and share their experiences with the designer. The iterative prototyping process will also be a form of co-design. It is clearly future-oriented and test persons will have a large say in adjustments to the design. The experiment studies are difficult to categorize. They included a future oriented element in which participants had to design and perform different ways of bathing, but in this phase of the process designers/researchers were in fact left out completely.

Whether accounts of participants on potential future practices – such as their evaluations of the experiments in the experiment-studies and concept tests in the industry project – were reliable remains an issue of concern. From the studies it became clear for example that it was difficult for participants to let go of the concept of showering and the specific expectations of comfort and cleanliness currently associated with it. For the iterative prototyping process this issue is addressed by working with actors, by creating a social environment (community of participants) that will support the practice change and by a longer term test in everyday life situations.

The aspects of co-evolution, conversation and iteration will also be integrated into the prototyping process, but results are still to be expected.

#### CONCLUSION

The project presented in this paper has explored two strands of research, practice theory and HCD in their potential for the sustainable design community. Reflection showed that the studies in the bathing project combined different ingredients from both strands.

Some ingredients were underexposed, for example relations between different practices and may thus have left opportunities unaddressed.

What we also see is that the merge led to types of ingredients new to both strands. Practice theory is in principle focused on what is and was, but when incorporated in a design approach future orientations on practices emerge.

Additionally, the merging role of the participant as object and subject occurring in the experiment-studies is new to HCD. Helped by simplified concepts from practice theory, participants were guided to reflect on their own practices. This approach was triggered by the idea in practice theory that novel practices emerge in everyday performance; innovation is seen as an ongoing process of co-construction (Oudshoorn and Pinch 2003) or co-evolution (Shove et al. 2007). 'Users' are then not only experts of their own experiences like in co-design (Sleeswijk Visser et al. 2005), but also designers of novel ways of doing.

Finally, the emphasis in practice theory on the social construction of practices led to an approach stimulating social contact between participants and the creation of ad-hoc communities for the studies, while in HCD participants are normally approached as a set of individuals.

With regard to desired change it can be argued that the Splash concept has potential for having large effects on household resource consumption. However, whether this potential fleshes out in reality has to be determined within the next phase of the project. The prototyping process will form a small scale evaluation of the actual effects of the design in the real world and thus of the practice-oriented HCD approach.

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# MATTER MATTERS: DESIGNING MATERIAL ENCOUNTERS AS TRIGGERS OF NEGOTIATION

JOHAN LIEKENS

DEPARTMENT OF ARCHITECTURE, SINT-LUCAS  
BRUSSELS/GHENT, BELGIUM & CHALMERS  
SCHOOL OF ARCHITECTURE, GOTHENBURG,  
SWEDEN

JO.LIEKENS@ARCHITECTUUR.SINTLUCAS.WENK.BE

## ABSTRACT

This paper ventures from a twofold interpretation of this conference's theme: 'Making Design Matter!'. An inseparable twin pair 'Matter' materializes. One twin, 'Matter' as to be of relevance, folds in a unity with the other, 'Matter' as in to become materialized: Matter Matters.

This twin pair operates as a lens through which we explore how design operates in between relevance (ethics) and materiality. The lens focuses on the mediation between these two issues. Looking through the lens, the question arises what kind of attitude in designing we consider to be relevant and reviving for today's people and world? And in addition, how is this relevance and its constitutive design attitude backed up by materiality, i.e. by the material working of the artefact? Are there different genres of materialization operative?

We suggest that a critical questioning design attitude, provoking a dynamic of negotiation through materialized designs, contributes to ongoing investigations of socio-spatial challenges, offering different, possibly refreshing, perspectives. This suggestion is exemplified by

NEL JANSSENS

DEPARTMENT OF ARCHITECTURE, SINT-LUCAS  
BRUSSELS/GHENT, BELGIUM & CHALMERS  
SCHOOL OF ARCHITECTURE, GOTHENBURG,  
SWEDEN

NEL.JANSSENS@ARCHITECTUUR.SINTLUCAS.WENK.BE

two design cases of both authors, in which dynamics of negotiation and different genres of materialization operate.

## A LENS ON DESIGN: THE TWIN PAIR 'MATTER'

### - OR, HOW DESIGN OPERATES IN-BETWEEN RELEVANCE AND MATERIALITY

A twofold interpretation, that is what emerged to us authors when thinking about this conference's theme: 'Making Design Matter!'. 'Matter' and 'Matter': a twin pair, manifesting itself as a folded entity.

In a first interpretation, to make matter is a call for an ethical stance on relevance, on meaningfulness. It instigates us designers to make our designs count, to enhance their performance within the world. Often design is perceived being primarily relevant to a targeted audience of connoisseurs, isolated from the real world in magazines, galleries and other exemplary and synthetic environments. Or, more democratic, design's relevance is considered to be a subservient, instrumental one, filling in the functional gaps with prostheses: between the flower and its water, we must design the vase. Hence, we think about the vase and design countless variations of it, considering the categories of the flower and the water as known and fixed and leaving them unquestioned. Design –and its accompanying design attitude– then constitutes an 'affirmative' act(ing). In our opinion, to make matter, to take an ethical stance on relevance, we must move beyond variations in the vase. We must not affirm but question the categories between which we design. Looking from a broad perspective, we believe that the main categories at stake in design are people (mankind) and world (environment). Unlike the water and the flower, people and world are unfixed, complex categories, both entangled in the many socio-spatial challenges we face. Hence, what needs to be problematized or questioned

critically is how people and world relate to each other, a relation that is always established by some form of design. Our design act(ing) –and its accompanying design attitude– has to be ‘critical’, if we want to instigate variations in thinking on meaningful relationships between people and world. ‘Making Design Matter’ thus is to address our full capacities of acting within the socio-spatial constellations that relate people and world.

In a second interpretation, the other of the twins appears. ‘Making Design Matter’ then is about design as a material manifestation to be encountered in the world. Design then being a material kind of ‘something’ Gilles Deleuze refers to when stating that ‘Something in the world forces us to think.’ (Deleuze 1994) We suggest here that it is necessary to draw materiality as a constituting term into the equation of instigating variations in thinking, hence in creating meaning and relevance.

Folding then ‘Meaningfulness’ and ‘Material Manifestation’ into an entity constitutes a dynamic of ‘mediation’: a mediation on meaningful relationships between people and world through the medium of design’s and architecture’s material manifestation. To speak with Rick Robinson: ‘Artefacts people interact with have enormous impact on how we think. Artefacts do not merely occupy a slot in that process, they fundamentally shape the dynamic itself.’ (Robinson 1994)

This lens on design, the folded entity of meaningfulness and material manifestation, thus produces a twofold question for further elaboration. First, what type of design attitude –and what type of design– do we consider to be relevant and reviving for today’s people and world? Second, how is this type of attitude and design backed up by the material working of the artefact? Are there different genres of materialization operative?

In this paper, we will focus mainly on the question for another design attitude. However, the role of the ‘material manifestation’ will at several occasions surface, amongst others in the design cases.

## A CRITICAL QUESTIONING DESIGN ATTITUDE INDUCING THE DYNAMICS OF NEGOTIATION

Now what new design attitude do we consider to be relevant and reviving for the interrelation between people and world?

We face many and complex socio-spatial challenges today and we need a continuous effort in sense-making and revising in order for the world to move forward meaningfully. Hence, as designers and architects, the time has come to address our full capacities of acting. However, according to Sanford Kwinter, our ‘capacities of acting -practically, ethically and politically<sup>1</sup>- in the world’ are currently ‘atrophied’ (Kwinter 2002) To

revive these capacities, we suggest that another kind of design attitude is needed towards the ‘objects’ we design to relate people and world. Kwinter suggests that we should look for ‘pathways that would have as a role to restore to architecture (and design) specifically the active, and not merely reactive role it once had in shaping cultural and social life.’ (Kwinter 2002) The reactive here then being parallel to the affirmative mentioned earlier, the active then parallel to the critical. One of these pathways, following Kwinter, is a revision of the architectural or design- object. ‘As design practice and thought are deflected away from the traditional and largely “aesthetically” constituted object and simultaneously reoriented toward a dynamic macro- and micro-scope field of interaction, an entirely new field of relations opens itself to the designer, theorist, or artist.’ (Kwinter 2002) Hence, as designers and architects, we should conceive our objects or artefacts as mediating within these fields of interaction. As mentioned earlier, our objects or artefacts then can instigate differences in thinking, becoming triggers of negotiation in sense-making and revising processes. This is the core of our new design attitude.

Arguably, all design and all design attitudes are concerned with thinking about novelty, the most commonly known being designing solutions for existing problems (the vase). However, the critical design attitude we look for unlocks a novelty of a different kind: it enables us ‘to think the world anew’ (Stagoll 2005) through designs that search to redefine the interrelation between people and world, thereby surpassing the existing, generally accepted relation.

Adopting this design attitude, we put the relation between people and world under critical questioning by means of designed objects or artefacts we activate through their materialization. Artefacts created alongside such a critical questioning design attitude consequently trigger a similar questioning within the people that encounter these artefacts. A difference of questions emerges (different possibilities, different visions), generating contrasting viewpoints, which in turn provides fuel for negotiation processes. Processes which in today’s society are paramount to induce change. We might thus say that a design attitude which enhances meaningful performances within the interrelation between people and world, is one of critical questioning, inducing the dynamics of negotiation on different possibilities and desirability.

Recapturing the other twin, materiality is an essential constituent to install mediation in the field of interaction between people and world. Designs can be seen as necessary material agents, acting as ‘interceders’ (Rajchman 2000) to our thinking. They are encountered, sensed, experienced, and it is primarily through this that a dynamics of negotiation can unfold. Deleuze identifies the starting point of thinking as a grasping ‘in a number of affective tones: wonder, love, hatred, suffering. In whichever tone, its primary tone is that it can only be sensed.’ (Deleuze 1994) Materiality tickles the senses

and accordingly starts thought processes. Hence, we might say that materiality is inextricably involved in sense-making.

In the following, we present two design cases we were involved in to illustrate aspects of this critical questioning design attitude and the nature of the artefacts produced alongside. Also aspects of materiality, of different genres of materialization will be touched upon.

#### M.U.D – THE INTENTIONAL RUPTURE OF THE BELGIAN COAST TO INDUCE THE AGE OF MULTI-USER-DIMENSION – FLC EXTENDED<sup>ii</sup>



Figure 1: M.U.D - artist impression - photo FLC extended 2005

The M.U.D project critically questions urban planning principles and the use of space, by designing a highly dynamic relationship between the categories of sea (nature) and land (human settlement).

The case taken is the Belgian coastline, a long but ultra small urban strip. All along this coastline high-rise holiday homes stand as close to the sea as possible, the materialization of the so longed for ‘view on the sea’. The design team considered a number of socio-spatial phenomena<sup>iii</sup>, one of them being the phenomenon of ‘Flood’.

‘Flood’ revolves around the interaction between water and land and its effect on the border area between both. The dike, up till now the main coastal defence, will not suffice when consequences of climate change set through. So, much energy is spent now in reinforcing the coastal defences, according to the ruling ‘hold-the-line principle’. But what if we were not to stick to a strict dividing line but, instead embrace the dynamics of the encounter between water and land? The borderline would change into a transitional area: a landscape the designers called ‘Future Conflict Zone’ would be created, designed as a flooding area. This means that locally the dike becomes porous and the land de-poldered. Depending on the landscape behind, the sea then gushes or seeps through dyke breaches into the flood areas.

In this context of ‘Flood’, M.U.D stands for mud, the substance that is a mixture of water and land. But M.U.D also stands for Multi-User-Dimension because territory and ownership become subject to the dynamics of the sea and are subjected to constant negotiation and redefinition.

The ever recurring occupation of land by water changes the statute of the area into a ‘free space’, not

permanently colonisable, acting as a buffer against the advancing urbanisation from the inland and against the rising sea level. The de-poldered land escapes control, it is unstable, therefore hard to claim, it installs a material agent to mediate the use of space over time. This mediation over use and function of the territory is induced by the ever changing nature of the materiality: land-mud-water-mud-land... It necessitates continuous negotiation between the multiple stakeholders that want to realize and maintain different functions and generate economic and social value.

The M.U.D project experimented with issues of hybridity, ambivalence and mixture, introducing a revised notion of zoning in urban planning. Zoning, conventionally oriented to fixate the use of every square metre of space in M.U.D becomes subject to time and dynamics. The negotiation triggered here by combining the materiality of water and land, does not steer to a fixed end-state but to a continuous redefining over time and a search for variations in degrees of freedom of programming the use of space.

So, unlike common urban plans, M.U.D turns the sheer physicality of the territory into an active agent in the negotiation on use, so introducing a mediation between the materiality of the place and the meaning that is attributed to it.

Being a pre-figuration, a so-called utopian project, the ideas on ambivalence and negotiating the use of space over time are triggered and discussed through what we call, a projected materiality. The effects of the projected materiality are however consciously enhanced by the actual materiality of the representation of the project by means of a carefully designed and materialized installation. This installation has been materialized in different ways, in different contexts<sup>iv</sup> and operates as an artefact embodying ideas about spatial settlement. As such, it triggers thoughts and discussion in the public.



Figure 2: M.U.D as ambient information and cognition system displayed at HVDV University Library U Ghent Dec2005-Jan2006 - photo FLC extended

So, there are two genres of materialization at work: the projected materiality of the project's proposals and the actual materiality of the project's representation. Both instigate thoughts, questions and negotiation on the issues the design project foregrounds.

A question that might be worthwhile to explore further is whether a high degree of projected materiality (in cases where a project is not meant or likely to get actually materialized) requests an equally high (that is, more than strictly necessary to convey the information) design attention to the representation of the project?

EXPLICIT – BUILDING FRICTIONAL ARCHITECTURAL INSTRUMENTS TO PROVOKE THOUGHT THROUGH EXPERIENCE AND USE – JOHAN LIEKENS<sup>v</sup>



Figure 3: 'Ont-Moetingsmeubel, inviting for different uses, provoking wonder and thought - photo Johan Liekens

EXPLICIT is a research studio in the educational program of Interior Architecture at the Sint-Lucas Department of Architecture, unfolding in a series of mediating architectural instruments. Its constant is to build frictional furniture, or sharper, 'complicating machines' (Rajchman 2000). These furnitures have the intention to problematize or question issues, related to people and world, and related to the acting capacities of interior architects on these issues. Encountering, using, experiencing these furnitures triggers contrasting viewpoints, leading to negotiation processes. Hence, EXPLICIT's blueprint is the interaction between material manifestations and dynamics of negotiation.

EXPLICIT's genre of materialization is real, embodying materiality, not scaled or abstracted representation. The idea of 'milieu' or 'field of interaction', as it appears in the writings of Deleuze and Kwinter, is essential, i.e. designs being embedded in a field constituted by connections. Hence, EXPLICIT leaves the safe walls of the school environment, adopts a 1/1 embodying scale and edifies its designs within the real world, inviting for encounters (affects and uses), even aberrant ones. The materialized designs are simultaneously object, method and medium of research.

EXPLICIT is about stirring negotiation in an effort to renew categories to think and work with, from the perspective of interior architecture towards world and people. One of the designs, the 'Ont-moetingsmeubel', will be focused on, because it was fully built and adopted during an event.

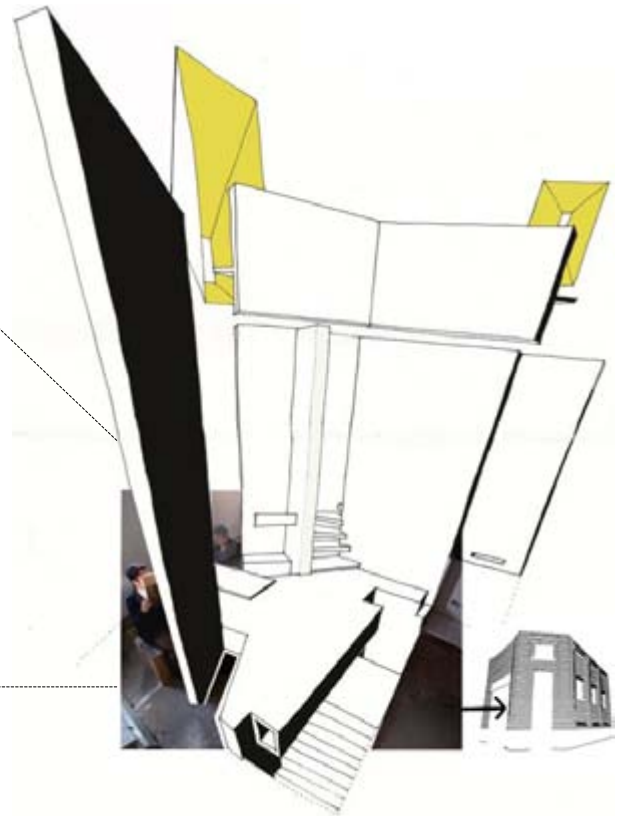


Figure 4: Scheme of the two story 'Ont-moetingsmeubel', installed in the public house in the right corner below; the yellow looking devices open up vistas (see text) - scheme Johan Liekens

The untranslatable term 'Ont-moetingsmeubel'<sup>vi</sup> mediates between the idea of being goody-goody functional furniture ('meubel') providing possibilities to meet each other ('ontmoeten') with that of a resistance against furniture's -and by extension architecture's- oppressive character to oblige people to meet and act in directed ways ('ont-moeten' is translatable as 'not being obliged anymore'). On the lower level of the two story installation, connected to public space, seemingly functionally normal architectural constellations appear. However, a bench has inclinations, people slide towards each other; sitting at a table, normal distances are shortened, the knees of the opposed are uncannily felt; a wall with mirroring shutters leaves the decision for communication or narcissism to the two users manipulating them. Hence, functionality is disrupted, wonder and questions arise through the slightly



distorted positions the body takes while meeting, and interpretations are given. The higher level opens up framed vistas on places where meeting occurs less controlled: the street, the launderette, the call-office,... 'Ont-moetingsmeubel' is a negotiation on the thin line between architecture enabling and architecture forcing, and how they affect everyday actions as meeting. It is a negotiation on formal instrumentalized space versus informal free space, as the carriers of our everyday meeting.

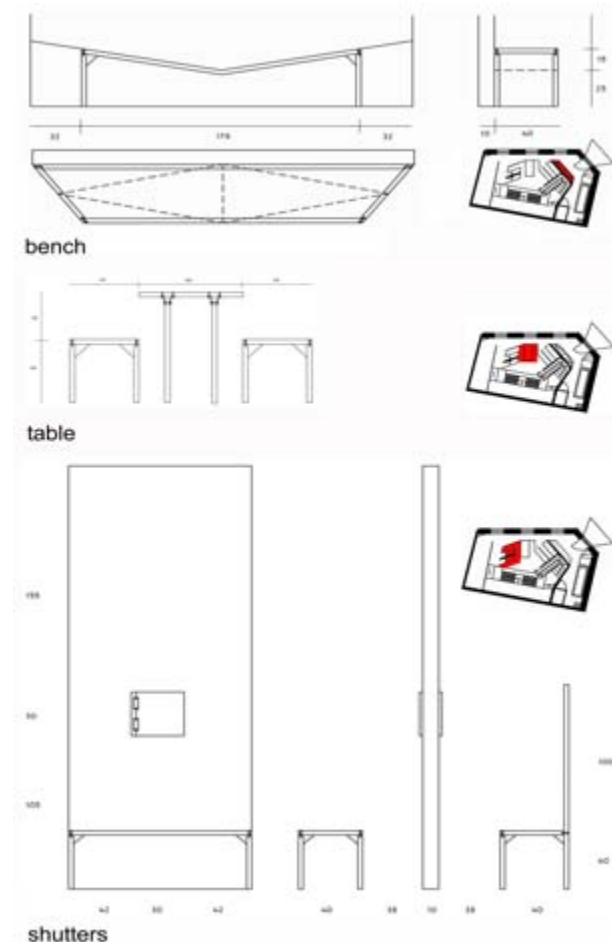


Figure 5: Frictional bench, table and shutters - scheme Johan Liekens and students 3ia 2009-2010

## NEGOTIATION AS A DYNAMIC BEYOND MERE QUESTIONING: A SUGGESTION FOR FURTHER EXPLORATION

The projects touched upon each in their own way take up the engagement of acting -practically, ethically and politically-. This acting comes as the installing of materialized negotiation processes in the relation between people and world. Questioning reality -raising the question 'What if...?'- through designs opens up a space of possibilities, leading to categories to think anew this relationship. A critical questioning design attitude disrupts the reinforcement or affirmation of the

known. It activates architecture and design -practically, ethically and politically-.

In our opinion, this design attitude and the negotiation processes it installs operate in our projects, designing from somewhat disturbing perspectives on known and fixed categories. M.U.D questions the tradition of the hold-the-line principle in coastal urbanisation scenario's; EXPLICIT undermines the dominance of functionality, aesthetics and prescribed concepts over interior architecture, by building frictional architectural furniture, that through its being used raises wonder and questions within its user.

Noise, deviation, friction, chance, difference, some degree of 'user-unfriendliness' (Dunne 2005): all of them notions normally considered uninventive guests in the design processes, become valuable dynamics in the constitution of a main generative dynamic: that of negotiation. These dynamics, and the questioning attitude accompanying them, also operate within 'Critical Design', elaborated by Anthony Dunne as a counterweight for what he calls 'Affirmative Design' (Dunne 2005). Remarkably, Dunne as well talks about it as an attitude more than a movement.

However, in the light of the explorative nature of this paper, we want to end with a question, or better, an issue for further thought and exploration. Although related, we suggest that there might be a deficit in Critical Design as presented, when compared to the potential of negotiation as a dynamic triggered by design. As said, Critical Design is concerned with opening up a space of possibilities, but it doesn't give a clear account on how these possibilities then are distributed towards the formation of new categories to think and work with, in short, towards the formation of a body of values.

Critical Design de-territorialises, resulting in a space of possibilities. But in order to perform, we need to go beyond just opening up, beyond a relentless asking 'What if?'. Negotiation, by its own nature, is indeed also related to selection, which comes as a re-territorialisation. We suggest that Critical Design needs to be supplemented explicitly with a process of gradual selection in the space of possibilities, evolving from possibility to desirability to vision and new, actualized frames of thought. The question accompanying this suggestion thus is the following: How to pair within the designerly dynamic of negotiation both the dynamic of opening up (what if?) and the dynamic of narrowing down by selection, without relapsing in a reinforcement of the known?

The research projects of both authors are in the process of dealing with this question. 'Projective Research in Urbanism'<sup>vii</sup> envisages a designerly mechanism merging the process of opening up (through critical design) with a process of selecting according to desirability, propelled by utopian thinking. 'Architecture's Provoking Instrumentality'<sup>viii</sup>, through the educational project EXPLICIT, adopts a strategy of de- and re-

territorializing dynamics on themes close to interior architecture. It aims to constitute a 'different' vocabulary for (interior) architecture's acting. However, in this paper, we would like to leave this question open for discussion, as a trigger to thought within the reader, as an invitation to you.

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<sup>i</sup> The political understood here by Kwinter as the production of new possibilities.

<sup>ii</sup> FLC extended is an ongoing sequel of designers in free association. See also [www.flcextended.be](http://www.flcextended.be) The M.U.D team consisted of: Carl Bourgeois, Marc Godts and Wim Van Der Vurst (design, visualization and scenography), Nel Janssens, Charlotte Geldof and Koen Pauwels (writings, research and feedback). M.U.D is a project made on the occasion of the 2nd international Architecture Biennale in Rotterdam 2005.

<sup>iii</sup> The design team picked up three contemporary phenomena, Flood, Capsularity, Hypereconomy and explored by means of a pre-figuration how these dynamics, thoughtfully brought in interaction with each other and the existing environment, could lead to a new situation. For more information see: Goossens, C. 2007, 'M.U.D', *Achtergrond 03: Architect/Ontwerper/Onderzoeker? Casus Mare Meum: een oefening op de zee*, Antwerpen, Vai, pp.36-51.

<sup>iv</sup> The M.U.D installation was exhibited in different settings: 2nd international Architecture Biennale in Rotterdam 2005 / HVDV University Library U Ghent Dec2005-Jan2006 / Casino Kursaal Ostend Summer2006 / CC Sharpoord Knokke-Heist 'Horizon 8300' 2009.

<sup>v</sup> organized at the Department of Architecture, Sint-Lucas Ghent together with Karel Deckers, involving Ellen Fievez, Jens Lippens & Sanne Delecluyse and all other students of the Explicitstudio, third bachelor year Interior Architecture 2009-2010.

<sup>vi</sup> 'Ontmoetingsmeubel' can be understood as furniture that enables to encounter one another, but when written as 'Ont-Moetingsmeubel', its meaning shifts to furniture that liberates people from having to -as in being forced to- meet each other.

<sup>vii</sup> Phd study currently undertaken by Nel Janssens.

<sup>viii</sup> Phd study currently undertaken by Johan Liekens.

# REVERSING THE CO-DESIGN PROCESS: CO-DESIGN TOOLS FOR POST- OCCUPANCY EVALUATION

CHRISTINA LUNDSGAARD  
THE DANISH DESIGN SCHOOL  
CLU@DKDS.DK

## ABSTRACT

Visual tools such as probes and design games are used during co-design events to facilitate a common design dialogue. They evoke new ideas and invite users, designers and other stakeholders to explore and rehearse future opportunities. This "toolkit" and working practices are continually evolving, but the focus is almost always on the upcoming design. Based on an experiment, this paper investigates how co-design tools can be used as a part of a post-occupancy evaluation (POE).

When you do a POE, you evaluate the performance of an already completed building in relation to the daily use. Unlike a traditional co-design process the POE looks back on the process in order to adjust or redesign the building.

The paper argues that co-design tools can be an instrument to make architects and other stakeholders reflect on the project once again in order to see it from a different perspective.

## INTRODUCTION

Post-occupancy evaluation of buildings arose along with the Participatory Design tradition in the 1960s focusing on engaging the users' perspective. Usually a POE follows all the major steps of project delivery and

may be used as feedback for fine tuning a building (see fig. 1) (Preiser et al. 1988).

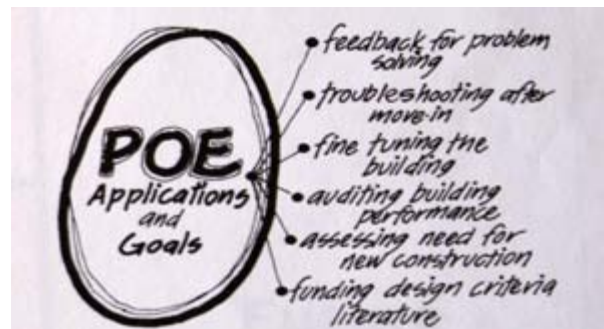


Fig. 1 POE may be used for any number of purposes (Preiser et al. 1988).

A typical Post-occupancy Evaluation has three phases: The first one is a preparation phase. Secondly, the evaluation team collects and analyzes data. In this phase interviews are often conducted while walking through the building. In the third phase the findings are reported by the evaluators and recommendations are made (see fig. 2) (Preiser et al. 1988).

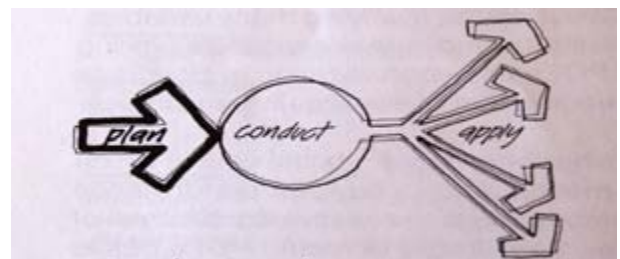


Fig. 2 The POE phases and steps are intended to be generic and they do not necessarily apply to all POE projects (Preiser et al. 1988).

Co-design (collaborative design) has its roots in the participatory design tradition and focuses on including users in the development of new design solutions (Sanders 2008). In a co-design process, users and other stakeholders are often involved in a series of workshops. These temporary spaces are intended to

build commitment and share experiences facilitated by tools such as probes (Mattelmäki 2006) and design games (Brandt 2006) (see fig. 3). These tools inspire the participants to experiment and explore a new range of possibilities by creating common tangible outputs.



Fig. 3 Designgame facilitating a common design dialogue.

Co-design and POE both focus on involving the users, but in two different ways. The POE seeks to test and evaluate the performance of building by conducting feedback from the users. The co-design process supports reflective ideas for an unknown future and engages the users in the design process as co-designers.

This paper focuses on what happens when co-design tools are used for evaluation. Is it possible to “reverse” the design process and give users and developers the opportunity to reflect on the project once again and realize something new? The following experiment will shed light on this question.

#### CASE STUDY: ENGAGING AN ARCHITECT IN A POE

The case study is a large development center in Denmark. An aim for the premises at the new building was to make the workplace more project-oriented rather than being divided according to professional backgrounds. Employees and other stakeholders were involved in this process.

As a preliminary session to a POE, a research team meets the main architect to uncover his intentions with the construction and his experience with user involvement doing the project. The purpose with the session is to articulate important locations in the building and bring up questions that the architect would like the user of the building to answer in a POE. Another purpose is to provide an indication of whether co-design tools are suitable for an evaluation situation.

At the beginning of the meeting, the architect (Martin) presents a power point presentation giving an overview of the project and showing how they involved the employees in a co-design process by using for instance

LEGOs. In his presentation, Martin explains that the building has 25 “base units” with space for 20 people in each. Each unit is designed with two project rooms as the core of the unit and sliding doors between them make it possible to join them to one large room. Adjacent to the project room there is a project-workshop and a “quiet room” decorated in relation to the base units occupants’ wishes. Two base units are interconnected with a joint meeting room and a wardrobe. The meeting room can be expanded or contracted with the use of curtains and the meeting rooms and project rooms can be interchanged, depending on the needs.

Martin points out that the building is not always used as intended although they involved the users in the design process. As an example, he mentions that the main corridors in the building, located outside to avoid noise, are not used properly as the employees tend to use the secondary ones, located inside the basic units. Several times during Martin’s presentation, he says that it is difficult for the users to change their behavior and he feels that a user manual might be a way to show how they are supposed to use the building.

Prior to the workshop, the research team prepared the framework and the materials to be used during the session (see fig. 4). In order to make the architect reflect on the project in reverse and perhaps get a different picture of the building, a metaphor tool resembling the tools used during a co-design workshop was introduced. Metaphors have also been used by Kensing and Madsen (Kensing et al. 1991), and according to them, the use of metaphors stimulates how to see things in a new way and is a way to broaden the users’ perspective. The aim of using the metaphor technique in this case was to get the architect’s attention away from his standard presentation and to see the project in a new light.



Fig. 4 Each task was presented in a booklet that also included metaphor symbols to be used.

To set the “stage,” a floor plan with an overlaying piece of manifold paper was put on a table. The transparent manifold paper made it possible for the architect and the research team to draw contours of the building and add other illustrations without destroying the floor plan. The architect was given three different tasks. The first one was to talk about the building from a city and a home metaphor. If the building were a city, where would the



shopping mall, the playground, the homes be and so on? In order to spark reflections to the story, the architect was provided with different symbols from both the city and the home context (see fig. 5). To complete this task he was asked to choose three important sites on the drawing with green rings – sites that he felt needed more attention in an ensuing evaluation of the building.

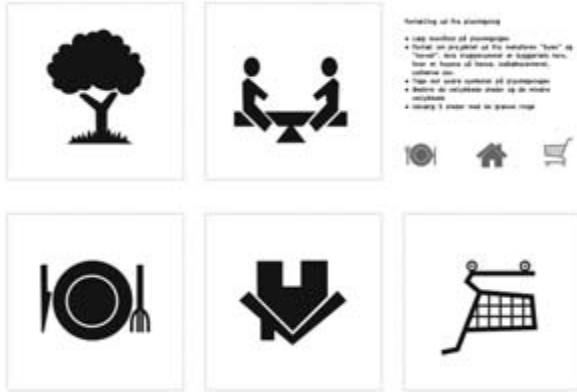


Fig. 5 A booklet unfolded with symbols of the citymetaphor.

In the second task, the architect had to describe four employee types that could represent all the employees. Small icons of eyeglasses, scissors, a light bulb, a paint palette, a cup etc. were printed on the sheet as an inspiration (see fig. 6).

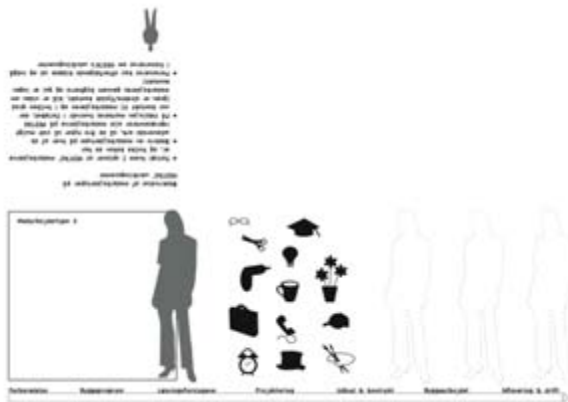


Fig. 6 The sheet with employee types unfolded.

In the last task, the architect had to draw scenarios in the booklet that he imagined could happen at various places in the building. When the booklet was folded it was possible to place it upright in the floor plan on a spot that the situation referred to (see fig. 7).

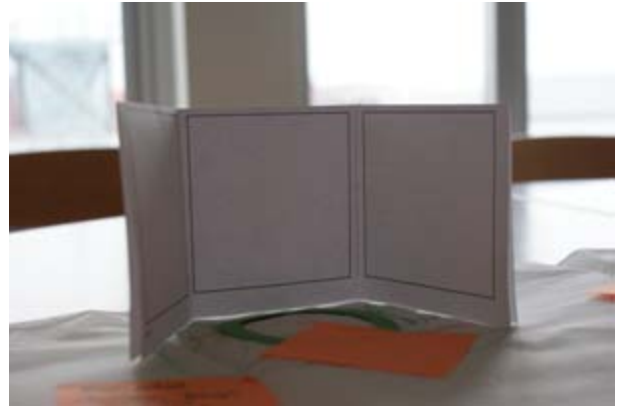


Fig. 7 The situation booklet in upright position as a test before the session

### MARTIN MAKES THE METAPHOR HIS OWN

Based on the city metaphor, Martin talks about the common facilities for the construction, which is primarily located on the ground floor of the building. This is a social place where people have fun, can be noisy, meet with colleagues and receive guests.

Along the way, Martin takes symbols cut out from the city metaphor sheets and uses them as props in his story. The metaphor symbols he takes up along the way provide a framing of the story. He also invents new symbols such as the "garage," which represent the test facilities in the basement (see fig 7).



Fig. 7 Martin uses the metaphor symbols as props. They set a frame to reflect within.

By moving into a metaphor terminology, inspired by the symbols, Martin begins the story of the basic unit, which he refers to as the "spatial toolbox." The "spatial toolbox" makes various types of configurations that can match the needs of the employees. These needs might change day by day, but also hour by hour.

Sometimes Martin tells the story through his own body instead of using the floor plan. In these situations, we get an extra dimension, namely the experience that Martin imagines the users have (see fig. 8).



Fig. 8 Martin tells the story through his own body. In this case, he shows the dimensions of the meeting room.

Through the home metaphor, the story of the basic unit evolves. Martin explains that each unit is divided into a primary living area where the family's life unfolds. This room can be both quiet and noisy. Martin then tells of how the basic units can almost be seen as a collective or a fraternity, as each base shares space with the family next door. They share the multi-functional meeting rooms that can be divided and joined.

Martin uses the green rings to point out three sites he feels are important for the building (see fig. 9). The base unit is pointed out very quickly. The second is the connection point between two base units. The final site is the connection between one base unit and the common facilities.

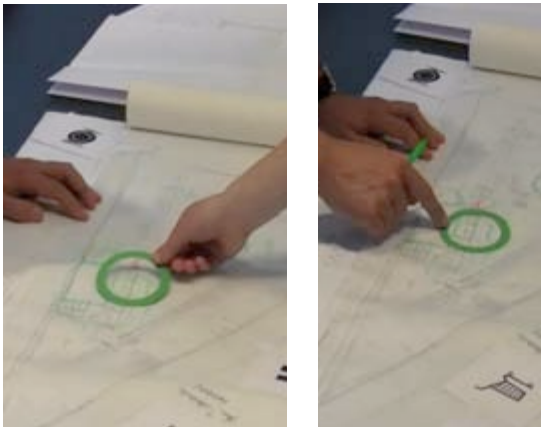


Fig. 9 Martin places the rings to mark important sites on the floor plan.

#### A DAY IN THE DEVELOPING CENTER

After we have introduced the second task, Martin begins a story of how he imagines the typical employee uses the building:

“If you imagine any employee who has a daily life here in the building, then he will always enter through the main entrance, meet some colleagues as he passes through the atrium and then he will choose a main staircase, depending on where he is located in the building...”

Further, Martin explains how the fictional employee arrives at the first floor, where the basic units are located and where he might start his computer work with different test equipment. Martin envisions a project meeting with some of the employees from the base unit. Not necessarily all 20 employees from each unit participate in the meeting, but it may be a sub project that a smaller group discusses in the project room. The base units are presented as a very vibrant and dynamic place where project teams expand and downsize at any time.

Instead of elaborating on the user types, Martin chooses to tell about the typical employee's usage of the building. This is rather an answer to the last task, but in a different way than intended. He never draws scenes of imagined situations from the building; he just tells about them in a very vivid way.

#### A SEARCH FOR EMPLOYEE TYPES

In the following, we try to make Martin define the various employee types, by probing what he sees as characteristic of the staff. Martin tells that many of the employees are comfortable shutting themselves inside their own little universe. During a user survey, they discovered that they barricaded themselves with very high shelves and walls of directories and files or computers and electronic equipment - cooped up in all their technology knowledge. In a way, the new facilities try to force the employees to work closely together although they are more characterised as loners.

In the search of employee types, Martin starts reflecting on the project and the users once again. His dream of the perfect office with its flexibility and great potential is replaced with some tension between how the building was conceived and how the employees use it. When he is asked whether the base unit works in reality he answers very quickly that it doesn't.

Martin starts to get curious about how the building is actually being used. He starts wondering whether the "nerd," who tends to be a "nest builder," is using noise as an excuse to put screen walls up in the basic units. He seems to realize that it might not only be because of the overstaffing but also because the base unit's flexibility and configurable potential is not exploited in practice.

Along the way, Martin seems to acknowledge that there might not be a right or wrong way to use the building and in that way a user manual is useless.

These considerations lead him into specific questions that he would like to ask the staff in a future POE:

- How do the basic units support the various work processes and needs?
- How do they see the interconnectedness with the adjacent base units?
- Do they feel disturbed in their workday, and in case they do, by what?
- Do they feel limited in their daily life?



## DISCUSSION AND FUTURE WORK

The session with Martin becomes a good foundation for a further evaluation, but in a similar session in the future, some adjustments should be made. First of all, the tools were intended for more people to engage and negotiate during the session. Unfortunately, we only had one architect attending the session and it became more of a monologue than a co-session for various participants. Secondly, we didn't know in advance what the floor plan looked like or the scale of it. This is important knowledge, but unfortunately floor plans and similar materials are often confidential. In addition, the tools were made as booklets, which made them inaccessible for the architect. Especially during the first task, it felt awkward to cut out the metaphor symbols. It would have been easier if they were separate pieces and not in a booklet. Finally, the task that encouraged the architect to draw scenarios from the building seemed too time consuming and not straightforward - even for an architect. By fine-tuning the method, it has potential in a session with the users of the development center, not as a substitute to a POE, but in addition to it.

In design research, we see a growing interest in design after design. This paper explores how the co-design process can be extended to handle what happens after a project is completed. It shows how the use of co-design tools can provide reflections and a new story of a completed project, a story that is different from the static power point version and different from a traditional POE aiming at testing the building's performance.

According to Schechner, a performance is a time-space sequence composed of proto-performance, performance and aftermath (Schechner 2002). If you study the use of a completed building as a performance, then one can recognize the co-design activities that occur in connection with a development project as a proto-performance and a traditional POE as the aftermath. A design evolves during the process like a proto-performance and in order to help the performer or the participants express themselves in action, the proto-performance seeks to help participants compose, control, embody and express emotions using material from personal, historical and other sources. The continuing life of a performance is its aftermath. Schechner states that the aftermath persists in physical evidence, critical responses, archives and memories and in that way it resembles the POE. When actors, singers and other professional performers use a coach to observe how well they are performing, it provides them with the feedback they need to do a better job. In the same way architects and other stakeholders need to take advantages of the lessons learned from both successful and unsuccessful building performance (Preiser et al. 1988).

By extending the co-design process to include design after design and implement it in POE activities, the participants get the opportunity to work their way backwards from the final performance to the proto-performance. Through the metaphor tools they get to explore, rehearse and reflect on the project once again instead of "just" entering the aftermath with feedback through a traditional POE.

The point here is that you cannot separate the design process from an evaluation as these two are closely linked as a proto-performance and aftermath is in a performance perspective. One must acknowledge that the design process continues after the building is inaugurated. The premises of the building are not as static as architects and clients might think, but dynamic and always evolving with its users. Thus, it is important to find ways to reflect and learn as much as possible during the aftermath.

## ACKNOWLEDGMENTS

The empirical part of this paper comes from the Workspace Design project II. Thanks to all the people involved: Ole Broberg and Vibeke Andersen, from the Technical University of Denmark, Palle Banke and Eva-Carina Nørskov from Technological Institute, Susse Laustsen and Per Tybjerg Aldrich from COWI and Thomas Binder from The Danish Design School.

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# DART - NEW TEACHING METHODS FOR ORGANIZING INTUITION

MARIA MACKINNEY-VALENTIN  
THE DANISH DESIGN SCHOOL  
[MMK@DKDS.DK](mailto:MMK@DKDS.DK)

DART (Driver Analysis – Reading Trends) is a new approach co-developed by the author to organize and develop intuition in the research and development phase of a creative process within the field of fashion and design. At its current stage, the model has been targeted teaching at design schools. The method is based on the author's Ph.D. dissertation ('On the Nature of Trends: A Study of Trend Mechanisms in Contemporary Fashion', 2010), teaching experience at design schools, and methods from fashion forecasting. DART is intended to support design students on two levels:

1. To qualify the students' sensibility or *hunch* when preparing a collection or other design projects.
2. To prepare future designers for working on the still more unpredictable fashion and design markets. The DART model suggests that the task of identifying and organizing trends often outsourced to trend forecasting agencies may be better placed within each individual designer or brand. So far, the model has been tested on fashion and design students at all the major design schools in Denmark: The Danish Design School, Designskolen Kolding, TEKO Design and Management College, and The Copenhagen School of Design and Technology (KEA).

## NEW PREMISES, NEW METHODS

The purpose of the paper is to explore new approaches to teaching at design schools specifically in relation to developing a flexible framework for the initial research phase in a creative process. DART (Driver Analysis – Reading Trends) is a model designed for organizing intuition. In its current form, it targets future designers, forecasters, and communicators.

DART was developed by myself, a trend scholar at The Danish Design School, and designer Lene Hald who is a communications teacher at The Copenhagen School of Design and Technology (KEA) with a background as a trend forecaster. Based on our teaching experience, we found that there was a need among both students and teachers for a model that could help organize, communicate, and qualify the complex process of maturing a 'hunch' for a visual product or concept. We had seen that students generally experienced a more fruitful and less frustrated creative process the more their concept was based on thorough research. But they often needed the framework to direct the research process.

The creeds of individualism such as 'Anything goes' and 'Creative consumers' bear witness to the challenges facing the fashion industry. It appears that relativity is threatening to take over (Magner 2008). How can the fashion world, which to a large extent is still organized according to seasons, become better at navigating on a premise that appears to be more and more fragmented, democratized, and decentralized? DART is designed to aid teachers in supporting the cultivation of the students' intuition without either standardizing their talent or promoting design that does not relate to a context. The statistics for employment for new designers is still too low and perhaps DART can be a small contribution to changing this by training designers to be more attuned to the context in which they operate without compromising their creative vision.

The output of the model is a scenario or moodboard that may form the basis of the design. The output may also be an article, blog, or video making the model a much needed contribution to heightening the level of especially fashion communication

The DART model is still in a stage of development.

Informal digital networks in the shape of social media, user-driven innovation online, and blogs have created

both opportunities and challenges in relation to the innovation and diffusion of trends in fashion and design. The development in fashion is moving towards a larger degree of democratization and decentralization (Agins 1999; Thomas 2007). The consumers have far more opportunity practically, culturally, socially, and economically for engaging in fashion and design. They have gained more influence, which is seen in the greater degree of exchange between consumers and industry. The distinction between high and low has become blurred as seen in capsule collections in fast fashion chains such as H&M. This horizontal, dynamic structure opens up to the individualization of fashion and design as both a visual expression and a dogma of difference. There lies a paradox in the individualization as a phenomenon because the understanding of personal style is played out collectively. The paradox is evident when Danish Elle proclaims 'personlig stil' (personal style) on the cover of its November 2010 issue. A fashion magazine is per definition a joint effort that aims to gather and spread trend information (Langley 1971). So the message on the cover seems to indicate that individuality is a collective quality. However, the democratization of fashion and design does not remove the need for an aesthetic common denominator as identity marker. Trends are necessarily collective in nature. Therefore the knowledge about trends holds potential for designers for navigating the altered premise. Not as a prescriptive measure as seen in most fashion forecasting, but as a tool for supporting and developing original ideas.

One way of doing this is by incorporating the various mechanisms that drive trends forward, which is what DART proposes. This approach to trend mechanisms is comprehensive in the sense that it attempts to encompass the multifarious mechanisms that are at play simultaneously in trends.

With the knowledge available today about trend mechanisms, there is no need for a speculative approach that characterizes much of the work done on trends especially within trend forecasting. Rather, the knowledge should be used to support and prepare a qualified basis for the design process.

Trends are about more than which colors, cuts, and materials are on the fashion horizon. There is potential for the industry in understanding and working with trend mechanisms in a new way. Trends are the visual manifestation of trend mechanisms, which are motored by a series of needs and agendas ranging from social identity (King 1963; Field 1970; Simmel 1971), market logic (Callon 1998), shifting perception of gender and beauty (Laver 1959; Entwistle 2000), and the construction of zeitgeist (Nystrom 1928). DART is an inspiration tool that holds the potential for qualifying intuition through incorporating knowledge of trend mechanisms into the creative process.

The current appearance of fragmentation and individualization in fashion does not need to be dealt

with as either absolute relativity or uniformity. Rather it may be possible to develop tools that could allow each designer or brand to administrate the task of qualifying a hunch as opposed to outsourcing the process to forecasters. Forecasters generally identify and organize trend information for the fashion and design industry in a way that may be incompatible with the current development towards decentralization. With DART, it is possible to develop an idea *as* it is contextualized. The ambition is that navigating trends can be situated within the visual, emotional universe of each designer or brand without having the process be so expansive as to reinstate the need to outsource the task and hence remain at status quo.

### DART / Driver Analysis - Reading Trends

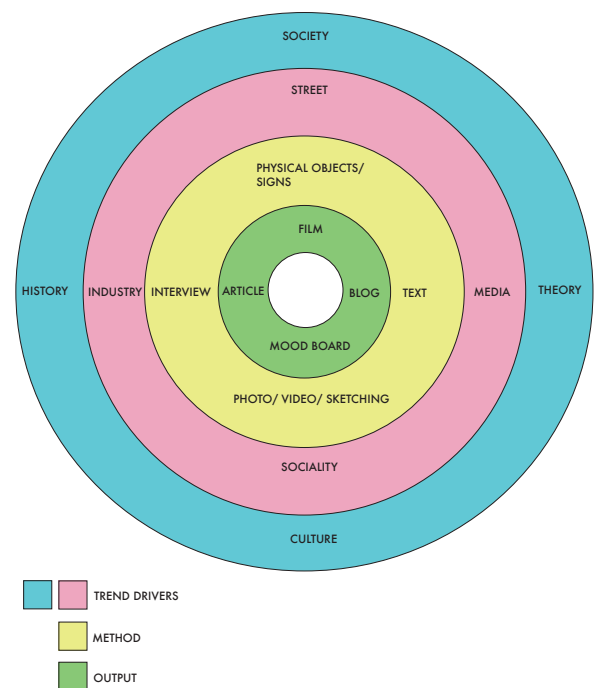


Figure 1: DART model

### DART – HUNCH TIME

DART is an inspiration tool that can help designers and communicators qualify their hunch and help them get from intuition to output. The output is understood as a scenario of a fully developed idea in the shape of a visualization or text.

DART combines traditional methods from trend forecasting such as observation, visual registration, and intuition with state of the art academic methods for exploring trend mechanism while always rooting intuition in context. This context is determined by historical, social, economic, and psychological factors that are both unique to the specific time and place while

still holding knowledge of mechanisms and agendas with analytical potential on a more universal scale (Harding 1991). Central for the process is to reach an output that has been through each of the categories in the DART model. It is also an important factor that the designer is able to communicate the results verbally, written, and visually. Whether designing a fashion collection, furniture, textiles or visual communication, identifying the initial idea as precisely as possible is crucial to the sharpness of the final design expression.

## DART PROCEDURE

Traditional trend forecasters often identify signs in contemporary society to predict the way of the future (Brannon 2005). The assumption in this field is that trends occur at a particular time and end when the trajectory is finished (Rogers 1992; Gladwell 2002). However, recent research in the field of Trend Studies finds that trends do not in fact change rapidly according to radical shifts. Rather trends mutate over a longer period of time (Lieberson 2000; Mackinney-Valentin 2010). This realization poses challenges to designers and forecasters alike because the current cyclical rhythm of the fashion and design system is disturbed. So, the opportunity to integrate the trend work actively in the design process holds the potential for a more differentiated and hence more contemporary approach.

Before the DART process starts, the student needs to identify a hunch. This is done by completing the sentence: "There is something about xx these days." In other words, the student senses that there is currently a development taking place that they are inspired by and that could develop into a larger idea. Depending on the visual universe of the student and how he or she prefers to work, a hunch can take many shapes and forms: From the abstract such as a mood (local patriotism), event (wedding), or value (slowness) to the more concrete such as an animal (an owl), a culture (Greenlandic traditional footwear), a color (nude), a type (the nerd), a material (tweed), a subculture (Japanese Mori Girls), beauty ideals (voluptuous women), and body adornment (feather tattoos). Each of these examples stem from teaching DART where the students felt stirred by these hunches in some way.

DART is designed to prepare an idea for a design project. Therefore it is part of the process that the hunch may have to be opened, adjusted, simplified, or even rejected in order to unfold a potential that is solid enough to form the basis for a project. The process is intended for the student to become as precise and detailed about the understanding of the hunch as possible. This is intended to move the student away from the normative, relative, and speculative. The result or output of DART is a visual or textual verification of the hunch where it becomes clear whether there was in fact 'something about xx' but also *how* the hunch was perceived by the designer.

## DRIVERS

The two outer rings are concerned with *drivers* understood as factors and phenomena that push a development or innovation forward. Some of the drivers may contribute more to the development of the hunch than others, and some drivers may overlap. Hunches vary and therefore place themselves differently in the spectrum. But it is important to apply all drivers for potential and even unexpected outcome.

The data is retrieved by exploring each driver. For instance: Is there anything in the current cultural production that might drive my hunch concerning Mori Girls forward? One might find that The Museum at FIT has an exhibit called "Japan Fashion Now." Less obvious results may also occur such as the opening of the movie "Red Riding Hood" that operates in the same visual field as Mori Girls. Each finding will force the student to consider whether this is something that drives the hunch or not. In either case, the result will be a small step in specifying the hunch as it is perceived by the student.

The organization of the drivers has been done to enable as comprehensive an approach as possible. Each DART circle has four independent categories, which will be described in the following with focus on fashion. The list of factors in each category is not final but can be expanded as needed. The Blue driver circle tends to be more general while the Pink is more current. However, the two are not strictly separated and a continuous exchange between them is to be expected.

### DRIVER 1 (BLUE)

**Society:** Demographic development, statistical data, market conditions, macro-economic events such as financial crisis, climate issues, or war.

**Culture:** Cultural production such as film, art, literature, music, theater, sports, clubbing, and cultural events.

**History:** Broader historical context relevant to the hunch.

**Theory:** Research in the field relevant to the hunch for instance shifting beauty ideals, the role of the body in fashion, subculture theory, gender studies, post-colonial theory, etc.

### DRIVER 2 (PINK)

**Street:** Registration of street fashion. How do consumers perform in real-time. What effects are used and what is the variation over a geographic area?

**Sociality:** Determining social identity. What is the relevant social premium? How is social status constructed at a specific time and place? Georg Simmel,

George Field, and Charles King are key in determining the social mechanisms involved.

**Industry:** Market conditions and possibilities. Survey and analysis of fashion week coverage, collections, brand management, communication strategy, collaboration, web, retail design, muses etc.

**Media:** Surveying print and digital media nationally and internationally. What characterizes the narratives and rhetoric concerning the hunch? Is there a development over time and discrepancy between various media?

## METHOD (YELLOW)

The Yellow circle is concerned with methods for registering the empirical material or information gathered from the Blue and the Pink circles. The purpose of the Yellow circle is to document and visualize the hunch and in that way move a step further towards a deeper understanding of the hunch and a more precise image for the student to work with.

The methods fall in four main categories that may be expanded if necessary: Visual registration (video, photo, sketch, observation, mind map), written documentation (notes, brainstorm, article, trend books), interview with actors (consumer, buyer, designer, editor, writer, blogger, stylist, producer), gathering physical signs (swatches, Pantone number, a stuffed owl, a wedding dress, Greenlandic folklore...).

## OUTPUT (GREEN)

The final product of DART is a moodboard, forecast, or scenario that is based on a qualified hunch. The output does not have to be a moodboard but might also be a film, article, blog, or tableau.

The center of the DART model is not a bulls-eye but rather a doughnut hole of potential indicating that the process is not the goal in itself but leads to the design production itself - and eventually the next hunch.

## CASE: CURVY WOMEN

To give a clearer impression of how DART might be used in teaching, a brief case study will be described with 'voluptuous woman' as the hunch. The case was used in a course on DART at the Danish Design School in October 2010. We used an article on the hunch: 'The Female Body Calls for Curves in Times of Crisis' ('Kvindetroppen kalder på kurver i krisetider') by Tina Splidsboel in the Danish newspaper Information from September 30, 2010. The article was used to explore how the journalist had supported her hunch that there was "something about voluptuous women these days."

The DART process is not necessarily linear moving from the outer circle and in. Rather, it might move

between driver and method that mutually inform each other.

We started with the Blue drivers, where the category 'society' offered answers that were also apparent in the title of the article, namely that curves and economic crisis were related. Here hunch was supported by an interview (Yellow circle) with Danish fashion writer Uffe Buchard, who argues that times of crisis give rise to a need for 'the comfort in the feminine and motherly' (history).

In the 'culture' driver, the hunch was supported by the popularity of the American TV show 'Mad Men' where curvy women are celebrated with characters such as Joan Holloway. The article draws in the 'theory' driver with references to two American researchers, Terry F. Pettijohn II and Brian Jungeberg. They have looked at the proportions of pin-up models compared to economic conditions over a period of 40 years. They have found indications that models tend to be young and slender during economic boom times and voluptuous and mature during recession. The 'history' driver added more depth to the hunch in terms of the development of ideals of beauty. The journalist refers to ethnologist Marianne Thesander, who has done research on the topic. This forms the basis for a comparative analysis between women today and the slim, liberated women of the 1920s. They experienced a shift towards a more curvy body ideal after the Crash in 1929 that lasted throughout the depression in the 1930s.

Moving into the Pink circle, the article also made use of 'industry' to describe the economic interests of the fashion industry in promoting a more curvaceous ideal. The article mentions how BBC – a 'media' driver – has estimated that about 62% of all American women are plus-sized rendering the market potential considerable. During recession, where the luxury industry tends to suffer, targeting plus-sized consumers might be seen as a pragmatic strategy on the part of the industry.

The article does not venture into the 'sociality' driver of the Pink circle though it may have held interesting perspectives. A celebration of curvy women in an age where health and fighting obesity is a national priority in many Western countries, the trend seems paradoxical. Exactly the paradox has been a primary 'social premium' since the millennium as a driver in fashion trends. This has been seen in the celebration of the *nerd*, the *homeless*, and the *bimbo* in fashion, which may have seemed odd or even inappropriate but have nevertheless been widespread. The explanation is to be found in the premium needed to create social distinction in an age where conspicuous consumption is no longer the primary status marker. Rather than demonstrating economic status, the surplus of time, creativity, and social courage have tended to dominate as social currency. This type of social currency has proven to be more effective in stalling the inevitable imitation process that forces trend setters to distinguish themselves again. This development can help explain

the rise of the voluptuous woman in 2010 as a result of the sociality driver and what might be determined the 'logic of wrong' in terms of social mechanisms (Mackinney-Valentin 2010).

The article does not refer to practice on 'street' level. It is to be expected that not all drivers provide material to qualify the hunch if the model is to be able to encompass a variety of trends and design approaches. But students are encouraged to explore all the drivers nonetheless because unexpected perspectives may occur. This happened when a fashion student at the Danish Design School had chosen a hunch regarding Greenlandic jewelry. She had not initially considered looking at the 'industry' driver. When she did, she discovered that Danish designer Peter Jensen had designed 'kamiks' in 2009 inspired by the traditional Greenlandic footwear. Consequently, he received death threats from angered Greenlanders who felt disrespected by the designer. The student then explored the 'theory' driver to become more reflected about her role as a designer in a cross-cultural context. Post-colonial theory gave her insight into the potential problems of using inspiration from a former colony.

In the teaching session, the Green ring was not used because the exercise had in a sense been backward in using the article – a possible output – to exemplify the process. However, being a type of output the article could in fact have formed the basis of a moodboard using the trend for curvy women as inspiration for a plus size collection. It may also have been used in a more abstract way as a scenario about the 'motherly' or 'maturity' as a hunch.

## DART – PROBLEMS AND POTENTIALS

Despite rumors that trends have been going out of fashion (Cartner-Morley, 2007; Magner, 2008), there is still a need for spotting, tracking, and working with trends. Designers need inspiration and methods for decoding markets, moods, and consumers. Just as trend forecasting came out of historical events in the 1960s with the development in industrialization and the rise of youth culture as cardinal points, the current state of the fashion industry and consumer behavior have also created a need for new methods. These methods should root the trend work in the designer or brand to create original and innovative products that cater to an individualist credo while acknowledging the collective nature of trends.

We set out to develop a singular model with a differentiated result where each user works with his or her own sensibilities, qualities, and interests. The idea was to create a tool to map and read signs in a specific context, in order for future designers to be better able to operate more systematically in relation to the creative process without reducing the important role of intuition.

To ensure a broad sense of the potentials and problems of DART, teaching sessions have been carried out at the Danish Design School with fashion students but also furniture textile, and others; Designskolen Kolding with fashion students; The Copenhagen School of Design and Technology (KEA) in a course entitled "Trend Communication", and TEKO Design and Management College with students from retail management, brand management, purchasing management, and pattern design.

Following the teaching sessions, formal interviews have been conducted with selected students. The feedback has been remarkably positive. The students have highlighted the ability to create structure to the often confusing process of clarifying a hunch. They have also welcomed the framework that allows their hunch to be rooted in a specific context on a solid basis. The overall experience has been that the model serves to organize, qualify, and develop rather than limit the student's individual inspiration and disposition because the process is directed by the student's personal hunch according to relevant drivers.

But there have also been challenges. While The Danish Design School and Designskolen Kolding have university status and are therefore accustomed to applying theory to practice, the business-oriented design schools KEA and TEKO are not trained to do so. When given an introduction to trend theory, the students at these schools were fully equipped to embark on the DART process with useful results. However, without this introduction it would be more problematic. This foregrounds the current need for qualified teaching material in Trend Studies specifically for business-oriented design schools. When this is solved, this issue of working with theory in DART should be less pertinent.

The DART approach is currently still in development. One aspect not yet explored theoretically is the question of didactics in general and learning styles in particular (Schön 1987; Dunn 2000) in relation to DART as a visual learning tool. Potentially, this approach could further support the potentials of DART presuming that many design students are visual learners.

Another step is to study how a hunch that has been qualified through the DART method fares compared to the practice generally employed at design schools in Denmark. The general practice today seems to be less formally structured and based on each student's individual disposition and the particular idea or concept in question. An international perspective is also essential to completing the development of the DART model.

## ACKNOWLEDGMENTS

I wish to acknowledge Lene Hald with whom I have developed the DART model. Her background as a designer and trend forecaster and her testing of the model at The Copenhagen School of Design and



Technology (KEA) have been invaluable in further qualifying DART. I also wish to thank the design students at the Danish Design School, Designskolen Kolding, TEKO Design and Management College, and The Copenhagen School of Design and Technology (KEA), who have tested the model. I am grateful to the Danish Ministry of Cultural Affairs and the Danish Centre for Design Research for funding the research.

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# DESIGNING ANTI-ACTIVISM: APOCALYPSE FASTER!

TATU MARTTILA

AALTO UNIVERSITY, SCHOOL OF ART AND  
DESIGN, FINLAND

TATU.MARTTILA@AALTO.FI

## ABSTRACT

This exploratory paper reviews literature on design activism and looks into the ways, how design can be used to bring matters to a head in our society.

Sustainable design can be perceived as design activism, and as such it can be connected to design exploration, seeking to provoke, criticize and experiment. This text studies explorative and participatory design approach in the context of sustainable consumption.

Focus of this paper is on a new media project called "Apocalypse Faster!", which was launched in January 2011. This participatory campaign takes an anti-activist approach against consumerism with designerly means.

## INTRODUCTION TO APOCALYPSE

The "big fuzz" around climate change and the Millennium Development Goals of United Nations is fading, but one message stays: An enormous global inequality exists as the developed countries consume the majority of resources, with only little left for the rest except the ecological burden. The real problem still is – and has always been – our well-developed consumption society.

Unseen growth in gross domestic production of the developed countries hasn't guaranteed happiness or provided a sustainable society (e.g. Happy Planet Index). Instead, there are emerging signs of decreasing biodiversity and exceeding the limits that our ecosystem can handle (WWF international 2010; Millennium Ecosystem Assessment 2005). At the same time it seems that the best design can offer is to improve eco-efficiency of products and style them "green", leading

only to rebound into increased production, or varieties of eco-friendly alternatives to stand aside the older ones in a twice as big mall.

## DESIGN AS THE CAUSE AND THE KEY

The finger pointing on design is nothing new - already the first sentence on of Victor Papanek's Design for the Real World states that '[t]here are professions more harmful than industrial design, but only very few of them' (1971). Papanek sees only 'advertising design' more harmful, '[i]n persuading people to buy things they don't need, with money they don't have, in order to impress others that don't care' (pp.1). Today Papanek's message stays even more relevant, emphasizing design for genuine needs rather than looks.

Design profession doesn't necessarily have to be "for advertising" but instead it could create changes in consumption patterns. Design has a normative position between domains of society, and could function as a key, if the process is kept open to stakeholders and to the public. To embrace this openness, design approaches such as co-design, participatory design, social design and others that encourage participation should be promoted further.

## DESIGNERS AS ACTIVISTS FOR SUSTAINABILITY

Designers play often the activist role, either being themselves activists or then being 'activists for hire' (Thorpe 2008, pp.2). In each case activism is defined by underlying cause for action, such as social or environmental issue, as opposed to a commercial cause (ibid.). Alistair Fuad-Luke defines design activism in his book with the same title (2009) to involve 'design thinking, imagination and practice' that is applied 'to create a counter-narrative aimed at generating and balancing positive social, institutional, environmental and/or economic change' (pp.27).

Why then take consumption in focus? - the reasons for this are clear. While from the point of view of sustainability the first group of people that urgently needs to change their behavior is designers themselves (Fuad-Luke 2009, pp.87), the group that could create the biggest impact is the western consumers. As one fifth of the global population accounts for over four fifths of the consumption it is well justified to call this majority of the world 'under-consumers', and the

remaining 'over-consumers' (Fuad-Luke 2009). Against the background shown in the first section, and with common sense, it is sensible and justified to focus on the over-consumers, the 20% of global population 'whose total mass and flow of consumption is causing most of the problems' (pp.86).

#### DESIGN EXPLORATION AND ARTIFACTS

Design process materializes in 'designerly ways' that 'thinify' ideas 'into dynamic artifacts, whether or not these turn out to be products, services, or spaces' (Fallman 2008, pp.18). According to Donald Schön's famous definition, design focuses not merely knowledge in action, but 'reflection-in-action' (Schön 1983), where existing knowledge is iteratively reflected to new problem contexts. Daniel Fallman has suggested a framework to interaction design that could help to identify different design activities. Fallman's model is a simple triangle, peaking in 'design practice', 'design studies' and 'design exploration' (2008; see Fig. 1). In the triangle design practice can many times be understood as commercial design activity, whereas design studies can be seen as academic activity that is distancing rather than involving (ibid.). Design exploration, on the other hand, seeks to ask *what if?* and it's ultimately guided by visions and ideals (ibid.).

As design activity, design activism seems often to fit into the category of 'design exploration' (Fuad-Luke 2009). Design exploration is ultimately guided by visions and ideals and is creating an interface towards society at large (Fallman 2008). It often seeks to provoke, criticize, and experiment, to reveal alternatives, to transcend accepted paradigms, and to bring matters to a head (ibid.), and the artifacts created by it or in it are often societal in character (ibid.).

Designers should not promote sustainability only by good design, but also indirectly by influencing behaviors with design. Therefore the strategy has to be twofold and intertwined (Fuad-Luke 2009), emphasizing both the process and the artifacts. One fitting approach to critically comment the consumer society to this mass is to take a participatory anti-activist's stance.

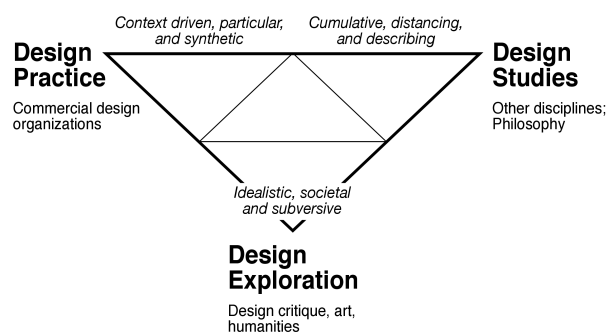


Figure 1. Framework to understand design activities (Fallman 2008)

#### APOCALYPSE LATER – OR SOONER?

Apocalypse Faster! is a collaborative design project that calls designers and public audience to ridicule consumer culture and the exhaustion of resources. It is based on concern about sustainability, is targeting consumers in the industrialized contexts, and has an anti-design approach that supports provoking and critical design explorations. The participatory approach taken in the project relies on the assumption that in the context of sustainability the design explorations should be made more open to public participation, to better enable societal discourse around the topics at hand.



Figure 2. Logo and concept development (authors 2010)

The project is based on the work of five post-graduates from the field of design – Liao Tjhien, Karthikeya Acharya, Anders Emilson, Anna Seravalli and the author – initiated in Nordes Summer School in August 2010, in Pukeberg, Sweden. It is grounded on a shared interest of sustainability, but also on a critical approach that is being more concerned with the existing consumerist mentality. It started as a serious attempt to question over-consumption with a concept called "Apocalypse Later", but evolved quickly into more effective attempt, hopefully better able to stand out from the passive status-quo that exists in consumption and design (see Fig. 2).

The project as well as this paper leaves outside it's scope corporate design activism, and also social innovation, where actual design solutions are scaled up from some niche market. Instead of the bottom the following case example focuses on the peak of the pyramid, and communicates with artifacts that try to provoke the western over-consumer.

#### DESIGN AS ACTIVISM

Design activism has a long history, which is not possible to go through in detail here. However, some clear examples can be found from the design discussions in the 1960's, when new radical thinking emerged and strongly influenced design field, reacting against the ideas of the Modernist movement. Radical design movement was particularly concerned to show up the growing alliance between design and consumption (Sparke 1990), and it took anti-consumerist position (Fuad-Luke 2009) involving also the he so-called 'anti-' or 'counter-design' that grew up

as part of the general crisis of the late sixties (Sparke 1990).

The radical movement as a whole introduced some revolutionary design approaches, including design with ‘holistic vision of the environment’ rather than with isolated item-specific approach (Sparke 1990, pp.200), entailing approach taken in future frameworks for sustainable design, universal design, inclusive design, but also for user-centred design, co-design and system design (Fuad-Luke 2009). During the 70's these topics staid in discussion among designers, and eventually left a lasting mark in design.

#### MORE RECENT APPROACHES

More recently several participatory design movements have been reshaping design's role in societal activities, one among them being ‘slow design’ (Fuad-Luke 2009). Slow design is raising from the grassroots and critically commenting the contemporary lifestyle, and it requires ‘stepping outside the existing mental construct’ to create ‘fresh awareness’ (pp.157). Similarly fresh counter-narrative approach resisting existing paradigms can be seen in modern critical design or anti-design. Critical design, popularized by Anthony Dunne and Fiona Raby through their firm, Dunne & Raby, takes a critical theory based approach to design and uses designed artifacts as critique or commentary on consumer culture. Anti-design and its famous case examples such as Adbusters have a similar approach.

Social movements such as slow design or modern anti-design are ‘an accumulation’ of several different actors taking different actions, but ‘held together by shared beliefs’ (Thorpe 2008, pp.5) and as bottom-up approaches they are evolving social capital. Radical design activism approach is still here in the form of design criticism, social innovation and participatory design, and designers are skilled to facilitate these processes.

#### TYOLOGY OF ACTION AND THE ARTIFACTS OF DESIGN ACTIVISM

Slow design movement involves “anti-activists” that are a diverse coalition of groups protesting against – generally – consumer society and its phenomenas (Fuad-Luke 2009, pp.6). Such groups are for example many movements and initiatives (e.g. Reclaim the streets, Buy nothing day, Meatfree monday) or NGO's and organizations (e.g. Adbusters), and their message is for example anti-consumerist or anti-globalist (pp.157). The common nominator to these is the focus in industrialized contexts and consumer society. These examples strive to shake existing thought-patterns, disturb or provoke society and behavior within it.

Ann Thorpe refers in her conference paper (2008) to seven typologies for design activism (see Table 1) and founds that many these revolve around artifacts (ibid.). Examples of design activism artifacts are ‘service artifacts’ providing humanitarian aid, ‘demonstration artifacts’ focusing to demonstrate positive alternative

solutions, and ‘protest artifacts’ that may be provoking, confrontational or even offensive, but offer critique against the status quo (ibid.).

Table 1. An initial shape of typology of action for design activism. (based on Thorpe 2008)

Action:	of total:	Explanation:
Demonstration	28 %	Demonstrating positive/superior alternatives
Info/communication	27 %	Making information visual/ tactile, creating symbols, physical links, etc.
Conventional actions	13 %	Proposing legislation, conducting research, etc.
Competitions	10 %	
Service artefacts	10 %	Humanitarian aid
Events	9 %	Conferences, talks, installations or exhibitions
Protest artefacts	3 %	Confrontational, even offensive, reflection on status quo

According to Thorpe’s material it seems that similarly as design in general, design activism is about mostly about artifacts and communication, as 41% of the cases orientate around artifacts and 27% around information/communication” (2008). This, similarly as the approach to design as a normative practice, suggests that most natural area for design activism revolves around communication and artifacts that embody societal meanings.

In consumer culture, products seem to substitute also self-identity and social life. Modern media and consumer culture – but also "consumer design" – encourages people into supine 'interpassivity' (Zizek 2002), and this fetishism towards things has to be questioned by 'radicalizing' the relationship between persons and things (ibid.). By attaching more fantasy to the artifact, designer can introduce another symbolic level to the artifact to induce attached messages.

Anti-activist approach seems to often create protest artifacts that question existing paradigms. Anti-activists act with communication by information. But provoking design can also be extended easily to material and tactile world of design as well. Provoking design in its tactile form can be found for example from Huggable Atomic Mushroom chair by Anthony Dunne, Fiona Raby and Michael Anastassiades, that was exhibited in Freak Show –exhibition (Bördner and Lovell 2010) in Gallery Helmrinderknecht, in Berlin (see Fig. 3). The work emphasizes the ignorance related to existing nuclear armament, and shows a perfect example of a design artifact protesting against a certain paradigm.



PHOTO: MARCUS GAAB STUDIO

Figure 3. Huggable Atomic Mushroom / White mohair chair (Dunne, Raby and Anastassiades 2010)

### CASE: APOCALYPSE FASTER!

The idea for Apocalypse Faster! was originally presented with an intentionally confusing message: The concept presentation started as a traditional campaign for sustainability, but then transformed into anti-statement towards consumerism (see Fig. 2) Feedback regarding the anti-approach was encouraging. It seemed that the project's anti-activist stance managed to induce critical thinking in the audience, but also humor it.

The project was then realized by the author: Three sketched design concepts were elaborated into graphical representations and simple mock up site was designed. In January 2011 "www.apocalypse-faster.net" beta website was launched. Apocalypse Faster! resulted in a new media campaign with a humorous portfolio of design concepts that are "promoting a faster apocalypse", and a forum for discussion. Its website offers a medium to download campaign media, browse and share critical content, and discuss and comment. Participating community can also suggest and upload new concepts.

### DEVELOPING SOCIAL CAPITAL BY TAKING A POSITION AGAINST

Interesting design approaches can be induced by design research carried out by 'practicing designers within an intellectual context' (Dunne 2006, pp.4), and activism many times is motivated by personal needs, desires, goals, or by a 'sense of altruism or morality', aimed for the greater societal good (Fuad-Luke 2009, pp.18). In most cases design activism results from a collective process and therefore represents collective action (Thorpe 2008). It is developing collectivized social capital as it tries to modify existing paradigms of meaning, values and purpose (Fuad-Luke 2009).

Examples of design activism often accept pluralism of values and interests, and are not targeted towards "universal rational", but towards some regulative ideas emphasizing certain practices. Design activism is promoting a form of 'normative rational' that aims to

open and 'deliberative' democracy (Mouffe 2000) without necessarily seeking a consensus. Apocalypse Faster! is an example of such activist project designed for a certain purpose - to criticize the fetishist approach to products and owning.

### CAMPAIGN CREATING COUNTER-NARRATION

The campaign tries to induce critical thinking in the audience by creating counter-narration with anti-design, and it calls for participation in the forms of communication and sharing of media. On the website audience can browse and discuss anti-design concepts. They can also download campaign material such as stickers and posters, and share and propose concepts (see Fig. 4).

Emphasis is put on re-interpreting the 'interpassive' status-quo of standard life (Zizek 2002), and on symbolic reduplication that is playing with design and semiotics. Problems of consumption and inequality are reframed into humorous fake design concepts (see Fig. 5) that try to provoke audience but also to amuse and ridicule, to encourage participation. In the long run the community can expand the concept portfolio further and add other media content.

### DISCUSSION: DESIGN IS ACTIVISM

Design activism in its several forms is not focused to any single domain of design (Thorpe 2008). Instead it should be extended to all designers and areas of design. Design activism requires new ways to communicate with 'imaginative use of design [...] to penetrate beyond the 'white noise'' (Fuad-Luke 2009, pp.88). It requires participatory design exploration with critical approach, in which new ideas can be created through transcendence from the tradition, arising from existing solutions when different groups, practices and knowledge meet (Fallman 2008). But most importantly, it should promote open cultural and social dialogue, and support the emergence of the 'deliberative democracy' raising from the grassroots and open to several views (Mouffe 2000).



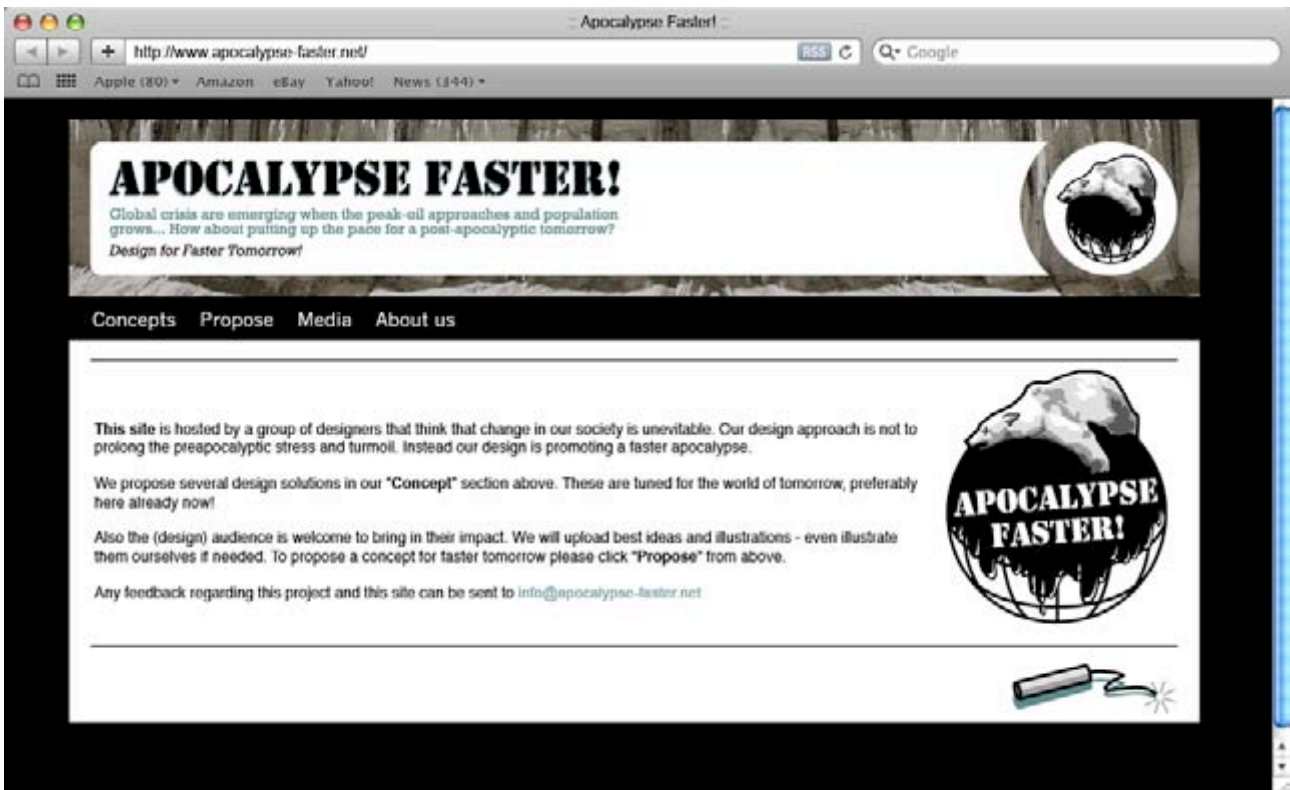


Figure 4. Campaign website – www.apocalypse-faster.net

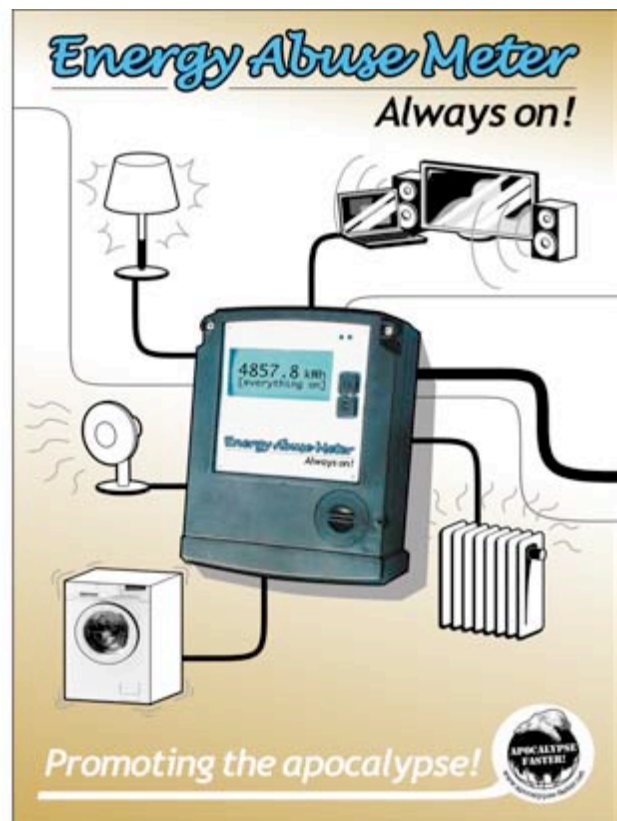
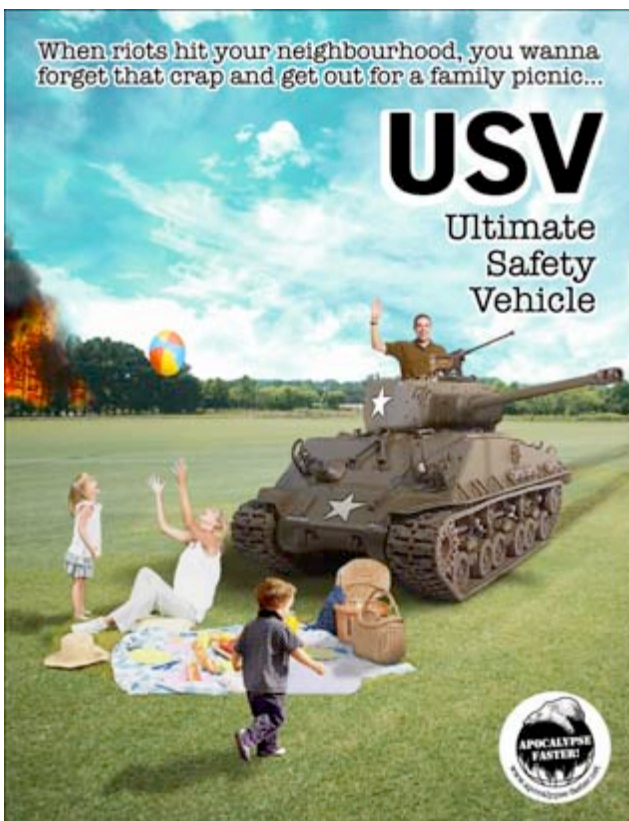


Figure 5. Examples of fake design concepts



As activists, designers are more likely to ‘help people imagine not just how to reform broken societal patterns, but to imagine and invent new ones’ (Thorpe 2008, pp.12). Promoting design activism could contribute to dialogue about new social goals and values, and this requires open participation and discussion. Designers are partly semioticians, but should not participate in creating mere 'semiotic skins' (Dunne 2006) for new products that promote the end of the world. Instead, while consumerism is running uncontested it should be challenged ‘through the visual languages and resources of design’ (Adbusters 1999).

Although protest artifacts are the least frequent instances of design activism (Thorpe 2008), they are aimed to create discussion in the design field and in wider audience, and can be powerful tools to create critical awareness. They are of fantasy and can be 'objectively subjective' frameworks to help to extrapolate the experience (Zizek 2002). *Apocalypse Faster!* is such a small attempt to provoke and raise discussion.

## CONCLUSIONS

Very little has changed since the first initiatives against consumerism. Several decades of pursuing for sustainable development haven't been creating more sustainable society. Design can be an agent for change in several ways, but most important issues from the point of view of sustainability have to be the habits of consumption.

Designers are entitled to raise discussion in public and bring important issues up in another shed of light. If *Apocalypse Faster!* succeeds to gather audience, it can help to point out the adverse logic in consumption culture, and to support open participation, and thus be involved in shaping the values for future society.

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# REFLECTIONS OF A WIRELESS RUMINANT

ANDREW MORRISON

INSTITUTE OF DESIGN, OSLO SCHOOL OF ARCHITECTURE AND DESIGN (AHO), NORWAY

ANDREW.MORRISON@AHO.NO

## ABSTRACT

‘Design matters’ is interpreted in this exploratory performative paper via a narrative pastiche in the form of a design fiction concerning recent developments in ubiquitous computing and their implications for emerging techno-material culture. The article has two research aims: 1) to connect discourses on ubicomp with ones on design fiction, and 2) to motivate design research to expand styles of playful, reflective and interpretative modes, and genres of research writing. A first person narrative perspective is located in bio-cultural contexts of design fiction future use, referring to WiFi, RFID and GPS technologies also of today. The narrative is a ‘tongue in cheek’ critique of hidden voices of participants to current and near-future ubiquitous technologies. The paper is written as an abductive design narrative that intends to escape from often ‘paddocked’ research modes of writing about design. On offer is a playful, performative problematising mode of design research writing that is connected to wider techno-societal concerns, drawing rhetorically on post-structuralist ‘inventio’ in the humanities.

## CHEWING THE CUD

It was one of those winter mornings when you simply stood still and took in the movements of the muffled city, Rumina recalled. The date was 2121. She loved the arc of pale blue sky and the snowed over cityscape. But

not just any day, she reminded herself. Not an ordinary Tuesday waiting for the human attendant to switch on the milking machines. Not one of those still fresh days when she traipsed the urban streets in her newly awarded wireless freedom. Days when she was terrified the Austrian designed robot mini-milker would sniff her out and snap onto her tenderest parts in front of any old pedestrian. Pervasive computing<sup>1</sup> was a phrase that came to mind, one she’d kept on meeting as history now reached her in the unfettered feed of wireless data that ripped through her once pastoral imagination. Here come another one. It’s a bit jittery so far. Must be a large image coming through...

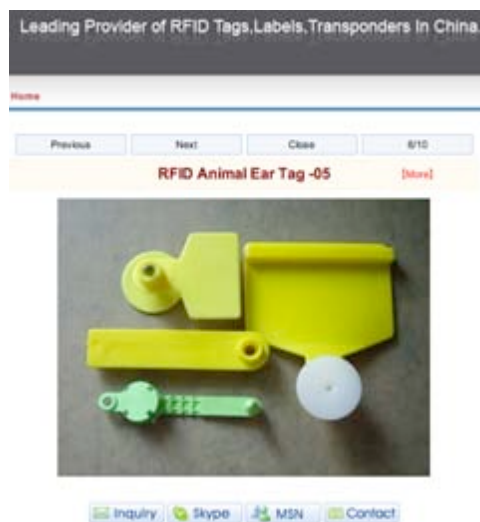


How strange this is, a mirror image, but not quite me, she reflected. An historical image from 2010, all that tech so clumsily balanced and strapped on. If I just concentrate on the feed like last time then the source might be revealed....

And so it was that Rumina stood stock still, her large piebald frame visible to the morning commuters alongside their head displays. ‘Yes, here comes the background,’ she said to herself. ‘It’s part of a playful digital portfolio by a British designer called Matt Herring.<sup>2</sup> That was early on in our interfacing with technology, she thought, aware she had started to use the word as a verb now. Look here’s another feed ... oh, its from 2004 and its about the move to ‘techno-branding’ as a replacement for burning our hides and tagging our ears with plastic: *Wi-Fi ‘Smart Collars’ For Networked Cows.*<sup>3</sup> If I just close my long lashes and think about it maybe the source article will appear... Yes, here it comes: *Virtual fences to herd Wi-Fi cattle.*<sup>4</sup> All very scientific? Look what it says: ‘A farmer would

control multiple herds from a single server at home as if they were playing a video game'. Those were the days when they talked about social media!

Things have moved on. Here's comes a manufacturer's website ... Its says 'RFID transponders are worn as ear tags or as an inter-ruminal capsules. Farm management can be fully automated for such processes as feeding, weighing, disease management, and breeding practices.'<sup>5</sup> All very functional.<sup>6</sup> I must concentrate on the word 'tags' ... and here's my 'feed':



I've never seen these tags and injectors!<sup>7</sup> All the way from China back in 2010. There was even an RFID Animal Consortium then, but we 'hoofies' weren't yet part of its 'value added business services and networking opportunities to its members around the world.' We needed to be tracked and coralled. After mad cow disease national strategies for herding us were drawn up, just look at the USA!<sup>8</sup>

Then there was the use of Global Positioning Services (GPS).<sup>9</sup> Ouch, that old MIT project that actually said on the web that 'We have developed a suite of electronics which sit on the top of the cow's head'.<sup>10</sup> Huh! They called it the 'Ear A-round'.<sup>11</sup> And they called the man behind it 'the cow whisperer'!<sup>12</sup> The tech blog where this is coming from tells about the 'directional fencing':

The commands vary from familiar 'gathering songs' sung by cowboys during manual round-ups, to irritating sounds such as sirens and even mild electric stimulation if necessary to get cows to move or avoid penetrating forbidden boundaries.

Boundaries, boundary crossings! It's my ancestors' digital experiences I'm partly sensing. But it wasn't all over with these tools. Following virtual fencing and GPS headgear, we experienced digital barcode branding with 'Biocompatible Chipless RFID Ink'.<sup>13</sup>

Now, almost a century later, we are embedded with microscopic WIFI tags that seamlessly move *design matter and matter for design* between gut, cortex and the Ether. Ruminating is what it requires. If I chew on a word, and then concentrate on it, the feed follows! Let

me think about 'tongue' ... What is this? Back in 2000 an electronic artwork positioned us, tongue in cheek.. its a licking station, is it? I am not joking here.<sup>14</sup>



These feeds were still hard to work with. I've got to learn to direct them. Seepage they called it, or was it wireless leaking?

## WIFI-WRITING

Rumina remembered one of the earlier playful wireless interruptions about design. It was on experimental narratives to do with social media, performativity and the city. A project called PLAYUR, part of a larger one called, what was it now?<sup>15</sup> Aha: YOURban.

The stories had been designed, she recalled slowly, as an experimental complement to more formal research publishing about digital design processes and enactments via a variety of media. Now here I am, Rumina reflected, a peripatetic part of a changing techno-discourse of mediated urban dwelling. Phew, she sighed, its one of those playful paratextual reflexive ruminations. Especially useful for thinking about design fiction, the fiction of design, like others did with science fiction. SciFi...WiFi ... WhyFi!

'Four stomachs are better than one!' they had claimed in an Orwellian way as if prefiguring the prototype experiments to rapidly produce more milk after the nuclear fallout of 2049. And another interruption arrived, channeled via Matt Ward's work,<sup>16</sup> shifting itself as if from her third stomach to frontal lobe:

It would be useful in the design world to prototype things in a way that help us imagine and wonder, and consider unexpected, perhaps transformative alternatives....

This kind of prototype has nothing to prove — they do not represent technical possibility. They are prototypes that give shape and form and weight to one's imagined idea. This is a kind of prototyping that couples the speculation inherent in design with the creative license of fiction and the pragmatic, imminent reality of fact. ... They aren't specifications for making, but they are specifications for imagining.<sup>17</sup>

Oh, see what it's status is now, recognises Rumina. The societal value lies in the design prototyping and in the stories about it, not a literal social science study! How to think into the future and to find ways, through play,

to debate it, and reflect back on the present too. The feed's from a recent conference on *Fiction and Design*. Here it comes ... it's a report by Evert Ypma:

The principle of enacting as a method of telling a story within design fiction therefore cannot be qualified as diegetic or as true fiction.... Design fictions are merely imaginary design stories that refer to reality and which are re-told in a 'designerly' way.

Funny how I've not come across this in my interest in design over all these months of following design leads with my WiFi on the hoof. The imaginary matters, the imaginary design matters, design imaginaries matter, grunted Rumina.

### SPECIES INSPIRATION

Rumina, blinked hard and realised she was blocking the pavement and people were walking out into the street to pass by. Block ...blog. That was the word she was looking for. Just concentrate and the wireless feed will come. It's not totally random if you are proactive. *Carniverous Cow* this one's called.<sup>18</sup>

It's an online, diary (not dairy) like feed, time stamped. A space for experimental writing. A witty, tongue-in-cheek creative and critical space, she remembered. The title, though, was a little alien to her rebranded identity and lifestyle and the embodied medley of WIFI, RFID and GPS. Maybe there's a new identity acronym there, she mused.

The blog was one of few that took discourse as its design material and played off the cow and her theory partner, a spider called Gramsci. Oh, here comes an zoom from the blog:

The Cow was rather disappointed in Alice in Wonderland 3D. "They could have done so much more with it," she grumbled to Gramsci. "Both the subject matter and the technology begged for it. And instead, they just popped another sausage out of the Disney sausage machine!"<sup>19</sup>

Rumina decided it was time to call these interruptions what they were: FEEDS. Not feed in the old sense, those pitch fork deliveries of hay in the barn deep in a nordic winter. But please, no more talk of linear production, no more self-reflexive squeezing us into those awful forms. 'I make milk not meat', she lowed against the hydrogen driven morning traffic steered equidistantly by way of families of nudgy sensors.

The feeds seemed mostly to be historical: from the end of the first decade of the 21<sup>st</sup>. Some of the feeds simply splashed into her retina, others rippled, warped and vanished. Then there were those that she was learning to motivate, to mediate. Get yourself back to today. Let the wireless cows roam free.

Roaming. And so it had come to pass that they'd incited the Electronic Frontier Foundation as a Digital Legacy Argument for limited species freedom.<sup>20</sup> Freedom. 'It's like some Hindu-inspired kickover from the Nobel

Peace Centre,' Rumina grunted, recalling the old weblink she had been wif-ed about yesterday via the peace promoting shop that sold recycled milk cartons made into 'cute wallets'.<sup>21</sup> At least it wasn't our hides for peace, she reflected. Shaking herself into the present, Rumina gingerly side-stepped the leftovers of a chicken kebab and its luminous sauce splattered over the pavement. She glanced down at its flavoured microscopic LED particles all aglow in watery morning light. So much for organic feed. Adverts everywhere.

### BEING BRANDED

'Branding!' she bellowed. Then silently, 'That's something I know about.' So much for all the pitter-patter-twitters of social media marketing. Rumina growled at the absurdity of the spread of 'brand vision recognition'.<sup>22</sup> She'd accessed the term soon after the forced, numbing wireless feed had been channelled to her as part of the 'freedom branding'. Chewing over her thoughts, she must have grunted and a little too loudly for one of the passers by swiped at the tip of his nose to increase the volume on his mobile device. He sneered at her waddling frame in his HoverBoots - or HBs as they were called - right off the bulletplane from Tokyo, as he was propelled by a cushion of air over the snow.

All this concentration animated Rumina's biofeedback sensors. She was still learning how to 'corp' them as it was now called: just use your body and your mind together they had told her. It was a little like that feed she had had yesterday referring to an early experimental narrative on aggression reduction called *Changing Hands*<sup>23</sup> in an EU art project on mixed reality arts.

### ROAMING FREE

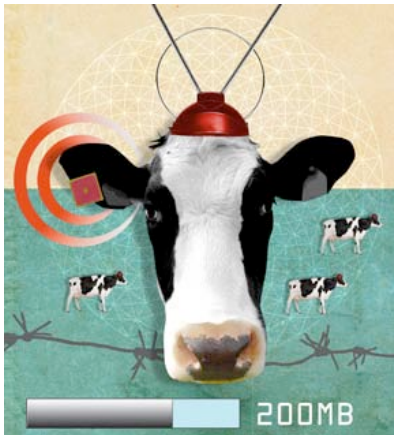
An interruption, that's what I am, she grunted again, just in time remembering the silliness of the kebab's shiney sauce, and stretched her legs to avoid it. Bad enough with these glassy hooves on the ice, so I'm not going to let people see me splattered on the pavement, my black and white coat a spread of small dark puddles on the snow. The coalition government's *Primary Techno Decree* lumped together a crowd of us players with non-speaking roles. The first in a series of Release Strategies they had called it. Let them go where they like, they had decided. Simply release a batch of pervasive technologies and let them foster social media expansion and deregulation.

Three other actants, that elderly French theorist (Latour?) had called them. He had queried their being patched (talk about pointing fingers at us!) together with ubiquitous protocols and devices.<sup>24</sup> ONE. Dairy herds to be released into the public realm of social media.<sup>25</sup> TWO. Domestic security devices would be allowed to snap to the urban grid as they liked, no longer house bound. And THREE, they would jettison a host of airborne advertising micro-drones, unswatatable in their speedy reconfiguration and taste anticipation meta persuasion algorithms. Well, at least they wouldn't swarm around us bovines. The drones will keep those

smartphone commuters busy scrolling and pinching at their screens. Look at them batting and swatting already, two new gestures to be added to the haptic sign language of 2015.

### WITHIN FREE RANGE

What's free, what's freedom? Here I am, released but regulated in this new free range urban paddock. Another interruption from that British designer, in the online magazine *The Economist* with a section on 'Augmented Business'.<sup>26</sup>



The article begins:

CALL it the democratisation of sensors. Pachube (pronounced "patch-bay"), a start-up based in London, offers a service that lets anybody make sensor data available to anyone else so they can use them to build smart services. One tinkerer has Pachube's computers control the fan in his office, guided by temperature readings uploaded from a thermometer on his desk.

Still adjusting, I am. Wireless feed: now that's a design paradox! Reminds me of one of those RFID collared pigs learning how to shake off their devices. Wiley ones pick up the collars and log-in for extra nosh!<sup>27</sup>

Back to the beginning of my story. I'd decided if living with wireless feeds was the cost of my freedom after all the years in the underground milk farm, then so be it. Anything for release from the cave of production ever since the claims of global warming and nuclear fallout met each other that catastrophic Korean spring day.

The giant thunderstorms that had followed the 'same ethnicity, different nation' nuclear war had delivered sheets of rain and ruined the grass for centuries. No time for radioactive ruminations, then or now. Rapid action research was needed and designers were in demand, the immediate lead players in a Rittel and Weber model of delivery, some said it was. By then bio-engineering was already well bred into the consumer market, with stem cells a skip and a jump to human body recovery and modification, so food production took a sharp u-turn and moved full scale into the city. But as with all rapid innovations, the first underground paddocks were rather crude. As if a designer had delivered a near-future prototype and it'd been built without full specs. Granted,

we were well fed, and the Circadian Bovine Rhythm Regulators kicked in on time. We ate and slept and produced milk untainted by history or the longtime lingering of half-life atoms.

### MOOBILE APPS

It wasn't long though before this new industry, once the stuff of far-eastern cyberpunk novels, was exposed in a new form of Nordic Steam Punk. We heard about it during a change of shifts by the human prototype milk tasters we endured every six hours on our new condensed day routine. The shifts were devised to fit into the old discarded 24hr clock, a multiplication of 6hrs by our 4 stomachs. Temporal curds and whey if you ask me. Then there was motion and mobility. 'There's something you must experience. A new mobile cartoon series,' Jacob had said to Tine, named after an old Norwegian dairy corporation<sup>28</sup> 'It's forwarded by a gentle brush of air from device to device.' One of the first real motion sensor narratives.

Hold on a second... Here comes another feed from the past, about Kenya, text first it seems then image...

iCow, an application developed by Charles Kithika helps cow farmers to track the fertility cycle of livestock as well as monitor cow's nutrition leading up to the calving day; so that breeding potential can be increased. The app is a voice-based application that means it can work with low-end smartphones too, which is more of a possibility keeping in mind the low per capita income in the area.<sup>29</sup>



We've moved on from that low end living, now able to understand design fictions of the past and future through not just acts of active search and retrieval, but through reading. Reading as rumination, for all of you who need to know how my words matter in the wider world. Yes, it's an important issue. Imagination and fictional voices matter in designing! Ask any designer or silly old bovine like me who now has access to ubiquitous technologies at every teat and tongue tip.

### UDDERLY URBAN AM I

What a day it was when we were released from that cavern where they first moved us to protect their



vitamin supply. That giant corralling of us, heated by the steam of human effluent in the new 'input-output consumption equation' championed by the First Coalition. (They'd had to change its title of course, too much carbon showing in the name!).

Free to roam, no charges! That was unlike the early days of smartphones, 3G, swipe-wipe, price-slice gestures and codings. Now there's only our nightly physical log-in at the urban tower by the Dutch architects MVDRV now FWNLB.<sup>30</sup> Once upon a time people mocked MVDRV's 'projected' pig farming in high towers<sup>31</sup>. FWNLB's built one in Oslo that's like a glass of milk! Tall and creamy, glistening fiordside. Like that social media and milk site with 'Cows deciding?'.<sup>32</sup> Whatever next!

### CLICK - AND BE GONE



Freedom - and its wireless tethers. Freed. Almost. Freed. Feed. The words just a letter apart. All these pervasive, mobile and wireless technologies were a serious matter for current and projected design and the emerging area of design fiction, Rumina understood. In 2011 the world was a-buzz with smart phones, social media and mobile games.

Another feed's here ... an old Facebook game designed to be trivial, to click and click away at 'connections'. You won't believe it's called *Cow Clicker*.<sup>33</sup> And it reads 'To farm is human, to click bovine'. Whose clicking? Right, that's a good moment to stop this design fictioning. Back to reality. I'll 'click' out of these wireless ruminations and meet my friend Ubiquita for some good old hoof-to-hoof chat.

### ACKNOWLEDGEMENTS

Thanks to Vicki Trowler for inspiration and to Synne Skjulstad, Ragnhild Tronstad, Einar Sneve Martinussen, Jørn Knutsen and Janike Larsen for comments. This one in a series of design fiction narrative works (PLAYUR project about performativity, social media and the city), part of the YOURban project, funded by the Research Council of Norway. All images are publicly accessible via the given links.

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# SUSTAINABLE INNOVATION AND THE ISSUE OF SCALE

PEKKA MURTO

AALTO UNIVERSITY

SCHOOL OF ART AND DESIGN

PEKKA.MURTO@AALTO.FI

## ABSTRACT

Sustainable innovation and eco-innovation have become priorities within the area of sustainable design. Focusing not only on production, also consumption and systemic changes have been addressed in order to handle increasingly substantial issues. Consequently, the focus of sustainable innovation has shifted from products to solutions and systems. However, as design has traditionally been a product-oriented profession, adopting operational models that require greater influence throughout the value chain is not necessarily easy. This paper explores the issues that the scale of sustainable innovation poses on design and suggests that the concept of environmentally sustainable innovation should be approached more deeply also at the product level.

## INTRODUCTION

Environmentally sustainable design has developed significantly over the years. Starting from reactive end-of-pipe measures the focus has been extended to production processes, the actual products produced and lately to consumption (Vezzoli & Manzini 2008a). The reason for expansion has been the inability of the previous approaches to deal with environmental issues. For example, while the products of today are often better for the environment than their predecessors, the increase in consumption has resulted in the growth of overall environmental impact (Robins & de Leeuw 2001). As a result, sustainable consumption and

production has risen as an approach in environmentally sustainable innovation.

Environmentally sustainable innovation or eco-innovation can be defined as ‘any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of natural resources’ (European Community 2006). For the purpose of this article the issue of specific interest are the levels of eco-design innovation that are often identified (see Figure 1). These levels can be seen to be derivatives of the development of eco-design: the approaches of refining and repairing are less effective when compared to redesigning and rethinking of products and entire systems. As Figure 1 also suggests, design should focus on redesigning and rethinking current products and processes. In practice, lifecycle design methodologies that optimize the environmental performance of products and systems are often offered as the main approach for redesigning products and services towards eco-efficiency. For rethinking and creating more radical eco-innovations, product-service systems (PSS) are

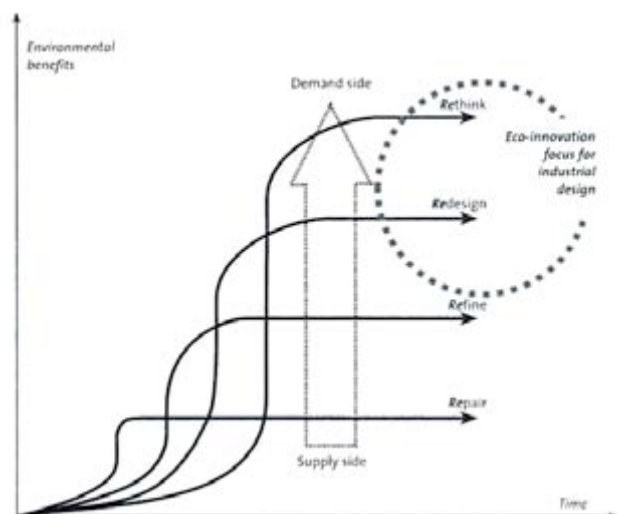


Figure 1. Revised model of eco-design innovation for industrial design. (Thompson & Sherwin 2001).

often brought up as the practical approach. A product-service system can be defined as 'a marketable set of products and services, jointly capable of fulfilling a client's need'. (Goedkoop et al. 1999). Product-service systems focus especially on decoupling consumption and environmental degradation by enabling more intensive utilization of goods and shifting to different product-ownership models that create incentives towards eco-design for manufacturers (Mont 2002). Although evidence of substantial environmental benefits created through more service-oriented business models is scarce (Heiskanen & Jalas 2003) some inspiring success stories – such as Interface Inc. and Xerox – have surfaced (see Mont & Emtairah 2008).

However, when looking at more generic design innovation literature – generic in the sense that it does not specifically target sustainability – it seems that there is a different size of scale in play. The writings of eg. Verganti (2009) and Kelley & Littman (2001) are full of examples of product-innovation: from wristwatches to furniture and shopping carts to computer mice. Although successful product innovation does most certainly require certain system dynamics behind it there seems to be no presupposition of scale of the outcome in generic innovation: it can be done on many levels, from products to services to systems. Eco-innovation, however, seems to hold a presupposition of scale by definition: Charter & Clark (2007) express the highest level of sustainable innovation as no less than 'design for sustainable society'. What is more, the discussion on the levels of sustainable design seems to have created some separation and even juxtaposition between products and systems. When speaking of the possibilities design can use to improve sustainability, Tukker (2008) states that the activities of product design 'centre on products and production rather than on consumption patterns' and gives higher priority to the 'design and envisioning of 'satisfaction-fulfilment' systems', ie. product-service systems. Similarly, Vezzoli and Manzini (2008b) insist that design should abandon its product-oriented nature and concentrate more on systemic and solution-oriented approaches. Even though this suggestion to abandon the product-oriented nature of design mainly criticizes current design approaches and not products *per se*, the tension between products and solutions is tangible in this notion.

It is obvious that design is not responsible for designing entire systems of consumption and production on its own and the necessity of considering the systemic level in eco-design is unquestionable. Nevertheless, the scale that seems to be built into the very definition of eco-innovation is not devoid of problems. This article approaches the issue of scale in environmentally sustainable innovation by looking at the amount of influence design generally has in product development in comparison to the expected requirements to arrive at radical innovations such as PSS. The main arguments of this paper are that environmentally sustainable product

design should be explored in greater depth and that attention should also be paid to eco-innovation opportunities at the product level.

## DATA

To discover the problem of scale in sustainable innovation the main issue addressed through the data is the amount of influence designers generally have within the product development process. The data has been gathered from two main sources: previous findings about the influence of design within the product development process and interviews conducted with Finnish designers on the topic of sustainable design. It is worth noting that the issues will be discussed in the Finnish context and the focus is on designers working in design agencies, where most Finnish designers are employed (Holopainen & Järvinen 2006).

## LITERATURE

By examining the underlying principles behind the idea of product-service systems introduced earlier, it is evident that the improved sustainability performance behind them stems from how things are organized: the system includes products that are just put to use in a more efficient manner (eg. through a car-sharing system). While this does to some extent justify the notions that design should focus more on need-satisfying solutions than products, it also raises the question of whether designers working in agencies are in a position to create systems of this scale? An attempt to push design to higher levels of influence within value chains is, without a doubt, a positive thing but do designers really have that amount of influence?

Valtonen (2007) has studied the development of the industrial design practice in Finland and recognized that designers have constantly aspired to participate earlier in the product development process in order to generate a greater impact, both in the process as well as in business in general (ie. moving from product design to strategic design). However, a survey conducted in 2006 states that product design was still the most bought design service in Finland: 64% of the responding companies had bought product design from design agencies. In comparison, concept design had been bought by 29%, branding by 27% and strategic design only by 2% of the respondents. The report concludes that design has not been used to its full potential, especially in the areas of strategic design and business development. (Holopainen & Järvinen 2006).

When looking at the typology of product-service systems, the problem of influence becomes increasingly evident. Tukker & Tischner (2004) categorize sustainable product-service systems into three categories in increasing amount of service content, sustainability benefits and radical innovation: product-oriented, use-oriented and result-oriented. For this paper the interesting issue are the necessary requirements for transforming companies towards more service-oriented business models. Gebauer et al. (2008) have studied

service development in traditional product manufacturing companies and state that the more service-intensive the offering, the more resources and antecedents are required from the providing organization, ie. the larger the scale of action. Thus for new businesses a PSS might be a great deal easier to set up, but in established businesses transforming from product manufacturing to solution-oriented business requires action on a wide scale and is mostly a question of strategy and business models.

## INTERVIEWS

A total of eight semi-structured interviews were conducted between November 2008 and February 2009 with design professionals on the topic of sustainable design. The purpose of these interviews was to explore the relationship of Finnish design – mainly industrial design – and environmentally aware design. For this article the interesting part relates to the designer’s sphere of influence within the product development processes.

The interviews give insight into in what stage of the product development process design is typically bought at and how much there is room for influence. The following contains insights into the influence of design from two designers:

‘Design is bought fairly late in the product development process and at that stage the specifications are pretty much set. At that stage you don’t anymore question whether or not you’ll design a mouse but you design the mouse according to the specifications. There is very little room there to influence.’

‘Always in these environmentally oriented projects there is some existing infrastructure or system that limits the possibility to influence things... and then when you get into these projects as a designer you can’t necessarily influence the underlying basic questions anymore.’

Based on an interviewee’s notion of the product development process and at what point design is bought at, Figure 2 summarizes the current situation well: design typically steps into the picture fairly late in the product development process.

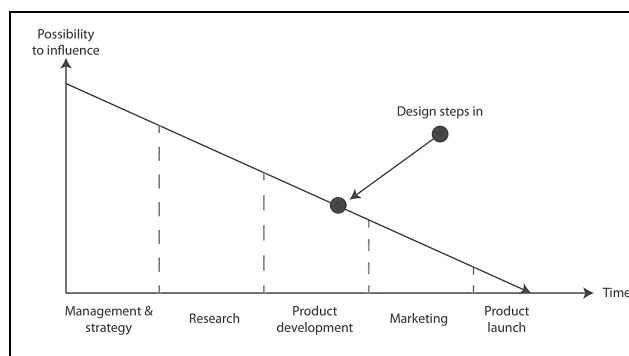


Figure 2. Product development process and where design is bought at based on an interviewee’s experience.

However, one designer did mention that design is slowly shifting towards the earlier phases of product development and that the possibilities to influence are growing. Despite this he did acknowledge that in typical product design projects the problem still exists:

‘These kinds of very typical product design cases, where the customer has already defined pretty much everything and then you start doing it, often make you think – almost self-evidently – that some issues could have been defined a bit differently earlier in the process.’

Although the question presented about the influence of design and designers should be researched in greater depth to draw solid conclusions, the quotes above do highlight the fact that the sphere of influence for design consultancies is not necessary big enough to generate solution-oriented design or question the principles behind the design brief (ie. whether to design a product or a solution).

## CONCLUSIONS

The relationship between eco-innovation and design is problematic: eco-innovation requires action on a wide system scale, but design – especially when bought from outside companies – does not typically possess the necessary power to address these systemic issues. It is obvious that action on a wide scale is required in order to achieve sustainability and design is not solely responsible for designing entire systems: as Wahl & Baxter (2008) suggest, problems related to sustainability are complex issues that require action and awareness across disciplines. However, the issue of scale does indicate a need to explore i) eco-innovation possibilities at the product level because of the limited role of design and ii) how product design influences and can influence the systemic level. Using a simple example can highlight the importance of these aspects: designing a disposable paper cup suggests a completely different consumption pattern and system conditions when compared with a ceramic cup. A paper cup is likely to be used for only a few times or just once whereas a ceramic cup can be used again and requires washing etc... It is evident that products are not only objects in intelligently crafted systems but actors that create, shape and influence systems and behaviour.

Looking at current product level eco-design methods and comparing them with the concept of eco-efficiency – ‘creating more value with less impact’ (WBCSD 2000) – also reveals that there is room for development. For example, current lifecycle methods focus mainly on technical guidelines for minimizing negative impacts of products and production (see eg. Vezzoli & Manzini 2008a) and say very little about the creation of more value in the context of sustainability. Some approaches that stress the creation of value have been raised up, eg. emotionally durable design (Chapman 2005). Another potential source can be found from the more mainstream approaches to design and innovation: even if many

examples of product-level innovation can be judged as environmentally unsustainable (eg. watches as fashion accessories, see Verganti 2009), the undeniable fact is that these examples offer great insights into creating value for companies and especially consumers. What needs to be done is to take these examples and explore how the very same mechanisms that might drive conspicuous consumption could be turned to serve sustainable consumption. Eco-innovation on a product level needs to be explored in greater depth: not only as a set of technical rules that deal with production but also as a means of connecting with consumers on a sustainably meaningful level.

## DISCUSSION

This paper has explored the problematic nature of the growth of scale in environmentally sustainable design and innovation. As shown, designers often have a limited role in formulating strategies and business models. On one hand, this stresses the importance of pushing design towards higher levels of influence but on the other hand it also indicates that innovating for environmental sustainability at the product and production level should be explored in more depth as well.

Although utilizing products and goods more efficiently through product-service systems seems like a big step towards more sustainable business models, an approach where products are seen as mere passive objects within intelligently crafted systems is outdated. Products inevitably imply certain patterns of consumption and form consumption patterns even if current eco-design methodologies do not stress this point. Furthermore, the whole concept of eco-efficiency as creating more value with less impact should be embraced more thoroughly in sustainable product design.

To conclude, more research and development is needed in all levels and dimensions of sustainable design in order for design to be able to fill its full potential when it comes to solving sustainability issues. Aspiring for more influence within the product development process through strategic design is important, but in the mean time the immediate opportunities for shaping consumption and innovating at the product level should not be missed either.

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# NAVIGATING IN THE WORLD OF SERVICES – VISUALIZING A SYSTEM OF SYSTEMS

JOHANNA NIEMINEN

AALTO UNIVERSITY

SCHOOL OF ART AND DESIGN

JOHANNA.NIEMINEN@AALTO.FI

TUULI MATTELMÄKI

AALTO UNIVERSITY

SCHOOL OF ART AND DESIGN

TUULI.MATTELMAKI@AALTO.FI

## ABSTRACT

Service design is a growing practice. Designers need new tools and frameworks for making sense of the intangible and tangible qualities of services. Customer journeys and service blueprints are among those tools. However, they typically address a specific service or a service package and lack of illustrating services as complex and relational systems. The challenge is to understand what kind of combinations services do and can create. This exploratory paper attempts to shed light on this challenge by first explaining the current frameworks, then introducing a case in which these combinations were studied and finally presenting a system experience map that attempts to visualize the combinations services create from the user point of view.

## INTRODUCTION

Service design is often described as a holistic approach that is able to see the bigger picture of design problems (e.g. Mager, 2009b). However, the primary focus has so far been on singular services. The most common tools, such as the customer journey (Mager, 2009a; Koivisto, 2009), service blueprint (e.g. Shostack, 1984) and service ecology (e.g. Livework, 2008), are focused on analysing a single service or a service package. However, services create systems that function in parallel and are connected to each other. Manzini describes the situation as an “*existence of a horizontal system architecture where complex activities are*

*accomplished in parallel by a high number of connected elements (technological artefacts and/or human beings)”* (2009, p. 48). In service science, these entities are called service systems that interact, create outcomes, and judge the value co-created by those interactions (Maglio et al., 2006). As it has been experienced in other contexts, designers are trained to envision systems from the perspective of the users (Miettinen, 2009) and that competence could be utilized also in the context of service systems. In the following we first briefly discuss the concept of service systems, visualization techniques and describe a ‘system experience map’ tool and a case in which the objective was to make sense of and visualize service systems from users’ perspective.

## SERVICE AND SERVICE SYSTEMS

There are multiple ways of defining service. The definition that is a base for service system thinking, and is utilized also in this paper is service being an act of utilizing one’s competences for the benefit of another or the actor itself. The term ‘service’ stands for the whole process and idea of serving. Inside this process there can be different tangible and intangible goods that deliver the service to the user (Vargo and Lusch, 2004).

The service system definition in this paper follows the definition proposed by Maglio et al.(2006). A service system is a system of systems that are interwoven together forming complex adaptive social systems. These systems have internal and external structures meaning that as a service system consists of smaller service systems it also works together with other external service systems; actions on one end are reflected in the other end (see Figure 1). Service systems differ in scale but an example of a service system can be a university, municipality or a city centre. Service systems are value co-production configurations of people, organizations, shared information and technology. These all can be viewed as different types of resources. (Spohrer et al. 2008)

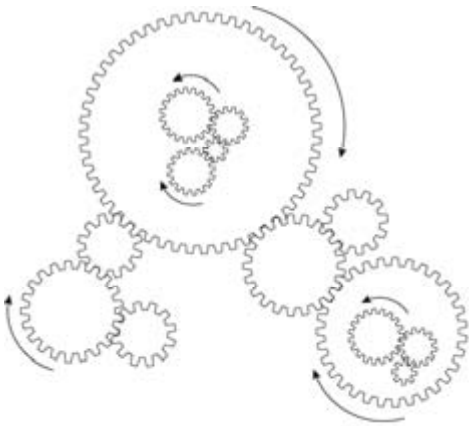


Figure 1 A service system with internal and external structures

As an example of a service system Spohrer et al. (2007) explain how a university builds up a service system. A university is a complex system of people and technologies working together. Instead of handling one co-production relationship, universities manage multiple relationships among different stakeholders. These include students and their peer experiences and government and its measurement systems. Universities have created processes and organizations to manage these various relationships. (Spohrer et al, 2007)

#### CASE STUDY

This paper is based on a project that focused on making sense of service systems and how they appear to the users. This was done through a case study conducted in a shopping centre in Espoo, Finland. The shopping centre was chosen as a context because of its way of combining both public and private services from health care and law services to entertainment and retail.

So far service systems have been discussed mostly from the organization management point of view. Through our study we wanted to explore how services are connected to each other from the user's perspective. The field study consisted of observing nine shopping centre visitors and documenting what kind of services they use during their visit. The participants were interviewed afterwards in order to get information on what kind of services they considered having used and experienced during the visit. Throughout the process visualizations were created and applied in different phases of the project to make sense and to communicate findings.

#### VISUALISATION TOOLS FOR SYSTEM APPROACH

The challenge in making sense, communicating and designing services and service systems is that they have little concreteness and visual evidence. Visualisation can *"make the ideas more tangible, complexity more readable and alternatives shareable, it applies quite well to support the communication between all actors involved, and the development of the process itself and its outcome"*. (Diana, Pacenti and Tassi, 2010, p.50.) Visual representation techniques should enable

communication 1) in all the phases of a design process, 2) with all the actors involved in the process and 3) in different scales from the smallest details to overall view (Morelli and Tollestrup, 2007). Segelström (2010) sees visualizations as a bridge between user research and ideation. They are tools for communicating the collected information within the design team, with stakeholders, and for keeping the empathy towards the users in mind throughout the process.

Different tools for visualizing services from the system perspective have been in use and discussed before (e.g. Shostack, 1984; Morelli, 2002; Morelli and Tollestrup, 2007; Livework, 2008; Diana et al., 2010; and Segelström, 2010). In the following, some of the most common methods are briefly described.

*Actors map* [also called a service ecology (Livework, 2008), actor network mapping (Morelli and Tollestrup, 2007) and system map (Segelström, 2010)] is a graphical representation of the actors involved in service creation (see Figure 2). The map can be created by placing the service in the middle of the map and gathering the actors around it. The idea is to show roles and relations between the actors. (Morelli and Tollestrup, 2007.) However, when the amount of relationships grows the map's communicability and clearness suffer. It does not take the dimension of time into account either but presents the network of actors as a static statement even though different stakeholders affect services in different parts of the process.



Figure 2: An example of an actors map

*A system map* [also called a system platform (Morelli and Tollestrup, 2007)] describes the system organization using symbols, arrows and keywords (see Figure 4) focusing on the material, energy, information and money flows through the system. (Tassi, 2008.)

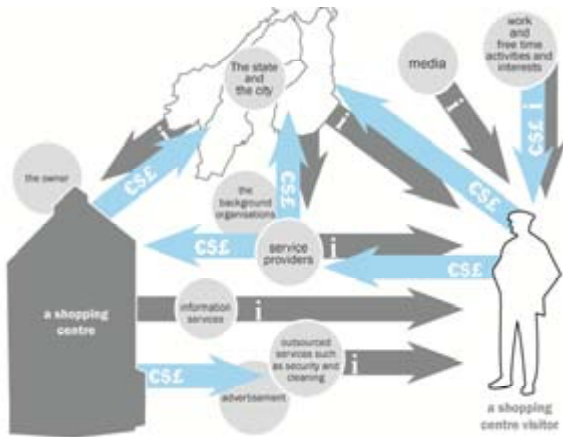


Figure 3: An example of a system map

Use cases, such as a service blueprint (Shostack, 1984; Morelli, 2002), give a detailed description of how a service works (see Figure 3). For instance, in the blueprint the actions visible to the user and the supportive actions happening in the backstage are described. (Morelli and Tollestrup, 2007.) However, when there are multiple operators responsible for the service experience a blueprint becomes difficult to manage. Wreiner et al. (2009) have experienced the challenge in presenting the several time lines and sequences between different actors.

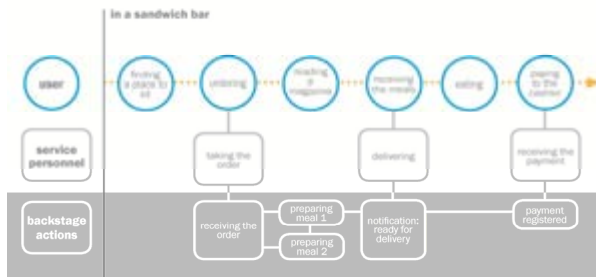


Figure 4: An example of a blueprint structure

A *customer journey* shows the service process from the user's perspective along a time axis (see Figure 5). The journey is a continuum of *service moments* that consist of *touch points* (Mager, 2009a). Service moments are like scenes in a television show. They have a beginning and an end containing smaller events. Every scene contributes to the overall storyline. This tool was the most influential in analysing the service system experiences in the case study.



Figure 5: An example of a customer journey

The existing methods see systems from a perspective of one service or a service package, not as a system of

systems. In addition, there is not a particular tool that would combine the aspects of a service system and how people perceive them. The tools that have the capacity of showing multiple stakeholders, lack often means in describing the service as a process. The visualization tools that succeed in describing the process become unwieldy to compose and use with multiple stakeholders.

### VISUALISATIONS IN THE CASE STUDY

During the case study, the system visualisations were used (1) for documenting the observations and interviews, (2) as a tool when interviewing the users, (3) for analysing the data and (4) in order to combine and communicate the findings, i.e. how people navigate in the service system. During these different stages it became clear that presenting a system of systems as a graph requires different elements from the tool than when presenting an individual service.

The first challenge is the contrast between the two main components; a system and experience. Describing a system requires taking a step backwards and getting an overall understanding, whereas, describing user perception calls for going close to the individual experiences that can be triggered from a very detailed part of a service system. The second challenge is the complexity of the time dimension. The events that take place in the present situation overlap and are affected by former events and future planning and expectations. Compared with other service representations, the service system representation has to have a capacity of handling multiple stakeholders, their relations and overlapping processes.

### SYSTEM EXPERIENCE MAP

The system experience map in Figure 6 represents a collection of findings from the study and was created in order to communicate the user and system perspectives. It combines the dimensions of navigating in a shopping centre context and how users build connections between different services.

The horizontal axis shows the journey inside the shopping centre and the vertical shows how the services link together in a longer time frame as stories (see Figure 7). The difference to tools, such as the customer journey, is that the elements are not separate service moments but services connected to each other by users' associations. The order and existence of these story elements cannot be tracked down in a similar way as in customer journey or service blueprint. The customer journey on the horizontal axis ties the abstract mass of experiences into practice. The creator of a map is an editor who spots series of services from the stories that the users share. This map simplifies a big system into manageable collection of connected services that the users see as relevant and meaningful.





In order to maintain empathy and provide rich inspirational material quotations and pictures from observation and interview situations can be attached. A flow-type of representation technique was chosen to represent experiences even though the more realistic techniques, such as images and narratives, have traditionally been seen more effective in describing experience (Diana et al., 2010). This was because through maps and flows it is easier to show associations and relationships that people form between services through experiences in an economic way.

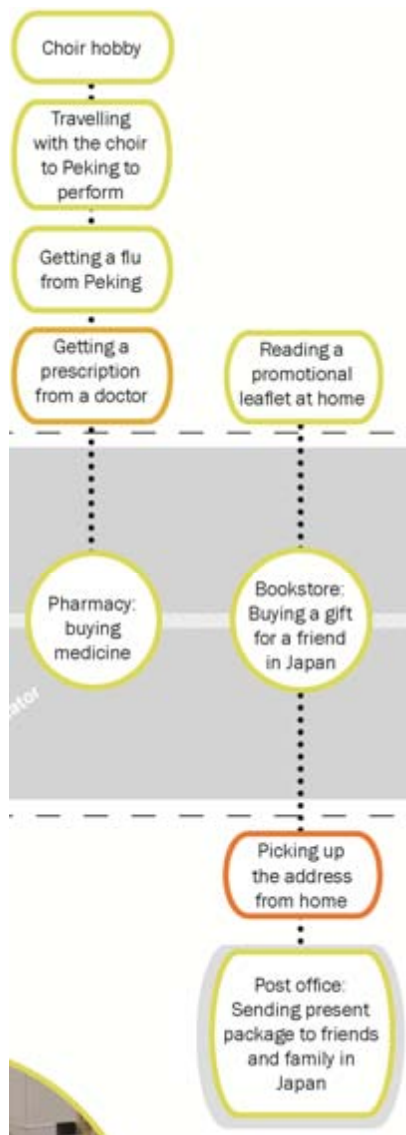


Figure 7: Services linking together as stories, a detail from Figure 6. From these two examples it is possible to see how a seemingly simple visit to a pharmacy or a bookstore in a shopping centre is actually intertwined with a use of multiple services. From these service chains it is possible to find service opportunities, partners for co-operation, as well as ways for understanding the users' processes also outside the service provider's service (in this case the shopping centre).

## DISCUSSION

There is a need for visualisation tools that are suitable for representing systems. During the process the existing service design tools were explored, developed

and in the end, a novel way of presenting service systems was introduced. This tool shows only one angle to the system and, as always, applying multiple tools provides a complete understanding about a system.

We have not yet tested the tool with service providers. However, we suggest that from an individual service provider's point of view the benefits of analysing a system deal with understanding how the service works as a part of a bigger whole. Who are "the others" in the same system and what kind of influence their actions can have in our service? Questions such as how the brand is positioned in relation with other services and how the service could be localised to fit the environment it is serving are addressed. Through these analyses it would be possible to find strategic partners and service networks. From a service system management perspective, it is important to understand that different services are not in conflict but support each other. By analysing system experiences one could better understand user needs and how successfully they are met.

One of the most challenging tasks for a researcher is to identify the boundaries of a service system. Maglio et al. (2006) have suggested that it can be done by identifying and interviewing stakeholders. This approach, however, has two problems, 1) often service systems grow that big that interviewing all the stakeholders is impossible or at least uneconomical and 2) identifying the stakeholders is one of the results of analysing the system, and they are not all known at the beginning of the process. In this study the topic of stakeholders was approached from the customer point of view by analysing what kind of combinations services create. The tool enabled seeing how services are connected to each other through stories. The stories are not formed only for the person to make sense of his world but they are also shared to others and communicated over the sphere of influence the service already has. The benefit in this approach is that also silent stakeholders can be found. By silent stakeholders it is meant different parties who are not part of the formal service system and do not hold a place in documents or organisation charts but still contribute or influence the service creation process. These silent stakeholders in the shopping centre case study were, for instance, a bus line passing for bringing customers, and a school program where all the students were required to bring a new book to school every month. Predefining the stakeholders has a danger that the silent stakeholders as well as opportunities for co-operation and finding new service ideas are not identified.

In the case study the system experience map helped in understanding how services affect each other from a distance and how also services outside of the shopping centre are present through the users. It provides new entrypoints to a service system and how it could be developed. By analysing, for example, individual, person to person services taking place in a service system there is potential in finding service opportunities



because through these actions the users fill in the gaps that the system might have. After identifying the most interesting actors in a system, other tools, such as blueprinting, can be utilized in a more detailed investigation.

The system experience map is a result of an iterative process and was created for the purposes of this study. However, we believe that it could be used in other contexts as well. The utilization of the system experience map can open new ways of seeing a system and it helps one in putting himself into the position of different users. Visualizing systems with multiple actors and processes is challenging. The biggest challenge lies in the massive amount of information and what parts of this information should be included and what not. These questions remain to be studied in future research.

#### ACKNOWLEDGEMENTS

We are grateful to Tekes for funding the SBC project, to Aalto Service Factory and Risto Rajala for supporting this study.

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# DESIGNING WITH SMART TEXTILES: A NEW RESEARCH PROGRAM

LINNÉA NILSSON

ANNA VALLGÅRDA

LINDA WORBIN

LINNEA.NILSSON@HB.SE

ANNA.VALLGARDA@HB.SE

LINDA.WORBIN@HB.SE

THE SWEDISH SCHOOL OF TEXTILES, UNIVERSITY OF BORÅS, 501 90 BORÅS, SWEDEN

## ABSTRACT

No longer is it sufficient to add 'smart' to textiles to secure interesting research results. We have surpassed the initial stages of explorations and testing and now need to raise the bar. We have thus specified a research program in which we investigate what it means to design with smart textiles. *What* can we design with smart textiles? And *how* do we design with smart textiles? We now explore how these complex, often abstract, materials can enter traditional design practices and what role smart textile can play in the design of our environment. In this paper, we discuss the challenges we see at present, we outline our new research program and we qualify it through three examples of our ongoing projects: The smart textile sample collection, Dynamic textile patterns, and Bonad [tapestry]. The paper is as much an invitation to join forces, as it is a description of a maturing process within design research. We are over the first love, now what?

## INTRODUCTION

For over a decade, we have in various constellations with other researchers experimented with smart textiles (Redström *et al.* 2005; Worbin 2010a). We have become familiar with the basic aspects of this composite material—its vast potential and its practical limitations. We have seen and demonstrated a wide range of possible expressions (Post *et al.* 2000; Berzowska and Coelho 2005; Redström *et al.* 2005; Braddock-Clarke and O'Mahony 2006; Seymore 2008; Worbin 2010a).

However, research into smart textiles has gradually surpassed the stage where anything 'smart' in a textile context is new and thus has a research value. Thus, we need to reformulate our research program (cf. Hallnäs and Redström 2006).

The new program is concerned with what it means to design with smart textiles. How the smart textiles can enter existing design practices and production processes and what these new material possibilities will do to them in turn? We will investigate what role smart textiles can play in the design of our physical environment and contexts of use. Before we go on to elaborate on the research program by means of three ongoing projects, we give a brief status of the smart textile research that has led us in this direction.

## SMART TEXTILES

We can generally define smart textiles as a material that interacts with its environment in more or less complex ways, including textiles that react and adapt to their environment. The research we summarize here is that which has directly led to the formulation of our new research program.

We have become familiar with what smart textiles can and cannot do with present day technologies. We master the skills of making them, and we have demonstrated a range of expressions (Redström *et al.* 2005; Landin *et al.* 2008; Bondesson *et al.* 2009; Worbin 2010a). Obviously, new developments happen continuously: new dyes, new fibers, new electronics, etc., but the basic principles are likely to stay the same for now.

We have learned how the design of dynamic patterns bare strong relations temporal arts, like music, movie etc. (Worbin 2010a). And, we have learned to think of the textile as a layered set of expressions consisting of the construction technique (i.e., weaving or knitting) combined with the materials (i.e. the yarns), the after-treatment (i.e., printed patterns) and the textile's dependence on its surrounding conditions (whether, and how it reacts to or even adapts to events in the environment). Seeing these layers it becomes apparent that a designer of smart textiles must handle new variables regarding the temporal and environmental context (Worbin 2010a). We are still, however, to find out how to handle these new variables in practice.

From another perspective, we have learned that smart textiles are difficult to grasp both physically and mentally—physically because they primarily exist as abstract notions of possibilities and mentally because they hold expressions that come to be in context over time (Bergström *et al.* 2010). We have suggested overcoming these difficulties by creating low-fi large-scale prototypes as a method to play with the expression before getting entangled in technicalities. However, we need a larger repertoire of methods to suit the range purposes for designing with smart textiles. Furthermore, only few commercial products embed smart textiles and the dissemination seems to happen primarily as do-it-yourself handicraft (cf., Buechley 2006; Buechley and Hill 2010). Hence, there is a need to investigate present textile design practices as well as to develop new practices for smart textiles.

We have also changed our understanding of computers in this process (Hallnäs and Redström 2008). Where the role of the textile in the beginning was to serve as computer displays it is now back as textile material in its own right. Computers and other electronics, instead, serve as a raw material that can be combined with textiles to form composite materials with new properties (Redström 2005; Vallgård and Redström 2007).

We have built prototypes of products out of smart textiles, and we have studied their use in context (cf. Ernevi *et al.* 2005; Redström *et al.* 2005; Hallnäs and Redström 2006). Still, however, we have little understanding of the full design potential of smart textiles. Little understanding of what we can do with these expression-changing and context dependent textiles.

These are the challenges that make up the foundation of our new research program.

## RESEARCH PROGRAM: DESIGNING WITH SMART TEXTILES

The two main questions coming out of the work so far are:

How do we design with smart textiles?

What can we do with smart textiles?

These questions form the frame of our new research program. *What* we can do with smart textiles are obviously linked to *how* we do it and vice versa. However, the smart textiles, defined by their material properties and behaviors, will in and by themselves usually have a stronger influence on both *what* we can do and *how* we do it. And it is exactly this influence of smart textiles we will explore within this program.

To carry out this program we primarily draw from the research traditions of textile design and interaction design.

## TEXTILE DESIGN

There are two important elements from the textile design tradition that will play a role in our further studies of smart textiles. One is related to the division of labor and the other to the design variable at play in the practical process of design.

Traditionally, the development and design of textile products and applications are layered enterprises with multiple roles and responsibilities. The road from the fiber to the finished application often starts with textile engineers developing fibers, yarns, and construction, textile designer(s) designing the structure and pattern of the fabric and finally other designers such as industrial or fashion designers using that fabric in their endeavor to create products or clothes. Smart textiles, however, have proved difficult to fit into this division of labor, primarily because it is impossible to develop by the meter for designers freely to place and integrate in their designs. Indeed, it seems necessary to break up the divisions between the disciplines and find new ways to integrate the design of the textile into the design of the garments or the interior. This brings up questions of how to actually deal with smart textiles in design practice. How can smart textiles enter traditional design contexts when they are seldom accessible for purchase? How can the potential of smart textile be communicated in the context of a design practice?

The design variables traditionally at play in a textile design process such as yarn quality, structure, color, shape, and rhythm are all challenged by different types of smart textile possibilities as they are expanded with state changes and thus significantly extended in their complexity. Indeed, we need to investigate what this complexity entails in a design practice and how can we find ways to deal with it.

## INTERACTION DESIGN

Smart textiles offer the possibility of having the material to respond to actions—a trait we otherwise primarily know from finished products. Interaction design is a design practice and research field that deals with the context specific actions of use as well as the temporality embedded in any computational design (cf. Hallnäs and Redström 2006; Mazé 2007). As such, interaction design should be able to provide some understanding of what it means to design responsive environments. Furthermore, a recent trend within interaction design is to perceive the computer as a material for design which means that are starting to emerge practices around giving forms to computers in comparable ways to giving form to smart textiles (Vallgård and Redström 2007; Robles and Wiberg 2010; Vallgård and Sokoler 2010). Indeed, it seems like the two disciplines could have something to offer each other when it comes to developing new design practice around complex materials. With a background in interaction design we will investigate what it means to design with materials that changes in context over time. How the changing expressions can be used consciously as a design

parameter. And particularly, what design spaces smart textiles can open as well as the constraints they invoke.

Generally, within this research program every investigation takes its outset in the material—whether it is the material’s role in the design process, or the materials influence on the design of products and environments. Thus, the investigations comprise material experiments and prototyping, prototypes of textile things, studies of design practices, and interventions into contexts of use. Essentially, with this program we shift the focus from the material in and by itself and begin to study it in a larger context of design.

## PROJECTS WITHIN THE PROGRAM

In this section, we will outline three of our ongoing projects and show how each explores different aspects of our new research program.

### SMART TEXTILE SAMPLE COLLECTION

Smart textile sample collection is project in which we develop a collection of smart textile raw materials with various qualities and properties. The collection will serve both as a dissemination platform for the potential of smart textiles but also as an opportunity for us to have a repertoire to draw on in future projects (Worbin 2010b). In a sense this project can be seen as a bridge between the previous program and the new. It will give a picture of what we can do with smart textiles at present, but it will also serve as a new starting point for future projects—a step above square one.

The collection will comprise “raw” samples of smart textiles that can be used directly as sketch or prototype material. This means, for instance, that the samples printed with thermo chromatic ink are designed as generic patterns to suit a wide variety of expressions. Currently, we have made approximately 100 meters of fabric design from five different principles. Four of which are woven cotton printed with different thermo chromatic inks, and one is another quality of woven cotton with strategically embedded conductive threads (see Figure 1 and 4). Additionally, we have a collection of conductive knitted textiles though only as test samples that we can reproduce when needed (see Figure 3).

The project also includes a series of workshops for various kinds and levels of designers. They are here given the opportunity to sketch and work directly in the material as means to gain some experience. The workshops also serve as a feedback platform for us to learn how the samples work as conveyers of the larger potential of smart textiles.

This project will run along side the other projects and gradually expand in size and complexity.



Figure 1 Sample of woven cotton with conductive threads on one side. The threads can serve as heating elements and thus change the color of a thermo chromatic pattern printed on the other side.

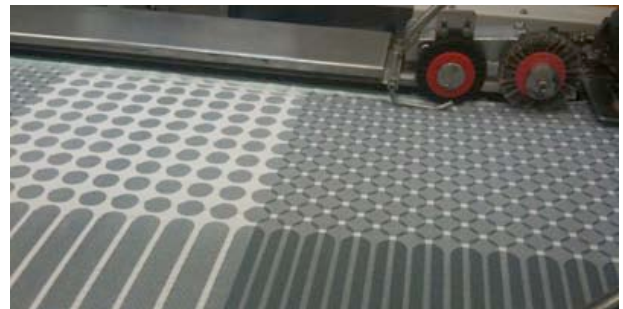


Figure 2 Sample of cotton printed with gray thermo chrome ink that turns white when heated above 27°C. Half of this sample is moreover coated with acryl to give a stronger surface for prototyping.



Figure 3 Three samples of textiles knitted with different strength of conductivity. Left: knitted copper with viscose. Center: knitted blue mohair with brass. Right: knitted turquoise cotton with stainless steel.

### DESIGNING DYNAMIC TEXTILE PATTERNS

Dynamic textile patterns, is an ongoing project where we investigate the complexity of designing with smart textiles.

In one experiment we have worked with a Swedish furniture company who wanted some concept furniture to demonstrate possibilities for smart textiles in furniture design. We designed the fabric for two footstools by using the woven conductive fabric (see Figure 1) from the smart textile sample collection and printed it with thermo chromatic ink. The general concept was that sitting on one of the stools would result in a pattern change either in the same stool or in the other.

In this experiment, we have through our own design practice been able to analyze the complexity of designing with state changing materials. In some cases, we can suggest strategies, or tools to deal with the



complexity in the design process. For example, in the case of designing the temporal pattern of the dynamic pattern we used with success a combination of a “note sheet” and a graphical interface to gain an overview of the sequence of the changes (see Figure 4). In other cases, however, we are still at a loss for how to cope with the complexity in a useful way. For example, putting together the color palette for one of the patterns, which in it self was a collection of patterns, proved to be incomprehensible (see Figure 5). At first we thought it was a matter of merely composing the two possible color states so they all would fit a coherent expression. We soon realized, however, that the actual transition between two states also contained a range of colors resulting in combinatorial possibilities that at present is difficult if not impossible to sketch. Obviously, this experiment will lead to new experiments where we will try different strategies and hopefully be able to develop new tools.



Figure 4 Left: The graphical interface of the software on computer screen. Right: picture of the “note sheets” to visualize the progress of the heating.



Figure 5 An example of the range of colors expressed in the transition between two color states.

#### BONAD [TAPESTRY]

Bonad [Swedish for tapestry] is a project investigating what it does to the depth, complexity, and quality of the designed textile expressions when one part of the material composition is held stable throughout the design process. Bonad is a platform comprising 1-48 servomotors mounted on a surface controlled by a computer, which in the test setup is controlled either through a graphical interface or through a row of potentiometers. We investigate whether such a platform is a viable way to reduce the complexity of the technological aspects and thus leave room for more advanced textile design.

From a textile design perspective the platform is used for developing new textile structures and patterns that can achieve interesting expressions with this kind of slow or rapid explicit rotations. How, for instance, a textile surface becomes more or less permeable, how it changes from a smooth surface to one with three dimensional features, or how pattern combinations can play together through the rotations. We expect to end up with an understanding of the potential expressions of textiles in composition with this kind of movement.

From an interaction design perspective we investigate how textiles in movement can influence and be influenced by the atmosphere of a room (Landin *et al.* 2011). Currently, for instance, we are experimenting with different combinations of context dependent behavior for a setup in a chapel and in an elderly home. As means to get an understanding of what new roles smart textiles can play in our environment.



Figure 6 Above shows an example of texture changes for a 3D knitted elastic surface and below shows of movements within a stiff 3D knitted construction. Both designed by Delia Dumitrescu.

#### AN INVITATION

This paper describes a process of the maturing of a research field from the initial explorations designed to give a basic understanding of what is at play, to formulating more specific questions and designing more focused explorations. The research program proposed here is still, however, a sign of an early stage in a research field. It is a program formulated to find ways for the new materials possibilities to reach a greater audience in parallel with studying in what this could mean for the design of textile products and environments.

The reason for publishing the formulation of this research program is not only to demarcate the maturing of the research within smart textiles, but also to formulate an invitation for others to participate. Participate both in discussing the direction we are taking

but also to contribute with own experiments and investigations—perhaps even in collaboration with us.

## ACKNOWLEDGEMENTS

We thank Vinnova Vinvext, for the funding of our overall Smart Textile program. We thank Prototype Factory for funding of materials in all three projects. We thank to Carranza, Gamlesaeter, and Redström at the Interactive Institute for the idea to the Bonad platform and for letting us continue to develop it. Finally, we thank all researchers in the Smart Textile Design Lab who are carrying out all the research within this new program.

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# INTEGRATING SUSTAINABILITY IN A REGIONAL DESIGN SECTOR

SIMON O'RAFFERTY

ECODESIGN CENTRE, UK

SIMON@EDCW.ORG

## ABSTRACT

Recent developments in European design policy are strengthening the links between design and sustainable development. Therefore, it is increasingly important to understand evolving perspectives on sustainability and develop new approaches to building competencies amongst designers so they are in a position to respond and remain relevant. The potential mix of competencies is diverse and is challenging traditional perspectives on the role of the designer.

This paper discusses interventions to build sustainable competencies in the design sector. It does this by presenting some insights from the early stages of developing a knowledge exchange programme in a region that has no existing programmes for sustainability in the design sector. This programme development was led by the Ecodesign Centre and was supported by the Welsh Assembly Government. The preliminary insights are drawn from two co-development workshops with designers in Wales and additional research undertaken by the Ecodesign Centre. The paper doesn't set out generalised policy recommendations but indicates some key areas for further discussion based on early empirical insights.

## INTRODUCTION

Sustainability is pervasive. It is a decades old framework that is increasingly part of mainstream discussion. We are seeing traditional sustainability issues such as poverty, climate change, well-being, sustainable consumption and resource efficiency being debated at the highest level of policy and economic development. In addition to this, European innovation policy makers are developing a wider understanding of the role design plays in sustainable development, as opposed to a traditional emphasis on a technological push. These recent policy discussions place a greater emphasis on the role of design within the innovation system both as a facilitator of innovation adoption and adaptation and as a key response to the challenges of sustainability. These two issues, sustainability and innovation, are now being drawn closer together than ever before.

Innovation, in its broadest sense, has always been central to sustainable development but there is a greater interest and emphasis on the need for open, systemic and potentially disruptive innovation. This emerging systemic context requires interdependent approaches to innovation alongside new innovation models, policy mechanisms and forms of governance. There is a need to find new ways to bring about innovations, incremental or radical, and products and services that are better adapted to the new context of climate change and economic instability.

Design can improve the sustainability performance of existing products and services while framing new key challenges, humanising technology and influencing positive consumer behaviour. While this is well understood in the literature, there is still much to learn from a policy and commercial perspective on how design and innovation interact and mutually reinforce each other to create net positive outcomes.

Designers are expected to acquire new competencies in terms of design management, innovation, service and strategic design. Designers are also expected to develop new competencies in terms of transformation and participatory design, socio-entrepreneurship, user-

centred and ethnographic design, ecodesign, eco-innovation and responsible design.

Many regions attempt to build competencies through public or semi-public infrastructure and private sector oriented policy measures. More recently, regional policies are taking a systems perspective by developing an infrastructure for linkages and co-operation between actors and agents with a particular region or network of regions (O'Rafferty & O'Connor 2010). The last few years have seen an increasing amount of discussion on the role of "design thinking" as a strategic dimension to design practice i.e. design doing. Much of the new expectations on design still fall outside of the traditional skill sets of designers (e.g. ideation, prototyping, needs defining, user insights). There is also some debate about whether these new competencies are being nurtured effectively by design education or driven by the market. These are clear challenges that are in part being tackled by some national governments and intermediary organisations.

## METHODOLOGY

This paper adopts a multi-methodological approach, utilising a variety of different data sources and methods to provide insights (Figure 1). Data was collected through a literature review, best practice scanning of other regional programmes, scoping discussions with policy makers, and workshops with designers. These workshops were delivered during a feasibility phase of developing a regional design programme. Thus the methodology did not follow a linear process. Instead it was performed according to an iterative process, evolved by interaction between a theoretical foundation (knowledge transfer, capacity building) and empirical material (literature review workshop outputs).

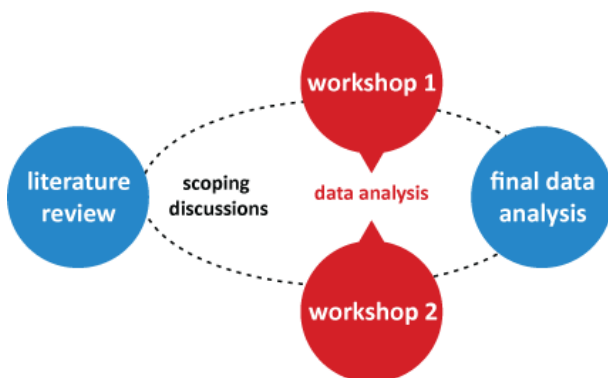


Figure 1: Methodology

## RATIONALE FOR COMPETENCE BUILDING

The main rationale for government intervention in the economy has been market failure rationale. In the market failure approach, market mechanisms must fail to efficiently (or effectively) deliver on public policy objectives and any intervention must lead to an improvement of the condition (O'Rafferty & O'Connor 2010). In his report to the UK treasury, Sir Nicholas Stern suggested that climate change "is the greatest and

widest-ranging market failure ever seen" (Stern 2007). The author would suggest that in combination to this, the sustainability challenges we face in terms of material scarcity, pro-sustainability behaviour change, ageing societies, poverty and health form part of a strong rationale for intervention to build competencies in design for sustainability. In addition to this strategic rationale there are other key rationales to consider. These include;

## FRAGMENTATION OF COMPETENCIES

Within different design methodologies and standards there are a number of management frameworks and tools that provide insights on the outcomes or analytical processes of designing in a more sustainable manner. These include full life cycle analysis, full life cycle costing, new material considerations and increased standardisation. These frameworks are often challenging for designers and design managers as they incorporate processes and technical requirements outside of traditional design expertise. In the context of sustainability designers are also required to consider new social contexts such as social exclusion, poverty, gender parities and politics. There are a number of areas that often remain overlooked in the literature such as adaptations needed for business organisations to put this knowledge into practice and the key capacities and competencies required by designers to implement these frameworks and tools.

It is accepted that to design in the context of sustainable innovation an organisation or company requires more than design process modifications or additional data analysis. The organisation requires a strategic understanding of the multi-stakeholder context and to initiate organisational learning and cross-functional integration. This is a challenge for traditional design management systems, as it requires communication feedback across groups that would not traditionally be integrated. If companies can facilitate these strategic changes they set the conditions for proactive and agile design processes capable of sustainable innovation.

## UNDER REPRESENTATION OF DESIGN IN GOVERNMENT INTERVENTIONS

The design sector is often under-represented in public support programmes for innovation. This means there is a significant gap in how regional governments can encourage the development of environmentally superior and sustainable products and services. This creates a significant risk of market failure whereby the objectives and strategic priorities, in terms of sustainable development and innovation, will be difficult to achieve. Therefore, there is a need to understand the needs of the regional design sector and explore the best options for knowledge exchange on sustainability.

## INSIGHTS FROM WALES

### THE DESIGN SECTOR IN WALES

Wales is a small nation within the United Kingdom (UK) and it is one of handful of countries worldwide that has built sustainable development built into its constitution. The industrial legacy of Wales is strongly linked to mining, quarrying and textile manufacturing. As Wales continues to make the transition to a post-industrial society, there is an increasingly strong policy focus on the creative industries as a sector for prosperity.

While Wales contains approximately 5% of the UK population it accounts for only 3% of its design business, with approximately three and a half thousand designers (Design Council 2010). A study undertaken by the Ecodesign Centre and Cardiff University in 2007 suggested that of 250 Welsh companies with a self specifying design capacity surveyed approximately 50% use some form of external design consultancy (O'Rafferty et al. 2008). This would suggest that many businesses in Wales undertaking new product or service development do not have in-house design capacity

The design industry in Wales covers a very broad group of activities and includes interior, product, packaging, furniture, web and digital media, graphic, spatial, apparel, fashion and service design. These include companies offering consultancy services on new product or service development, innovation and packaging.

There are a handful of intermediary organisations and grassroots networks supporting the design sector in Wales. These include the Ecodesign Centre, Design Wales, SEE Project, some knowledge exchange programmes run by universities and design sector-led activities.

### KEY INSIGHTS FROM DESIGN WORKSHOPS

The Welsh Assembly Government contracted the Ecodesign Centre to explore the feasibility, scope and potential for a knowledge exchange programme on sustainability for the design sector in Wales. The purpose of a knowledge exchange programme would be to build sustainable competencies and literacy among designers.

The Ecodesign Centre organised two co-creation workshops in Cardiff to engage the designers in defining this network. During the first co-development workshop, approximately fifteen design companies from the Swansea, Cardiff and Mid-Wales areas came together to collaborate and share experiences. The workshop was divided in two parts. The first part involved inspirational talks from leading practitioners with an informative and challenging questions and answers session. The discussions placed broad sustainability issues in the context of design practice and challenged the designers in terms of personal

perspectives, commercial expectations and potential social-political complacency.

The second phase of the workshop included a "60 minute design challenge". This workshop was structured around three conceptual themes;

- Purpose – This theme was to address the key needs of the sector and what the opportunities the sector could gain from engaging in a knowledge exchange on sustainability
- Solutions (issues to tackle) and
- Ingredients (Values, inspiration, action)

This structure allowed for a deeper discussion and exploration on the needs and aspirations of the design sector. The process for the workshop included generation of ideas using post-its and recording of these on flip chart sheets, discussions and prioritisation, preparation of group priorities (oral or visual format) and presentation back to the whole group.

A few months later the Ecodesign Centre hosted a second workshop. This second workshop allowed for the refinement and further development of the issues discussed during the first workshop. On the basis of the preliminary insights we selected and filtered out the most relevant and pertinent points for developing a regional intervention. Some of the key reasons why, in the view of the designers, a knowledge exchange network should be developed in Wales were to;

- Identify key sustainability issues (internationally and nationally) and define hurdles
- Share knowledge and learning (including with policy)
- Develop knowledge portal / open source / knowledge sharing / network of suppliers
- Disseminate leading edge thinking
- Share common problems
- Solve local problems (collective creativity)
- Support Independent verification (accreditation) for designers
- Develop Wales' hub of sustainable design
- Develop Welsh brand of sustainable design
- Provide peer review for work
- Provide endorsement through accreditation
- Support skills development and education
- Add value to the eco debate
- Enable inter disciplinary collaboration
- Provide a collective / unified voice for the design sector
- Tap into academic knowledge access research

Some of the key issues that the designers wanted the network to tackle included;

- Materials resources
- Procurement opportunities
- Joint projects / Consortium bids

- Tackle big issues (climate change, waste) through small actions
- Build confidence
- Promote action and demonstrate that it is “not as scary as you think”
- Share suppliers (approved suppliers / welsh suppliers)
- Subsidised resources (learning or knowledge)
- Community based projects

Some of the principles through which the network should be delivered include;

- Inclusive (language and technology)
- Back to basics
- Create an atmosphere for sharing
- Transparency
- Trust
- Tangible outputs
- Collective vs networking
- Scale vs survival
- Common interests around mixed disciplines

## CONCLUSIONS AND DISCUSSION

It is clear that designers in Wales believe sustainability is a strategic design issue and building competencies in this area could create competitive advantage. The workshops suggested that there is a consistent set of macro, meso and micro level barriers to the implementation sustainability in the design sector. These include;

- Low levels of control over the design brief
- Low confidence to introduce sustainability considerations to design specification
- Poor availability readily accessible and useful information
- Incoherent and inconsistent drivers from the public sector e.g. procurement

In order to overcome these barriers, interventions need to be drawn from this multi-level perspective. In practical policy terms, there is a need to move beyond traditional strategies of ‘picking the winners’ and generalised individual business support. These multi-level interventions require a combination of;

- Networks / meta-networks and knowledge exchange
- Clear market signals – pricing, reducing risk and legislation
- Procurement process that are supportive of small business constraints
- Collaborative pitching and open innovation

There were a number of additional recommendations developed through these workshops. These recommendations can be clustered under broad themes.

## STRUCTURED CO-ORDINATION AND PERMEABILITY

It is understood that SMEs, especially in the design sector, are idiosyncratic and heterogeneous. This increases the complexity of developing regional interventions. There is a need to facilitate the structured co-ordination of the regional design system in a manner that facilitates multi-level and demand-led interventions.

The development of multi-level interventions that facilitate structured co-ordination of the regional design system will be challenging for most regional policy makers. Therefore there is a need to address short-term permeability between existing and future interventions to support innovation and sustainability in wider business sectors. This can be achieved through a strategic review of inter-sectoral synergies within which design can be embedded and a horizontalisation of interventions. This horizontalisation can be achieved on a cross-departmental basis or a thematic strategy based on regional priorities.

## PROXIMITY AND TRUST

The role of proximity in facilitating knowledge diffusion and spill-over in regional innovation systems is well understood. This understanding generally rests on the relative importance of tacit versus codified knowledge in innovation. The key role of the regional government in developing appropriate multi-level interventions will be to create platforms through which these regional actors can collaborate while developing face-to-face relationships. It will be important to understand within which regional actors (and design companies) significant sustainability knowledge is embedded.

In practical terms, it will be essential to gain buy-in and commitment from all the relevant actors while developing trust-based relationships. It will be important for all regional actors to agree on the main points of the medium to long term vision of any intervention.

While proximity is a key consideration, there is a latent demand to develop meta-networks that connect regional networks and facilitate transnational knowledge exchange between designers, intermediary organisations businesses and policy makers.

## OPEN INNOVATION NETWORKS

Designers tend to be embedded in multiple networks but perpetually encounter the problems of scale and effectiveness. For example, designers struggle to target larger public sector contracts or have high search costs for new knowledge and expertise. Open innovation networks can improve the efficiency and effectiveness of knowledge exchange while overcoming problems of scale. Networks that facilitate an open innovation approach give designers consultancies stronger incentives to collaborate, access to a wider pool of knowledge, a broader contact base and improved competencies.

There is a need to capture and capitalise on the growing range of social technology and open innovation platforms and embed these within regional interventions. If the knowledge exchange remains codified within intermediary organisations and universities it will be difficult to move beyond incrementalism towards design-led radical or disruptive innovation.

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# INITIAL FINDINGS ON DESIGN AND PRODUCT CATEGORY EXPERTISE IN AESTHETIC EVALUATION

OSCAR PERSON

DELFT UNIVERSITY OF TECHNOLOGY

F.E.O.K.PERSON@TUDELFT.NL

DIRK SNELDERS

EINDHOVEN UNIVERSITY OF TECHNOLOGY

H.M.J.J.SNELDERS@TUE.NL

## ABSTRACT

What appeals to designers does not always appeal to consumers. Still, surprisingly few studies have set out to investigate why designers sometimes favour other designs than consumers. Through an initial study on small-sized cars, we found that the effect of design expertise on evaluations of aesthetic appeal shifted based on an individual's product category expertise. In short, when people knew little about the product category, design expertise demonstrated a positive influence on aesthetic appeal (design *experts* rating small-sized cars as more beautiful than design *novices*). However, when people knew a lot about the category, design expertise showed a negative influence on aesthetic appeal.

## INTRODUCTION

When the Multipla was introduced in 1998, its novel design granted Fiat considerable attention within the design community. Among other things, the car was displayed at the Museum of Modern Art in New York during the 'Different Roads – Automobiles for the next century' exhibition where its unusual proportions and window fittings were celebrated for adding to the car's "enhanced sense of spaciousness" (MoMA, 1998). However, the unusual design of the Multiple did not appeal to everyone. Many consumers saw the design as

weird and unattractive, rather than interesting and appealing, resulting in weak sales for the product.<sup>1</sup>

The situation facing the Multipla represents a well-known problem in design: what appeals to designers does not always appeal to consumers. Recognizing this problem, companies often make considerable investments in planning and conducting research on what consumers find aesthetically appealing (Moulson & Sproles, 2000). Car companies, for instance, reportedly change 30 percent of the colours on their products each year – involving colour consultants three to four years prior to introducing any changes (Triplett, 1995). Several studies have also set out to define what constitutes appealing and appropriate designs for consumers (for a review, see Veryzer, 2000). Still, few empirical studies investigate the underlying reasons why some designs appeal to designers but not to consumers. In this article, we contribute to this gap in the literature on design by exploring the roles of design and product category expertise in aesthetic evaluation.

In many markets, design expertise related to the appearance of new products provides companies a competitive advantage (Ravasi & Lojacono, 2005). A salient example is Apple, who holds a leading position in the computer industry, acquired by introducing products such as the iMac and iPad that through their appearances have redefined how we look at personal computers.

Given the importance of design for companies, our study on expertise is of both practical and academic interest. It is of practical interest as it helps to account for differences between designers and non-designers (consumers). This, in turn, will help designers to more effectively develop products with an appropriate design. Accounting for differences between designers and non-designers is valuable as there is often a great deal of unease among managers when it comes to targeting consumers through the appearance of new products. It is of academic interest to extend on the findings of past

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<sup>1</sup> In 2007, Time Magazine reaffirmed the Multipla's low appeal among consumers when they rated it as the fourth ugliest car since 1990 (Time, 2007).

studies on design and category expertise by considering their joint effect on aesthetic appeal. While both design and category expertise have been shown to influence peoples' evaluations of designs, no study to date has investigated their simultaneous effects. Yet, both types of expertise seem relevant in explaining the differences that emerge between how designers and consumers evaluate the appeal of new products. Designers possess a higher degree of design expertise than consumers do. Still, some consumers can hold a high degree of design expertise (Bloch, Brunel & Arnold, 2003) – meaning that design expertise may vary over and within groups of consumers. Simultaneously, the expertise about the products in a category may vary among both designers and consumers. Some designers use their expertise within a limited domain of products whereas others extend it over different product categories. It is also common for consumers to display greater interest in some products over others, and accordingly, to vary in their expertise about products in different categories. Thus, by studying these two types of expertise simultaneously, we extend past studies on how people form evaluations of designs.

## EXPERTISE AND EVALUATIONS OF AESTHETIC APPEAL

Expertise has long been advocated to influence how people evaluate objects. In the visual arts, experts (such as connoisseurs and museums directors) have been suggested to base their aesthetic evaluations on different visual qualities than novices (Minor, 1994). Goodman (1980) even suggests that experts in art see qualities in objects that are unseen by the untrained eye of the novice. A number of experimental studies also demonstrate differences between how experts and novices evaluate art (see e.g. Hekkert & van Wieringen, 1996).

Differences in the evaluation of experts and novices have also been shown for the design of products. Specifically, two distinct forms of product expertise are found in the literature: *design expertise* and *category expertise*. Design expertise (or acumen) refers to an individual's general ability to recognize and evaluate (high-quality) designs (Bloch, Brunel & Arnold, 2003). Extending Csikszentmihalyi's and Robinson's (1990) work on art to the field of design, Bloch and colleagues (Bloch, 1995; Bloch, Brunel & Arnold, 2003) argue that design experts hold more sophisticated preferences regarding the aesthetics of products than design novices. They also suggest that design experts favour visual over verbal processing and, because of this, place greater emphasis on appearance when evaluating products. In partial support for such claims, Wolter, Bacon, Duhan and Wilson (1989) show that designers' evaluations of a product's colour, size and roughness sometimes differ from those of consumers.

Next to design expertise, an individual's category expertise is suggested to influence how people evaluate products. Category expertise refers to an individual's

level of knowledge regarding products in a category (Cordell, 1997). Extending work on art to the field of design, Hekkert, Snelders and van Wieringen (2003) proposed that product category experts place greater importance on novelty in evaluating the aesthetic appeal of products than novices. However, in subsequent experiments, they were unable to demonstrate such a difference. Instead, they found that experts used novelty and typicality as two separate (instead of opposite) criteria in evaluating the aesthetic appeal of products.

While design expertise potentially extends over product categories – inducing a general effect on what is found aesthetically appealing – category expertise may, in theory, moderate this effect. We ground this idea in the finding that an individual's category expertise influence on what grounds products are evaluated (Alba & Hutchinson, 1987). Based on this, we propose the following: when people know little about a product, we expect high design expertise to positively influence the aesthetic appeal of products as it allows the expert to appreciate qualities that are 'unseen' by the layman. For high category expertise, the relation is however uncertain as experts may have different interests and, accordingly, appreciate different aspects of a design. Thus, we tentatively hypothesize that:

H<sub>1</sub>: The effect of design expertise on aesthetic evaluation is moderated by an individual's degree of category expertise.

## METHOD

To test our hypothesis, we performed an experiment where design and non-design students evaluated the aesthetic appeal of small-sized cars quantitatively, based on photo stimuli. This methodological choice is similar to earlier studies on expertise and aesthetic appeal (see e.g. Hekkert, Snelders and van Wieringen, 2003), and allowed us to (1) study potential cause-and-effect relationships between expertise and aesthetic appeal and (2) do this study practically feasible.

Cars were chosen as stimulus material as car experts can be found among both designers and non-designers (consumers) – allowing us to study the two forms of expertise simultaneously. Similar to Hekkert, Snelders and van Wieringen (2003), we limited the study to a single type of car to reduce the influence of differences in functionality and/or price on the students' evaluations. Further, as the aesthetic appeal of products can be highly fashion-sensitive (Sproles, 1981), we limited ourselves to cars currently sold on the Swedish market.

## PARTICIPANTS

105 students at a technical university in Sweden volunteered to participate in what was described as a product evaluation study. 42 design students were recruited from a course in design management. 63 students (following other programs) were recruited at study centres and cafes at the university campus. As an

incentive to participate in the study, two mp3-players were raffled out among the participating students.

The age of the students ranged from 18 to 38 with a mean age of 23. The sample included both female (33 percent) and male (67 percent) students. Further, both Swedish (80 percent) and foreign (20 percent) students volunteered to participate in the study.

#### STIMULI

Four A5 booklets, incorporating photos of 12 small-sized car in different order, were used as stimuli. The photos were selected so that the front and the side of the cars were simultaneously visible. We digitally removed product names and logos from the cars. Further, as colour can have a prominent effect on how products are evaluated (Grossman & Wisenblit, 1999), we provided all the cars with grey metallic paint to minimize this effect. Grey was chosen as manufacturers typically incorporate it as a standard colour. Thus, by providing the cars with a grey paint, we controlled for the potential effect of colour on the students' evaluations. Further, the grey colour helped in reducing the potential influence of a colour-brand mismatch.

#### PROCEDURE

Each student received a booklet and was asked to go over it and look at each car individually for a few seconds before evaluating the appearance of each car. The purpose of this procedure was to familiarize them with the complete stimulus set prior to the evaluations of each individual car. The students rated the aesthetic appeal of each car on a five-item scale adopted from Hirschman (1986). Their design expertise was measured on a four-item self-report scale adopted from Bloch, Brunel and Arnold (2003). Category expertise is preferably assessed objectively (Cordell, 1997). We therefore assessed the students' category expertise through a knowledge test where the brand name of each car in the booklet should be given.

#### DATA ANALYSIS

We estimated an ordinary least squares regression model to investigate the effects of design and category expertise on the students' evaluation of aesthetic appeal. Prior to estimating the model, we assessed the reliability of the multi-item scales. Alpha coefficients for the aesthetic appeal and design expertise scales were .96 and .74 respectively. We standardized the design and category expertise scales to make their interaction term interpretable (Jaccard, Wan & Turrisi, 1990).

Prior to estimating the model, we also checked for the independency of the two predictors (design expertise and category expertise). There was no correlation between the predictors ( $r(103) = -.01, p < .01$ ). Further, as aesthetic appeal can vary over cultures (Bloch, 1995), we controlled for the students cultural background. A t-test revealed a statistically significant difference between the mean aesthetic evaluation of the Swedish ( $M=3.24, SD=1.39$ ) and foreign ( $M=4.01, SD=1.69$ )

students. We therefore focused our analysis on the Swedish students in estimating our model.

The different cars were entered into the regression model as dummy variables. A significant effect for 11 out of the 12 cars was found. The estimated model explained 29% of the variance in how the respondents evaluated the aesthetic appeal of the cars.

#### RESULTS

We present the main and interaction effects of design and category expertise on the students' evaluation of aesthetic appeal in Table 1.

Table 1: Main results of estimated regression model (N=1007).

	Aesthetic appeal	
	Coefficient (β-value)	Standardized coefficient
<b>Design expertise</b>	-.02 (-.49)	-.01
<b>Category expertise</b>	-.02 (-.61)	-.02
<b>Design expertise x category expertise</b>	-.18 (-3.93)**	-.11**

\*\*  $p < .01$

As can be expected, the model incorporates no significant main effects of design and category expertise on aesthetic appeal; expertise makes people favour different things – cancelling out the main effects in the students' evaluations. However, consistent with H<sub>1</sub>, we find a significant negative interaction effect between design and category expertise on the evaluation aesthetic appeal.<sup>2</sup> In Figure 1, we illustrate this interaction effect using simple slope analysis.

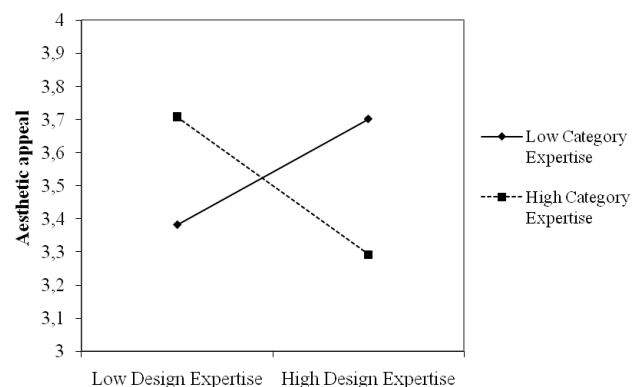


Figure 1: Simple slope analysis of the significant interaction effect for aesthetic appeal (n=1007)

The simple slope analysis shows that low (high) category expertise is positively related to aesthetic appeal, for consumers high (low) in design expertise. Put differently, individuals with high category expertise

<sup>2</sup> In estimating separate regression models, the negative interaction effect persists across all 12 cars – being significant for three cars and marginally significant for an additional two.

report lower aesthetic appeal for the cars in the case they hold high design expertise in comparison to if they have low design expertise. In contrast, low category expertise demonstrates higher aesthetic appeal in the case if an individual has high design expertise in comparison to if he/she has low design expertise.

## DISCUSSION

In this paper, we have sought an explanation for why designers and consumers (non-designers) sometimes differ in their evaluation of products. In an experimental study using photos of small-sized car, we found that some differences may be due to their expertise about products. Specifically, we found that product category expertise moderated the effect of design expertise on evaluations of aesthetic appeal.

Photos of products are commonly used as stimuli in consumer studies on design as they provide stricter control over extraneous influences. This said, viewing photos does not necessarily mimic the full aesthetic experience in use. Future studies may therefore address how expertise influences the aesthetic appeal of objects in a more ecologically valid setting. In studying objects in use, both qualitative and quantitative research methods may provide interesting insights to our phenomena of interest. Further, researchers could explore the effects of expertise on product evaluations using a different sample and/or by studying different types of products for which the product category expertise vary for designers and consumers. In addition, researchers could explore if product category expertise in one area influences an individual's evaluations in other areas. As many companies depend on external designers, such studies could provide valuable information for design managers in selecting which designer to contract for different types of products. With these recommendations in mind, we hope our initial findings will stimulate further research on the role of expertise in design – capitalizing on the benefits of both qualitative and quantitative research methods.

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# VALUE REPRESENTATIONS: A VALUE BASED DIALOGUE TOOL

MAJKEN KIRKEGAARD RASMUSSEN  
AARHUS SCHOOL OF ARCHITECTURE  
MAJKEN.KIRKEGAARD.RASMUSSEN  
@AARCH.DK

MARIANNE GRAVES PETERSEN  
DEPT. COMPUTER SCIENCE AARHUS  
UNIVERSITY  
MGRAVES@INTERACTIVESPACES.NET

## ABSTRACT

Stereotypic presumptions about gender affect the design process, both in relation to understanding users and how products are designed. As a way to decrease the influence of stereotypic presumptions in the design process, we propose to view gender through a value lens. Contributing to this perspective, we have developed Value Representations as a design-oriented instrument for staging a reflective dialogue with users. Value Representations are fictional, value-driven concepts developed to promote dialogue with users about their values and how they may materialize in their everyday lives.

## INTRODUCTION

Bratteteig (Bratteteig 2002) points out that discussions about gender and design primarily address the product side of design, rather than how gender affects the design process. She points to the relevancy of studying gender in relation to the design process, as products are influenced by the gender presumptions held by the designer. Huff & Cooper (Huff & Cooper 1987) has studied how gender stereotypes, held by designers and programmers, affect what they design. They conducted an experiment, where they engaged software designers to build educational software for boys, girls, and students. The stereotypic presumptions about gender led the software designers to design different software for the three categories. The designs for boys and students were very similar, while the design for the girls were based on stereotypical girlish activities. The designers thus built a gender script into the design, supporting the stereotypic notions of what is girlish. The examples illustrate how easy it is to stumble into the pitfall

of simplifying gender into the pervading cultural stereotypes, when designing artefacts. And although the gender stereotypes might hold true in some situations they fail to provide a nuanced picture of peoples preferences and values.

As a way to decrease the influence of stereotypic presumptions in design process, we propose values as a lens to view gender through. Contributing to this perspective, we have developed Value Representations as a design-oriented instrument for staging a reflective dialogue with users. The focus of the technique is to elicit a dialogue, based on a range of fictional products in order to explore and reflect upon a new set of values in relation to a specific product area. The technique has been developed as part of a multidisciplinary research project focusing on creating interaction design for advanced electronic products, based on studies of feminine users. The project explore feminine values, motives, challenges and desires, in relation to three case products; a bluetooth headset to be used with a mobile phone, a music entertainment system and a system for indoor heating control. Historically, and still predominantly IT development is being dominated by males (Bratteteig 2002). The thesis we explore in this paper is that, developing interaction design from a perspective of feminine values, might result in interesting and novel types of product and interactions.

Before we continue we will like to point out an issue of clarification. Some activities and values can be gendered as feminine, but can still be performed and adopted by people of any sex. The gendered values say nothing about how any individual will react towards these or represent these. This paper presents the theoretical grounding for a value perspective and next present the development of value representations and the use of these in workshops with users promoting a reflexive dialogue with users around which values resonate with their lives and how these values may become contextualised with respect to three case products.

## THEORETICAL PERSPECTIVE

Within both Value Based Design (Cockton 2004) and Gender Research (Bardzell 2010), there seem to be a



scarcity of concrete techniques and approaches to how value and gender can be used generative in the design process. With Value Representation we propose to help fill the gap within both fields, through providing a concrete tool for exploring values and gender in the design process. The technique is inspired by Gaver's notion of Value Fictions (Gaver & Martin 2000) supported by Schein's theoretical perspective on the relation between artefacts and values. How the technique separates itself from Value Fictions [ibid] is discussed and reflected upon later in the paper.

Value Fictions utilizes fictional artefacts to explore an alternative value perspective in order to broaden a design space and to provoke reflection upon possible relationship with technology. They differ from science fiction by proposing practical technologies for implausible social goals, instead of inventing implausible technologies to support recognisable cultural activities. Schein's (Schein 1992) framework describing values in relation to culture provide theoretical grounding alongside theories of design as communication (Crilly, et.al 2008), for the close relation between values and artefacts presented in Value Fictions. Schein (Schein 1992) distinguishes in his framework, between three levels of values, namely basic assumptions, espoused values, and artefacts. Basic assumptions form a view upon the world. They are *use-values* and affect the way we act and behave in certain situations. Espoused values comprise what people say, but not necessarily predict how they will act in a given situation. Thus an espoused value can either be or not be congruent with the basic assumptions of the group, but this may not necessarily mean that the expressed value is manifested through actions. Finally, Artefacts are constructed environments and social contexts. They comprise physical buildings clothes, interior etc. But they are also verbal and behavioural manifestations. To infer what the artefact is a manifestation of, can be difficult, and should involve an investigation of both the espoused values and basic assumptions connected with the artefact.

We find Schein's framework valuable as it provides a perspective, which accounts for how artefacts can be manifestations of values and in giving artefacts an equal role in defining and exhibiting values, as the people who use them and as a tool for understanding users wishes, motives, and what they strive for.

## VALUE REPRESENTATIONS

Value Representations focus on eliciting a dialogue between designers and potential users, regarding users values and how they relate to a specific context. The dialogue is centred on fictional artefacts, which serve as visual placeholders concretising abstract values. Figure 1 show an example of a value representations used in the dialogue. The role of the value representations is to act as boundary objects (Star & Griesemer 1989) bridging the gap between the designers' perception of the users values in relation to a specific context and the

world and values experienced by the users. The aim is thus not to discuss whether the specific artefact is desirable in the users home, but to discuss the values inscribed in the artefact. Taking Figure 1 as an example, the aim is to debate the desirability of having or loosing control over the music, how music relates to activities in the home, the desirability of artefacts influencing the activities in the home, and artefacts exhibiting awareness of the users. By centring the dialogue on concrete artefacts representing values, we utilize the established lesson of participatory design and iterative prototyping, alongside Star and Griesemer's notion of Boundary objects (Star & Griesemer 1989)]. To achieve the plasticity of the fictional artefacts as boundary objects, while maintaining a common identity (Star & Griesemer 1989) they are presented on paper cards containing a product visualization accompanied by a short text. The cards contain no technical explanation of the products functionality, but if the participants question the functionality of the design, then its plausibility is loosely described in the dialogue.



Figure 1 Value representation example: exploring awareness and empathy: The music system senses the activity in the room and attempts to select music, which is appropriate.

## THE DIALOGUE

For each of the three case products, we conducted one dialogue session, with four users, divided into two groups. The dialogue session was divided into three parts, a warm-up activity, the dialogue based on the value representations, and a final part where the participants reflected on the artefacts. The women, who took part of the dialogue session, were recruited on the basis of a larger study, conducted earlier in the project, where 200 Danish women were interviewed about their relation to technology. The women who participated in the dialogue session were chosen based on three criteria's: living locally (around the second largest city in Denmark), representing different age groups, and that they differed in their relation to technology.

Each dialogue session were based on 16 value representations, presented in three categories each highlighting a different overarching value theme. In principle, the value themes can be established in a range of ways, either through value based cultural probes (Vaida, & Mynatt 2005) or a new company value proposition, the important aspect is to frame a relevant value theme, guiding the design of the value representations and focusing the dialogue. In our case

the value themes stemmed from the project's initial research phase, were we investigated a number of case studies within the area of psychology and HCI centred on how women relate to technology (Colley & Maltby 2008, Dyke & Murphy 2006, Hou 2006, Van Slyke 2002, Wright 2006). Beside the existing research, the value representations are also informed by information on motivations and barriers with respect to the case products that were gathered in four in situ interviews for each of the three case products. The values promoted in the value representations include: supporting social relations, empathy, holistic, and collaboration.



Figure 2 The value representations were used in workshops with 2x2 women for each case product. Participants were asked to discuss and reflect upon the individual value representations as well as judge between them.



Figure 3 Example of Value Representation illustration: The scarf creates a private sound space, which allows you to talk privately in the public space without being overheard.

#### DESIGNING VALUE REPRESENTATIONS

The basis for designing the value representations, were a specific product and the set of values. However instead of focusing on the specific product, the design space are defined by the "service" the product provides, thus defining it by the functionality that makes the product appealing, rather than the product itself. Defining the design space, as the service the product provides, made it easier to shed existing preconception about the product as a type and redesign it based on a new set of values. In our case we worked with a headset, an indoor heating system and a music entertainment system, but defined the design space for the aforementioned case products as 'flexible communication', 'high quality indoor climate' and 'high quality music experience'.

In order to obtain a finished look and sense of realism in the value representations, without spending a large amount of time on designing each representation, they were created as collages utilizing different images of

existing products or product concepts. The existing products, were altered to visually to communicate their new function. An example is Figure 3 showing a simple scarf, which is transformed to communicate the creation of a personal sound space. By visually adding the impression a few LED lights on the scarf, it gets the sense of a more "technical product", which might be easier to accept as being able to block the sound.

#### REFLECTION ON THE TECHNIQUE

The value representations worked extremely well for triggering discussions and reactions during the value representation dialogue. However, the challenge of creating a recognizable context and situation became evident. Contextualization and relevancy helped breaking down the boundary between the visualization on the card and the participant's lives. Creating relevance of situation and context, proved difficult, as the group of participants were varied, and it was thus hard to find situations that were relevant across different types of living conditions and life stages, ranging from people living alone, with teenagers and with small children and living in different types of homes, from old houses, to modern apartments.

We were pleased to see that people were able to relate to the value representations and put them into the context of their own lives. The reactions to the value representations showed a varied spectrum, ranging from strongly positive and negative feelings, to perceiving them as silly, helpful or even too far out. But they clearly made people envision and relate to new opportunities, as one of the participants put it: "*You start thinking about issues you did not realize that you could think of in this way*". However, as argued by Schein there is no guarantee that the responses made based on the value representations are grounded in basic assumptions rather than espoused values, as the gained information is still based on responses rather than actions. But as a way of seeking to overcome this, we sought to ground the participant's answer, through steering the dialogue towards exemplifying very specific situations relating to their lives, rather than relying on generalized answers.

#### DISCUSSION

Value representations bare close relation to Dunne and Gaver's (Dunne & Raby 2000, Gaver & Martin 2000) notion of Value Fictions, but differs on two points, their role and relation to users. Fictional artefacts are the core, in both value fictions and the value representations, but they differ in relation to what role the artefacts play. The aim of Value Fictions is to be critical and question people's lives through exploring values that are currently socially implausible. The fictions serve a range of roles: a workbook for encouraging a process of imagination with partners (Gaver & Martin 2000), artefacts challenging current assumptions about computers (Dunne & Gaver 1997), or placebo objects taking conceptual design beyond the

gallery into everyday life (Dunne & Raby 2001) Value Representations has the opposite intention, the aim is explore values that are socially plausible and desirable, but hitherto has not been manifested in a specific product area, through gathering knowledge about the values' desirability in a dialogue with users. What is sought is not to present a critical view on people's relationship with artefacts, but to place the focus on whether existing artefacts fit people's values or just blindly follow existing preconceptions about how products should be and what values they should be built upon.

## REFLECTION

The value representations are design-oriented in a double sense, in that they explore directions and designs for possible futures as well as drawing upon design skills in the creation of the representations themselves. The design focus is not on creating value representations as designed products, but on them being visual placeholders of ideas and tools for people to relate to a broader design space encompassing a larger variety of underlying values than prevalent products presume. Value representation also represents a value-driven approach to product and interaction design innovation in that values and services are the starting point of the innovation process. Finally, value representations is a tool for both exploring a broader set of values as well as an approach to addressing gender in design.

## ACKNOWLEDGMENTS

We would like to thank the reviewers for their insightful and helpful comments.

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# TIME TRAVEL, A METHOD FOR PLAYFUL FUTURE-ORIENTED USER RESEARCH

THEO ROODEN, PAUL EG, RIANNE VALKENBURG  
RESEARCH GROUP KNOWLEDGE TRANSFER IN  
PRODUCT INNOVATION  
THE HAGUE UNIVERSITY OF APPLIED SCIENCES  
M.J.ROODEN@HHS.NL

## ABSTRACT

This paper describes the development of a user research method called ‘Time Travel’. The aim of the method is to inform and inspire designers with imagined futures by consumers. The method should give answers to the following question: How do consumers imagine technological and social developments to have an impact on their personal lives (in a certain domain)? An engaging game concept was developed in a research through design process: generative activities alternated with evaluating mini-experiments. The metaphor of time traveling shaped the design vision by presenting elements such as the suitcase (anchoring the imaginations in the here and now), and fuel (informing players about technological and social developments). The ‘final’ version showed opportunities to indeed transport consumers to possible futures. Further development of the method needs to focus on having players actually integrate the information on future developments (the fuel) with their personal contexts. This might be achieved by using the strengths of the game in individual interview

sessions with consumers.

## INTRODUCTION

A plethora of user research methods exist (e.g. IDEO, 2002; Goodwin, 2009). Researchers and investigative designers gain detailed insights in consumers’ doings. These insights are key to successful human centered design processes (Valkenburg *et al.*, 2008). These insights are not a goal per se, but a source of information and inspiration for designers in human centered design projects. Current ethnographic methods of user research may overwhelm designers with detailed information on present situations, probably hampering inspiration instead of presenting new opportunities. The bridge between user research and design has been a research topic in recent years. For instance, Sleswijk Visser (2009) focused on involvement of designers in user research projects and on communication of results of user research. Brandt (2006) developed playful ways for design teams to adopt information from user research.

In this paper we share our experiences with the development of a method called ‘Time Travel’. We explored possibilities to bring the future into user research and let consumers imagine personal futures. The aim of future-oriented user research would be to gain more relevant and more inspirational insights than is gained with current methods.

Three basic aspects were rendered important for methods to elicit personal future narratives from consumers.

(1) *Personal narratives*. When talking about the future it is our experience that people are inclined to make general statements and predictions. Only a small number of people, domain experts and futurists, have sufficient knowledge for grounded general statements. In our Time Travel method we were not after laymen’s predictions and armchair visions on the way of the



world. Rather, given certain plausible future technological and social/societal developments in the world, how would consumers see this having an impact on their personal lives?

(2) *Awareness of the current context.* Consumers need anchors in the present to reflect on their personal futures in meaningful ways. Who they are now, and what they are doing now should serve as jump-point and guide their imaginations of their future lives.

(3) *Games.* Futures and future scenarios can be explored via games and role-playing. Games enhance engagement, active participation and motivation, and they transport people to other worlds in time and/or space, freeing them from their present context. New, surprising and unexpected events are labeled in positive ways during games. Using games is not new in human centered design. Industry and academia use serious gaming for scenario-development and playing with scenarios (Brandt, 2006); Johansson and Linde, 2005; Rotte *et al.*, 2009; Valkenburg and Rooden, 2009). In many of these games multidisciplinary teams of professionals imagine the future from various angles. Information from preceding user research is available in these games. It is specific to our approach that the game is part of the user research itself with consumers as players. The results of the Time Travel method are to be used for scenario development.

Our research question was: How do the aspects (1) personal narratives, (2) awareness of the current context, and (3) games contribute to future-oriented user research?

## APPROACH

In our project we adopted a method of research through design. Insights and hypotheses are generated, not only via testing and empirical research, but also via generative and creative activities. Choices in design create stimuli to be tested in informal mini-experiments, triggering further choices and adaptations. The robustness of the insights and the quality and relevance of the design are more formally tested in later phases.

The project was carried out by the first two authors of the paper: a senior researcher/designer and a student Human Technology. In all some 45 players participated in the evaluating experiments. The project started in February 2010 and was finished in July 2010.

In this paper we first present our design vision, followed by a description of the process of design ideas and evaluations. We conclude by presenting the final design and discussing our gained insights.

## DESIGN VISION

### TIME TRAVEL

At the start of our project we were playing with the metaphors of time machines and time traveling. The term time-machine was coined at the start of the project,

neglecting the journey itself. Putting emphasis on the journey, both the outward and homecoming journey, helped us to define the main elements of the method 'Time travel':

(1) *Suitcase.* The literature suggests that thinking about the future is facilitated by awareness of the current context (Hekkert and van Dijk, 2001). The suitcase helped us to find an anchor in the present. It was rendered important to have participants prepare for the 'journey' by packing a suitcase. They were to bring something relevant for them in the present and related to the specific topic of the user research. Apart from anchoring in the present it would help participants to sensitize for the topic (Sleeswijk Visser *et al.*, 2005; Sanders, 2000).

(2) *Fuel.* In order to imagine their own personal futures, consumers need knowledge on expected developments by futurists and domain experts. This knowledge can be seen as fuel helping consumers to travel a distance and project themselves into a future world. Fuel can be administered in various forms: film, written or spoken verbal explanation, visuals.

(3) *Souvenir.* The suitcase is not only useful for bringing stuff into the future, but also for bringing something back into the present: a souvenir. By unpacking a suitcase at home after the journey the contents can be shared. Stories connected to these souvenirs are part of the imagined futures.

### BOARD GAMES

In addition to examples of serious games, we found inspiration in three leisure board games: The Game of Life, twists and turns (Levensweg in Dutch), and vintage games such as Future (1966) and Future Stories (1992) (see figure 1). Various consumers are familiar with such games and associate them with informal settings, which should facilitate them to jump in. We were not interested in a game per se, but in its potential as a catalyst and guide for conversation.



Figure 1: Board games Levensweg and Future Stories

### PROTOTYPES AND EXPERIMENTS

During the project various game elements and game-concepts were explored. It is beyond the scope of this paper to present the design choices and the evaluating experiments in detail. The major steps are briefly

presented to give a flavor of our method of research through design and our choices. More detailed descriptions of the game rules follow in the paragraph presenting the final game.

#### CARD GAME

An early concept took its core principle from the card game quartets. Players exchanged cards in order to gather sets of four cards on a similar topic (see figure 2).



Figure 2: Card game

The players were sensitized and fueled (in this case with clips from YouTube) before playing the card game. When a certain card was exchanged a related question, which was printed on the card, had to be answered before receiving the card. By answering these questions and listening in, the players were expected to imagine their possible futures.

#### *Gained insights in evaluation.*

- Games of question and answer stimulate conversation and narratives.
- Fuel should be dosed or be available throughout the game in order to influence future imaginations.
- Motivations to win the game can hamper talking and thinking about the future.

#### THE SUITCASE

In various versions of the game, participants were asked to bring objects or photos to fill their suitcase at the start of the game. At the end of the game participants were asked to imagine an equivalent of this object in the future. How would it change and improve?

#### *Insights gained from evaluation.*

- The contents of the suitcase should play a role throughout the game. As soon as new knowledge about the future is shared, this should be connected to the personal object.
- It is advised to exert some level of control over the contents of the suitcases to make them useful during the game.

#### CHALLENGING GAME-ELEMENTS

During the course of the project various interesting game-elements such as scoring methods and alternatives

for dice) were combined, borrowing from existing board games.

#### *Gained insights in evaluation.*

- The game should be simple and clear, though challenging and surprising at the same time. Long term play value is not an issue as with leisure board games.
- The moderator plays an important role in explaining and guiding the participants through the game.

#### BOARDGAME WITH TRACKS

The initial card trading concept was dropped for a board game with tracks with pawns going from a to b (see figure 3 for an example). This fit very well with the concept of traveling. Various loops and tracks were tried.



Figure 3: Early version of a board game with tracks.

#### *Gained insights in evaluation.*

- The track on the board should explain the procedure of the game
- The actions along the track should motivate players to move along.

#### FINAL DESIGN: TIME TRAVEL

Experiences with designing previous versions, discussions and experiments resulted in a final design. Some aspects of the game are topic-related, such as the fuel and the contents of the suitcase. Our chosen example topic was food and drinks in 2020.

Four players participate in the game with an expected duration of two hours. In preparation participants are requested to bring along three items or visualizations of these items. All three should be related to eating and drinking, and should be meaningful to themselves. One item should have a link with technology, another item should have a link with society, and a third item should be really personal. At the start of the game each player explains the three items briefly and places them in his or her suitcase (see figure 4).



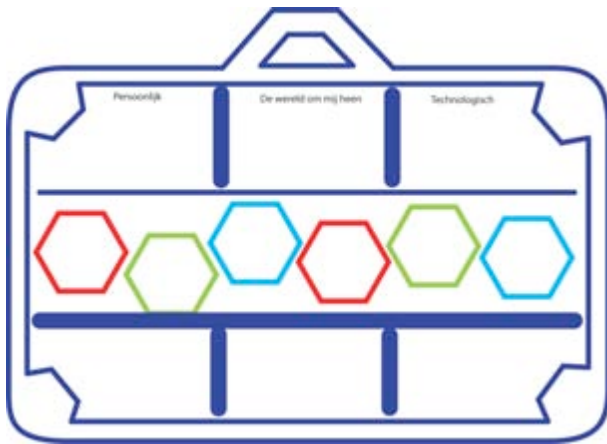


Figure 4: Empty suitcase. The upper part contains placeholders for the three items which are brought along by the players.

During the game pawns walk the inner track of the board (see figure 5). When landing on a jerry can symbol, a card with fuel is presented and placed on the grey areas of the board. These cards inform the players with expected technological or societal future developments (for instance: nano tags supply all kinds of product-information). Each card comes with a question to the player to link the new information to his or her own life (for instance: what are the qualities of your tap water in 2020?). The new insight is written in the middle section of the suitcase, in order to keep these insights available.



Figure 5: The board at the start of the game.

Landing with your pawn on a question-mark means answering a question, using information from the fuel available on the board. The star fields come with challenges, presenting more active and surprising ways to process the new information (for instance: show a page of your 2020 cookbook). These challenges in particular help players to imagine their personal future lives.

Players also collect credits depending on the quality of their narratives. These credits help to bring in some kind of competition and motivation. The details of this system are beyond the scope of this paper.

After a number of rounds (an hour and a half playing), the participants are to use all new information and insights to reflect on their brought items. How would

these transform in ten years? Figure 6 presents a view of the board and suitcases at the end of the game. The suitcases and a video-recording of the session serve as data in the user research.



Figure 6 The board and a suitcase at the end of the game.

## USER TRIALS WITH THE FINAL GAME

Two user trials were carried out with the final version of the game. Per session four players were invited. The players had various backgrounds, varying on their affinity with technology and innovation. Both sessions took place in the university building. They both lasted about one and a half hour. The second author of this paper moderated both sessions, the first author was participating observer in one of the sessions. The moderator was challenged to give enough room for stories and set the pace to play a number of rounds to bring in enough fuel to actually feed the participants with future-information. The two sessions yielded the following experiences.

*Personal stories from past and present.* As with other methods of user research participants easily came up with personal stories from past and present, facilitated by the items in the suitcase (e.g. addictive snack tomatoes in a fancy packaging) and the question cards (e.g. What does your Christmas dinner look like?). These stories led to discussions in the group, enriching the information.

*Intriguing future conversations.* The fuel-cards and related questions triggered interesting discussions about

the future. When dealing with the question “What are the qualities of your tap water in 2020?” Participants talked about different water qualities for different activities, tap water with personalized taste and nutrients, disinfecting water, salty water for certain purposes, etc. Other narratives focused on the potential of a device advising what to eat and drink based on continuous measurements in the body. Information from the fuel was well integrated in the narratives. Sometimes the link with the personal situation remained unclear. When a player explained that for him healthy food is not an issue in 2010, what then is the relevance of his narrative about the convenience of measuring the nutrients in food in 2020? Another player told that she would buy local food in 2020, but she could not explain why she didn’t do so in 2010.

*Verbal information.* The imaginations remained predominantly verbal. In the challenges players were to draw and visualize in various ways, but the participants found it hard to do so. It seemed that these individual tasks interrupted the social conversation dynamics of the game.

*Individual differences.* Some players were very well able to combine new information and translate this to their personal situation. Some participants fell silent or took on the role of interviewing the others. Some players had difficulties avoiding expert behavior and having strong opinions about developments (i.e. “I don’t think that local food has a chance in urban areas.”). It was difficult to have certain players talk about their own lives instead of talking about the general public. Some participants came up with wild and fantastic future views, others are more critical and pointed at unrealistic aspects. Both types of behavior played a role in keeping a balance.

*Role of the moderator.* All questions and challenges in the game were prepared with a certain aim (i.e. to trigger specific discussions). In many cases the conversation took unexpected turns. The moderator played an important role in keeping the atmosphere around the table future-oriented and respectful to all players. The moderator had to control the conversations to collect relevant information. The final phase of the game, in which the contents of the suitcase are transformed, suffered from time pressure (see empty spaces in figure 6). During the game itself many references were made to the personal items, serving as examples.

## CONCLUSION

In this project we explored a method for future oriented user research: a time traveling game. Three aspects were introduced: (1) personal narratives, (2) awareness of the current context, and (3) games. The game aspect worked very well. Players were motivated to play a game, and it helped them to loosen up. The metaphor of a time-travel was well chosen. It was natural for users to travel through time within the context of the game, and

to be confronted with unexpected questions. The sensitizing task of filling the suitcase with objects from the present, and talking about these objects in the first phase of the game, yielded awareness of their current situation. So, the building blocks for eliciting personal narratives were there. However, it still proved difficult to elicit personal stories which were both based on the presented fuel and on their personal situation. The dynamics of the game and the group of players brought along a number of distracting effects, such as trying to ‘win’ the game and trying to outwit the others.

For a next step in the development of the method attention will be paid to the quality of the personal narratives and the informational and inspirational power of these narratives for designers. In parallel, opportunities are explored for using the strengths of the method in individual interviews with consumers.

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# VISUAL INQUIRY: A TOOL FOR PRESENTING AND SHARING CONTEXTUAL KNOWLEDGE

FREDRIK SANDBERG

LINNAEUS UNIVERSITY, SCHOOL OF DESIGN

FREDRIK.SANDBERG@LNU.SE

## ABSTRACT

This paper presents an inquiry method where the participants create a visual presentation of their experiential knowledge of working. As an example the paper describes experiences from using the inquiry method together with small local food producers. The owners use the visual inquiry tool to present their small company's activities, the stakeholders involved, problems, strengths, changes and dreams for the future. Although the food producers never had described their knowledge as one picture before, they had no problem mapping out and visually presenting complex information about their production. The method uses sticky notes as mapping tools, which enables the participants to rearrange information, point at related information, jump in time and also include the research group in the knowledge creation. The use of the visual inquiry method increases the participants' involvement and community building. The paper also describes how the visual presentations, created at several inquiry sessions, are used in a workshop on collaborative services.

## INTRODUCTION

In this paper we present a method in which the participants make use of sticky notes as tools to visualize activities, actors, problems, strengths, changes, and dreams. We focus on the practicalities of using the method and our experiences using it in the Digital Service Markets (DSM) project. Finding a good method for creating knowledge about participants' work contexts is complicated, as different methods elicit different types of information and different types of reactions. During the DSM project we learned, through experience, that a traditional questionnaire with predetermined questions could not sufficiently support or include the participating food producers in the process of knowledge creation. This approach to acquiring contextual information created an inquiry session, which could not show the connections and details quickly enough. In response to these issues, we developed a workshop with tools and exercises drawn from generative techniques (Sanders 2000), human-centered design (Krippendorff 2006), actor network mapping (Morelli & Tollestrup 2007), and critical incident techniques (Edvardsson & Roos 2001). We begin by describing the project background, and then describe the visual inquiry activities and our experiences using the method in a research project. We conclude by suggesting how others can use the method and describing how we hope to use it in the future.

## PROJECT BACKGROUND

The Digital Service Markets project is a collaboration project between an interdisciplinary group of researchers at Linnaeus University, a group of food producers from the surrounding province, and food buyers from the municipality in Kalmar. The project has two aims; one is to create new services that will help the municipality to buy locally produced food. The other is to create services that will increase communication between the involved food producers.

The group of researchers includes participants from three areas: Computer science, Computer supported

cooperative work, Informatics, and Service design. The food producers are a scattered group of 25 small companies, each with 2 to 10 employees.

In order to create knowledge about the food companies' work context, the research group visited the food producers in their work environments and interviewed the employees. The interview questionnaire included prepared questions, such as, what hours the producers work, who they work with, and what kinds of new services they think would help them in their future work. The answers were very helpful for the research group, but it was difficult to understand how the different answers were connected. It was also difficult for the designers to use the interview session and the analysis of the interviews as inspiration for developing new service concepts. Therefore, we clustered the questions and developed themes that could be mapped. During the rest of the inquiry sessions, the contextual knowledge was created and shared both verbally and visually.

### THE VISUAL INQUIRY METHOD

Visual inquiry is a co-operative design method used to co-create knowledge about context, connections, and possible future service opportunities. The method is used during an activity where everyday material, such as sheets of A2 paper, sticky notes in various colours, stickers, and pencils are available to help the participants talk about and build their own presentation of their context. The workshop consists of six coherent parts. Each part has a specific colour and a theme that the workshop participants are to map out. The themes are: activities, actors, problems, strengths, changes, and dreams.



Figure 1: Toolkit

#### ACTIVITIES

- Inquiry assignment: Map out all the activities happening within a specific time-frame.
- Purpose: To create knowledge about when people are active, what people do, where the people are represented, and how the people value their activities.

#### ACTORS

- Inquiry assignment: Map out actors tied to all the activities.
- Purpose: To create knowledge about stakeholders, partners, and customers.

#### PROBLEMATIC EVENTS

- Inquiry assignment: Use stickers to map out problems.
- Purpose: To create knowledge about new product opportunities.

#### STRENGTHS

- Inquiry assignment: Use stickers to map out strengths.
- Purpose: To create knowledge about new product opportunities.

#### CHANGES

- Inquiry assignment: Map out how the end result of the proposed research project affects the document created using sticky notes.
- Purpose: To create knowledge about hopes and fears.

#### DREAMS FOR THE FUTURE

- Inquiry assignment: Map out dreams for the future.
- Purpose: To create knowledge about new product opportunities and future changes.

### EXAMPLE: THE HERB GARDEN

The activity was tested with two employees at a small company that grows and sells herbs. The inquiry activity took place in the company's lunch; it was managed by three researchers from the research group. One researcher was in charge of the mapping activities; the other two listened and asked related and prepared questions. The inquiry activity lasted approximately two hours and was videotaped.



Figure 2: Employees

At the beginning of the activity the employees explained that they were a bit unsure about what they should do. To help them get started, we began a discussion about the starting date of their business year and what kind of activity they normally engage in at the start of the year.



During the dialog the employees began to share and compare their knowledge of past years' activities. Their dialog about common and uncommon activities revealed that they usually start the year by producing products for the coming season. Therefore they chose to start the activity theme with producing products. We asked them to write the activity down on a yellow sticky note and place it at the A2 paper in front of them.

The first sticky note triggered a discussion among the employees about other related activities. They were so eager to describe their next activities that we had to remind them to write them down on the sticky notes. They soon learned to divide the work between them; one described the activity whilst the other was writing and mapping. Halfway through the session they realized that they had forgotten a couple of activities, but they solved that by moving the older notes a few steps ahead on the paper and then they had room for the new ones.

When the employees started to map out the actors, they chose not to write down the actors' real names, as they thought that was sensitive information. Thus they assembled most of the actors under descriptive names such as customers or companies.

Even before we asked the participants to map out their problems, they had already talked a lot about them during the activity mapping. So when they were asked to put red stickers on problem spots, they didn't have to think for long. They put the first red dot on January, which is when they have to order products for the whole year. They never know if the ordered products will arrive on time or be late and delay everything else. When we asked them where things were going well or what they felt positive about, they had to think hard. Finally they chose to put the green stickers on places where they are close to the customers.

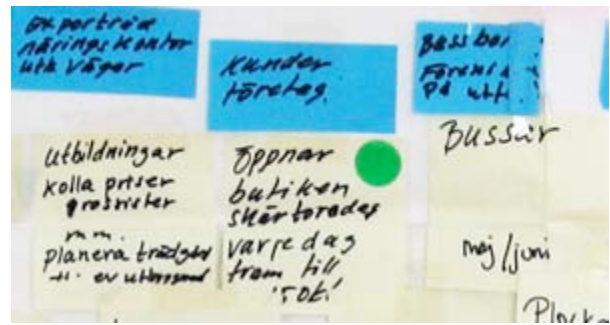


Figure 4: A section

When the researcher introduced the questions about changes and dreams the participants become very uncertain. They said they were not sure about the meaning of the research project. And they started to ask questions of both the researchers and each other. The discussion then led to insights about how the results from the research project could affect their visual presentation. They said that the project would create more co-operation with other companies. They also said that they would like to share their knowledge and become a mentor for new companies. When the workshop was over the participants said that it was very useful for them to do this workshop. It made them realize how much work they do and they wanted to keep it as a schedule for the next year.

## REFLECTIONS ABOUT THE HERB GARDEN ACTIVITY

During the first stage of the inquiry session the participants' memories played a major role. They shared their memories with each other so that they could fill in the gaps on the paper. And the procedure of moving sticky notes back and forth helped them to connect and create other memories. Every memory that they placed on the paper also created a small detailed story.

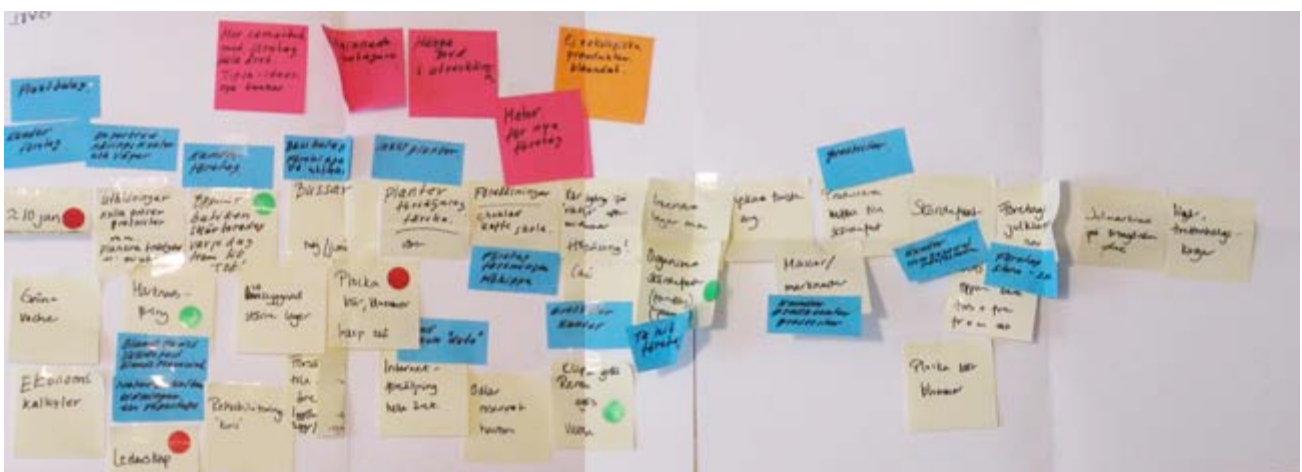


Figure 3: The visual presentation from the Herb Garden

They often co-created related stories. This procedure of placing memories and telling stories eventually became self-sustaining and the researchers only had to break the flow when it was time to introduce new themes or when the discussion drifted to far away from the topic.

During the inquiry the participants used the material in a very playful way and the method supported their process of placing and replacing information. The finished presentation became a document that shows both details and an overview. It is possible to see problems they have in January and their activities in July at the same time.

The participants chose to place activities that occur inside or close to the herb shop along a central horizontal line. Further down on the paper they placed activities such as individual fairs and year-round internet sales. The most exciting aspect of the workshop was how much information the participants managed to share with the researchers. In only two hours the researchers learned a great deal about an entire business year.

### INTRODUCING THE METHOD AND THE RESULT TO THE INTERDISCIPLINARY RESEARCH GROUP

The visual inquiry was developed by the design researcher i.e. the author. The first time the whole research group tested the method was during the herb garden activity. After the session the participating researchers compared the visual inquiry to the earlier questionnaire activities.



Figure 5: Discussion within the research group

Their experience was that when the visual inquiry method was used it was easier for the food producers to talk about their work activity and context. The research group also noticed that the food producers were more engaged in producing knowledge when the visual inquiry was used. One important change from the earlier questionnaire activities was the visual presentation. When the visual inquiry method is used the information can be read in many different directions. That enables the researchers to think and ask questions in a non-linear way. The researchers also think that the visual presentation is a good basis for later discussions within

the research group. It is easy to hang the presentation on the wall and use it as a reminder of the actual activity. The researchers also appreciated that the visual presentation makes it possible to see connections over time and space, which was not possible with the questionnaire method.

### USING THE VISUAL PRESENTATIONS IN THE FUTURE FOOD SERVICES WORKSHOP

During the DSM project, the result of the visual inquiry session i.e. the visual presentation was used in two different settings. It was introduced directly to the research group, and it was used again in a new workshop named Future food services workshop.

Three companies were invited to the future food service workshop. They had all participated and created a visual presentation during the visual inquiry activity. The mission of the workshop was to introduce the companies to each other and to co-create new food service concepts.



Figure 6: Food producers sharing their knowledge

During the workshop the food producers used their visual presentations as tools to introduce their work context to the others. They used the visual presentation as a starting point for discussing problems, future trends and their dreams for the future. The final workshop activity was to analyse all the produced material and create a vision for themselves and for future food communities.

### DISCUSSION

When we started to develop a new method for a contextual inquiry we wanted to create a meeting format that made it possible for experienced food producers to share their complex work knowledge with designers or researchers who have no experience of that work. It was also important that the inquiry session and the result would inspire designers. In order to do that we changed our existing inquiry method and complemented it with moveable artifacts and themes to map out.

We have now tested the method with seven different food producing companies. Our experience from using the method is that good dialogues emerged because it was possible to move around the sticky notes with information written on them. It was an open dialog with



no prepared script and that brought the food producers and the researchers closer together.

We also noted that both the researchers and the food producers learned something during the visual inquiry. The food producers said they had never structured their work in this way before. So for them the visual inquiry outcome was a new visual understanding of the work they do and of ways they could change.

As design researchers we learned that the visual inquiry works well in an interdisciplinary research project. The method created an artefact that all the researchers in the project could gather around. Also, the combination of artefact and video recordings makes it possible to reflect later on both the verbal and visual result.

Using sticky notes in research or idea creation is nothing new. The visual inquiry fits well into the strong tradition of using design games to facilitate interdisciplinary groups (Brandt, 2004). Similarities exist between visual inquiry and other game-storming activities such as SWOT analysis and AT-ONE (Tollestrup, 2009). Compared to the SWOT analysis the visual inquiry is more of an opening game without a desired end state. During the opening game the food producers try to create and share their world's boundaries, rules, and agreements (Gray, 2010). But later on in the future food service workshop the participants created and explored different desired end states together. The similarities between AT-ONE and the visual inquiry are that the visual presentation also contains actors. AT-ONE develops new service concepts by combining or replacing actors inside a service. The visual inquiry can be used in the same way. It is possible to extract actors from the visual presentation and to rearrange or replace them in order to inspire the process of designing new food services.

During the tests of the visual inquiry method, some participants added other tasks to complement the initial ones. For example, they drew extra figures, talked about other related themes, and decided not to follow the suggested map. But what is important in this process is creating one's own picture. Doing so gives the food producers an emotional attachment that makes them want to continue the collaboration. So even though that the method has rules, it is not a bad thing to break them.

## CONCLUSION

In this paper we have presented an inquiry method in which participants create a visual presentation of their company's relationship to stakeholders, problems, strengths, changes, and dreams. This new way allows the participants to understand and describe their knowledge as one picture, and it makes it easier for both participants and researchers to see the frames and rules inside the context being explored. The outcome of the method is not only propositional but also presentational knowledge (Heron 1996) about new opportunities for collaboration and product development. The visual inquiry outcome has not yet resulted in any new

functional services. However, based on the experiences gained in this research project we propose that the method can be used to increase co-creation and context awareness in new service development projects.

## FUTURE WORK

During the visual inquiry activities we learned that the method supports small food producers in remembering and visually explaining their complex work context. Our next steps were to test the method in other areas. In one case we tested the method with people who attended a rock concert and found that the method could successfully create knowledge about their experience of safety. Another step is to see if the food producers can continue to use the method with new members of the food producing community.

## ACKNOWLEDGEMENTS

I wish to thank the food producers and my fellow researchers without whom this work would have been impossible. I also thank Elizabeth Sanders who participated in the design of the Visual Inquiry method.

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# EXPERIENCING, EXPLORING AND EXPERIMENTING IN AND WITH CO-DESIGN SPACES

ELIZABETH B.-N. SANDERS  
MAKETOOLS, LLC  
LIZ@MAKETOOLS.COM

BO WESTERLUND  
LINNÆUS UNIVERSITY  
BO.WESTERLUND@LNU.SE

## ABSTRACT

The concept of *design space* has been useful to designers in supporting the act of designing and for reflecting on the activity of designing. With the increase in cooperative design practices, it is time to consider the concept of *co-design space*. Co-design spaces differ from design spaces in that they tend to be situated in the early front end of the design process (also referred to as pre-design), they rely on the collective creativity of designers working together with non-designers, they deal with very complex challenges such as social change and organizational transformation, and they often point to embodiments in the immaterial domains such as experiences and services. We will argue that we can add greatly to our understanding of design by experiencing, exploring and experimenting in and with co-design spaces.

## INTRODUCTION

There are several understandings and descriptions of the concept of *design space* currently used in the design literature so it is obvious that design discourse needs concepts that support designers both when they are doing design work and also when reflecting on it. (e.g. Binder & Hellström 2005, Browning et al. 2009, Heape 2007, Löwgren 2005, Westerlund 2005, 2009). Taking this observation as a point of departure, this paper discusses how an understanding of the concept of *co-design space* could contribute to the design discourse. Does a

co-design space have different qualities than a design space? Does thinking in terms of co-design space add to our understanding of design? Is it possible that the concept of co-design space could be used to support the creation of successful co-design processes, and therefore better proposals for desired futures?

## CO-DESIGN PROCESSES AND APPROACHES

Different flavours of cooperative design have been around since at least the 1970s with Robert Jungk's Future Workshops (Jungk & Müllert 1989) as one of the earlier examples. There are many different procedures for cooperative or participatory design (e.g., Ehn, 1988; Greenbaum & Kyng 1991; Schuler and Namioka, 1993) and co-design (e.g., Sanders and Stappers 2008) and it is not our aim to give an account for all the manifold of approaches in this paper, but we will introduce some of the primary directions. Most approaches include design work and aim at creating some kind of proposal for change that is imagined to work and be regarded as meaningful by prospective future users and other stakeholders (who are not experienced in design).

There are several issues identified as problematic in design processes where novices (i.e., people not experienced in design) participate. One is that too much time is spent on one early idea instead of exploring many possibilities. Another is that it can be difficult to get people to create ideas when they feel that they have insufficient knowledge. A third problem is that people who are brought into co-designing experiences may feel that they are not creative. Therefore many different co-design approaches have been explored over the years.

Can an exploration of the concept of *co-design space* help us understand how better to provide for these needs? Before we address this question, we will briefly investigate the current uses of *design space* and discuss how these may be connected to co-design processes.

## DESIGN SPACE

There is no such thing as an objective *design space* that can be defined or agreed on. Not beforehand and not even after the design work. *Design space* refers to at least three quite different definitions or interpretations: The experienced physical space, the current work and the future situation of use.

- a. the experienced or practiced physical *design space* in which, and with which, the design work takes place. This includes the materials/props that are present in the space. Using design space with this interpretation supports describing the activity going on and the situation's "back-talk" that Schön identified (1983:79) as one example.
- b. the *design space* of the current participant(s) in the design process and their practice. This includes the proposals that are currently worked on, and other aspects of the current design work.
- c. the *design space* of possible proposals that are imagined to "work", that prospective users and other stakeholders would find meaningful. This is sometimes called the solution space. This category of space is located in the "future".

All of these three are relevant to discuss in relation to design work, although there are different advantages for the use of each definition. But our intention is to explore some possible uses of *co-design space* and in order to discuss its potential, we will first present an example.

## CO-DESIGN WORK, AN EXAMPLE

A group of researchers and PhD students from different academic departments at Linnæus University participated in a workshop aimed at creating opportunities for joint interdisciplinary research projects. This workshop was situated in the front end of the design process and involved designers working together with non-designers on a complex challenge that would lead to social change and organizational transformation. The final goal was to identify topics and processes for future collaboration in research activities across the disciplines.



The afternoon workshop was briefly speaking done in three steps: the participants individually presented their current interests and work, divided into three groups the participants created desirable visions and finally they collectively tried to identify what activities would be necessary in order to get from the current situation to the desirable visions.

There were thirteen participants in the workshop which was held in a large room with many free walls.

The journey started with a presentation of the past and current research interests of each participant. In order to make the most of this activity, participants were asked to prepare for their short presentations before coming to the workshop by writing key words or phrases on up to six cards and bringing one object about which they could tell a story. After each participant's presentation, the cards and the objects were displayed on the large central wall. The wall was structured as a timeline moving from the past to the present to the future. Everyone sat in comfortable chairs facing the wall.

The next step was for the participants to cluster the cards, and thereby the concepts, so that connections and themes could be identified, named and easily seen by all. Thus, the wall and the objects brought in for sharing provided a visual map of the co-design space of their past and current research experiences. This collaborative co-design space provoked some interesting discussions.

The participants were invited to take a break with the understanding that when they returned they would leave







behind the past and current situation and jump into the future. The action changed places as well, with small tables being set up for the small team working sessions.

To facilitate the generation and communication of ideas between team members, we had prepared toolkits that contained a wide variety of visual forms, colors and sizes. As an experiment in the role of ambiguity in the co-creation process, we did not include any verbal content as is normally the case with generative toolkits. By using only simple and symbolic shapes we hoped that the participants could move past their own languages of expertise to focus on the shared content of research collaborations at their university anywhere from two to ten years in the future.

After creating their co-created visions, the teams presented their visions for the future and placed them up on the large wall on the future end of the timeline.

In the final step, the participants were challenged with coming up with ideas to describe how to get from the current situation to the future they had described. Each person filled out action items on colorful cards that were shaped like puzzle pieces. The cards were positioned on the large front wall in the space (i.e., the Bridge) between Present and Future. After a presentation of all the action items each participant was invited to use four red dots to prioritize the action items he or she felt were



most important to explore. Thus, the final prioritized list of next steps was visualized collectively as the step between “now” and “future”. The final wall is shown in the picture near the end of this paper.

### CO-DESIGN SPACE

What about the concept of *co-design space*? What would be productive ways of using this concept? If we reflect on the workshop using the three aspects, a, b and c, above as a starting point we get:

a. The experienced physical space where this workshop was held was a large room with many free walls that afforded paper and stuff to be pinned on them. Also tables and chairs could be moved and placed freely. This together with carefully designed assignments and toolkits greatly supported the participants in their co-design work of envisioning as well as presenting ideas. This could very well be called a *co-design space*.

The environment where the co-design work takes place can, of course, also have negative effects on the work. This can be the case when the environment does not afford people to sit, stand or move around in ways that they want (e.g., in a room for lectures where the furniture is fixed and mostly one-way communication is supported).





Use of the physical space and the sequence of activities in the physical co-design space were carefully planned to optimize the time spent by the participants, most of whom had to travel to attend the event. The physical co-design space became a mirror of the conceptual co-design spaces and afforded the visual display of the artifacts that were produced and discussed along the journey.

b. The participants' activities can be said to constitute a *co-design space* through their situated practice. The sharing and understanding of their respective current experiences as well as the generation of ideas, framing, judgments, proposals, staging, etc. were highly collaborative.

The co-design work clearly needs to be accounted for and prepared for. *Co-design space* would differ from *design space* in this context, for example, by the additional preparations needed to ensure that all the stakeholders are able to contribute on an equal basis. Visualization of the emerging solution is also something that both the design experts and non-experts must understand.

c. In this example we can also say that the participants co-designed situations they, in the future, themselves would like to participate in. Each team created a desirable *co-design space*. But when exploring this *co-design space* they also identified future fears to this *co-design space*, like economic threats resulting from restrictions or requirements that the university and funding agencies would create.

## DISCUSSION

Knowledge is primarily only present in the form of knowledgeable people as Molander nicely puts it (2009).

Therefore we need techniques, procedures and other ways of conducting these co-design activities, as well as artefacts like space, material and props, in order to support all the participants in both creating understandings of what might be desirable and also supporting each other in doing so. It can also be instructive to support the participants in creating understandings of what is not desirable in the future. As much can be learned from utopian as from dystopian scenarios of the future. And what it is that is learned is likely to be quite different in each case.

And we also need a discourse to be able to plan, conduct, understand and learn more about co-design activities and here we see that the concept of *co-design space* can be useful. Because of the number and variety of people involved in co-designing, there are many more aspects to consider in the process such as:

- Preparation for the co-designing event(s): Recruiting participants, providing activities to ensure that they are “warmed up” for creative thinking, preparing special props or materials to evoke idea generation, etc.
- Facilitation of the event(s): What is the agenda? Is it fixed or open? What role does the facilitator play? Are there tools or techniques that are in play?
- Documentation and visualization: How will the output of the co-designing activities be displayed? How will the event be recorded?
- Reflection on the co-designing process: Who determines what the outcome means? How do you know if the event(s) was/were successful? What is the collective outcome? What are the individual outcomes?

It is argued that design is conducted “backwards” from rough ideas of the wholeness of what might be desirable situations (Gedenryd 1988). From there we create more detailed and articulated proposals. But outcomes of the co-designing process can be the dystopian scenarios. These scenarios inform or inspire the creation of the desirable solution since these are outside of the co-design space. These are not desirable but still they support the understanding of it by triggering discussions on both undesirable but also on conflicting issues.

One support for this is language. The better we can talk about the activities, the better the participants can understand possibilities. And with the variety of participants in a co-design process, it is important to consider multiple types of languages in use. It is here that visualization and enactment can come in handy.





Perhaps the most obvious advantage of using *co-design space* over just *design space* is when each participants' influence on the outcome is of great importance or salient in some other sense. This is the case, for example, in the design of new healthcare systems and/or services. Each stakeholder has a critical and distinct perspective. By acknowledging that each participant is very important, we move towards an understanding of a collaboratively created understanding of the possibilities and impacts of the future situations of uses for different people.

The design spaces of these future situations are infinite, in the sense that there are always an unknown amount of possible solutions. This is the same with a co-design space, but in practice a co-design space will in a way feel smaller or more focused since the participants together will be able to exclude more solutions that are neither desirable nor sustainable.

In another sense the co-design space will seem larger and/or more full since the participants with their different experiences will be able to envision and present even more different and relevant solutions.

It seems clear that this use of *co-design space* would not deal so much with "facts" but with emphasis on creating knowledge regarding desirable and understandable futures in relation to specific contexts, aims and people. The "co-" prefix clearly acknowledges that this *co-design space* in practice depends on the participants.

Instead of arguing for only one use, we encourage use of the concept *co-design space* meaning all of these simultaneously: the "real", experienced material, the social relations and practices, and the imagination of futures. This is similar to Edward Soja's concept *thirdspace* (1996), thus acknowledging both the understanding that space is socially constructed as well as the increased importance many scholars ascribe to spatiality and space. But most of all, acknowledging that we need a discourse to be able to plan, conduct, understand and learn more about *co-design activities* and here we see that the concept of co-design space can be useful. The addition of the "co-" to "design space" also clearly accounts for the collaborative creation of knowing that constitutes co-design activities.

We hope that this exploratory paper generates discussions that will create more knowledge in relation to the uses of the concept *co-design space*.

#### NOTE

A video about the workshop, *Exploring Opportunities for Interdisciplinary Research Projects – Linnaeus University*, has been posted at <http://www.youtube.com/watch?v=Jeb5i9J5l8I>

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# THE GLEANING STUDIO: A SPACE FOR REDIRECTION AND REFLECTION

TANIA SPLAWA-NEYMAN

SCHOOL OF ARCHITECTURE AND DESIGN

RMIT UNIVERSITY

MELBOURNE, AUSTRALIA

[tania.splawa-neyman@rmit.edu.au](mailto:tania.splawa-neyman@rmit.edu.au)

## ABSTRACT

There is a difficult challenge for design practitioners when establishing ways of applying Fry's (2009) strategy of redirection. Redirection is complex and multifaceted and requires an expansive view of the requirements for future sustainment alongside ways of interpreting these understandings within design process. When redirection demands so much of practitioners, the task can seem insurmountable and a starting point difficult to find.

Within this paper, I suggest that reflective practice can aid in this pursuit, and through my own practice-based research, offer insights when applying reflective techniques to assist my own redirection.

This relational thinking generated the development of an experimental studio structure, situated within my existing fashion design practice. This expanded situation serves to cultivate my bases of knowledge and knowing, and is influential in achieving the objectives of redirection.

The research findings suggest the emergence of a potential template for executing redirective practice. Could fashion design in the future be

practiced in this way?

## INTRODUCTION

Awareness of sustainability is becoming a prerequisite for designers across all disciplines and market levels. Within the field of fashion design, a dialogue centred on sustainability and ethical issues has been initiated through the endeavours of researchers and early adopters of sustainable design practices. Amidst these conditions, an emergent paradigm is challenging the role of design and designers to move beyond the considerations of material selection and waste management. Fry (2009) advocates the remaking of design practice to meet the demands of the future. His theories and methodologies of redirective practice<sup>1</sup> force designers to question design's purpose and effects, and therefore its process. The challenge for practitioners of fashion design is to develop ways of practicing design which will facilitate redirection.

Redirection demands the appraisal of what exists within a design practice. So how do designers uncover their provenance in order to practice in a future appropriate way? A potential methodology in assisting this pursuit is reflective practice. A heightened awareness of the "conversation with the materials of the situation" (Schön 1983, p. 78) will impart tools to designers to reveal what they do and how they might change if deemed necessary.

Through practice-based research I have fused the concepts of redirection and reflection, resulting in the redefinition of my design space as a gleaning studio, and a series of exploratory design works emanating

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<sup>1</sup> 'For design, 'redirective practice' has three areas of focus: adaptation in the face of what has to change to counter the unsustainable; the elimination of what threatens sustainment by designing 'things' away; and prefiguration, which is designing in order to redirectively deal with what is coming' (Fry 2007, para. 1).

from this space. Within this exploratory paper, these manifestations raise questions regarding future fashion design praxis, whilst presenting a potential template for redirection. The presentation of a selected design work invites the discussion of the agency of designed objects, pertaining to the objectives of futuring.

## REDIRECTION & REFLECTION

At its most basic level, sustainability has been concerned with material selection. However, as part of the future sustainment of our structured world, Fry (2009) suggests that, “fundamentally, design has to serve the creation of futures within which humanity, in its independent condition of being, has to be redirected toward sustain-ability.” (Fry 2009, p.118) Note here that sustain-ability is differentiated from sustainability, as it is “a means to secure and maintain a qualitative condition of being over time” (Fry 2009, p. 43), thus is a process rather than an endpoint. Fry makes a poignant point that without sustain-ability, we have no future, we are lost, we have nothing. The central core of design futuring<sup>2</sup> is the pressing necessity to enact design practice which will create a future. As the named strategy to implement futuring, redirective practice is complex and multifaceted. Essentially it has the characteristics of:

- Remaking how we think, as opposed to only rethinking
- Identifying and changing our processes and outcomes which defuture
- Rematerializing valuable existing knowledge and ways which are compatible with a self sustaining future
- Developing new knowledge and actions which have sustain-ability

As a fashion design practitioner, engagement with the methodologies of reflective practice is effective in meeting the challenges presented by the demands of redirection. Maintaining reflective conversations within the design situation fosters the perception and progression of what a designer knows. I found that insightful probing results through Schön's (1983) reflective techniques of frame analysis (discovering my own strategies of attention), and seeing-as (where analogy and metaphor connect the familiar and unfamiliar).

## GLEANING AND DESIGN PRACTICE

The reuse of material and waste, both post production and post consumer, is well established within art and design practice, and was documented substantially by Agnes Varda in *The gleaners and I* (2000) and the

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<sup>2</sup> Defuturing is ‘the essence of any material condition of unsustainability, where the actions of today take futures away from ourselves and other living species’ (Fry 2009, p.1). Therefore, futuring, by default is defined as actions that will create a future.

follow up in 2002. This documentary served as inspiration for a generative metaphor within my research – the concept of gleaning. Gleaning is the gathering of the leftovers of production or society, commonly rejected due to non-conformity to mainstream standards. The act of gleaning is traditionally part of the agricultural system, where the poor were given the right to gather the leftovers from harvest.

In relation to design practice, gleaning as a metaphor transcends the reuse of materials alone. It achieves the aims of redirective practice by uncovering valuable existing knowledge, and revealing inconspicuous aspects of knowing in practice<sup>3</sup>. Within the situation of design, gleaning opportunity lies within the physical/material leftovers from previous projects, alongside the skill set and knowing of the practitioner. These leftovers are picked over and scrutinized to ascertain their value and potential contribution to the redirective practice. This reflective process must be applied in-action, which necessitates the consideration of other attributes of the practice.

## THE GLEANING STUDIO

Redirection forces a comprehensive overhaul of all aspects of practice, with particular focus on the sustaining abilities of the practitioner her/himself. Within my own fashion practice, it was clear that the place of my design activity required development in correspondence with the expansion of my designerly thinking and knowing. In *Design Futuring*, one of the strategies of a redirected architectural practice is the establishment of an urban farm (Fry 2009, p.230). Taking influence from this example, the growing of food and the positive actioning through nurturing, nourishment and environmental flow on effects could be called upon as a personal and existing contribution towards sustainment.

Just outside the scope of my home based workroom was a redirective opportunity in the form of a small adjoining vegetable patch which I have tended for approximately three years.

Figure 1 depicts a bird's eye plan of my property, the house highlighted, and the expanded studio circled. On the right, is a close up of the space comprising the workroom (a converted garage) and the patch.

Combined, they form the studio, where as part of daily habitual work I tend to the patch alongside activities of design and make. This new design space, as well as situating the research in terms of redirection, extends the insights into my fashion practice through additional gleaning opportunities.

The studio is a place, but also becomes a tool within the reflective conversation. The conversation occurs between the happenings within the patch and the workroom, and the window between the two places

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<sup>3</sup> Knowing is distinct from knowledge in that it is “the realm of skills...part of thinking and doing” (Downton 2003, p. 93)

becomes the mechanism which allows this conversation within the studio (Figure 2). The window then becomes a reflective space, which can be viewed from both perspectives, as well as offering an experience of the other from within (Figure 3).

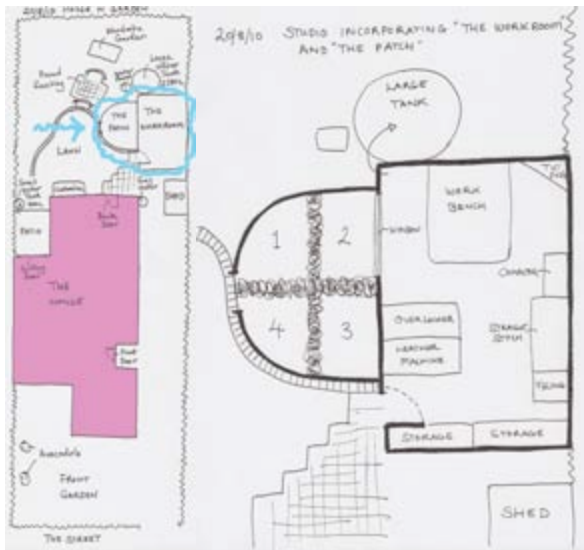


Figure 1 – The proposed gleaning studio

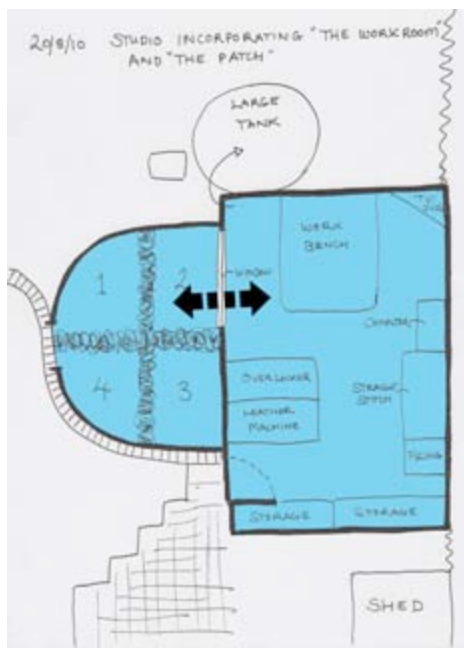


Figure 2 – The reflective conversation forms a reflective space



Figure 3 – An experience of the patch from within the workroom

The design potential emanating from this studio proposition raises questions as to what sort of design and designed product could come from this space, however the critical question is, what *should* come from this space?

### WHAT DOES DESIGN GATHER?

The dilemma of what designers should be designing is real when attempting redirection, with one of the first line strategies being elimination - to design nothing. The recognition of the linkage between design and time, and the key understanding of what design designs is essential. Anne-Marie Willis (2006) offers a philosophical perspective on the agency of designed objects through the comparison of a tetra pack juice box with Heidegger's thinging jug. In the essay *The Thing* Heidegger's jug gathers, holds and outpours a drink that gifts a shared experience (Heidegger & Hofstadter 2001). Conversely, the "juice box gathers fruit juices and packaging materials from different parts of the world...it quenches thirst and nourishes, but...it is not part of giving or sharing...it designs individual consumption on the move...and drinking as an individualised, rather than communal activity" (Willis 2006, para. 42).

As well as giving a perspective on consumed objects, Heidegger's jug also gives a way of thinking about the implications which gathering actions have for design. What is gathered by objects defines how they presence<sup>4</sup> themselves in the world through the creation of a mesh of meaning which we then relate to. In the example of Heidegger's jug, its gathering action in holding and outpouring is its presencing. This becomes part of the gleaned information which, as in the example of the tetra pak juice box, can be used to give clues as to the wider implications of what is designed.

### GLEANING APRONS

What do we really need? What *should* I design? In responding to these challenges, I envisioned a simple idea of a garment to wear within the expanded studio, which could also reflect the lifestyle choice of growing your own food. With reference to overspecialised products, my tongue in cheek response is 'an apron for picking broadbeans' and ultimately, a series of aprons for various purposes and degrees of usefulness and unusefulness.

A gleaner of bygone times in *The gleaners and I* (Varda 2000), says that she "wore a large apron", triggering my recollection that when gleaning, the actual apron is used to gather. An apron for gleaning has a commonality with Heidegger's thinging jug. They both act as vessels which presence themselves through their ability to gather, hold, and then release their contents as a gift or

<sup>4</sup> Presencing is a thing's essential nature.



something for others to use. With this in mind, I examined the essence of a broad bean when generating design ideas. The pod of the broadbean acts as a vessel for the bean or the seed inside. It gathers and holds the bean as it grows, but also performs an act of nurturing and protection, until the bean, like the liquid in the jug, is gifted outwards as something to be consumed (Figure 4). The apron used for gathering the broadbeans, can be seen to presence itself as a vessel through the same kind of actions.



Figure 4 – Broadbeans gathered by its pod

These vessels – the pod and the apron also share another similarity in that they are shaped through what they gather. Every bean pod is made of the same stuff, but the shaping unique to each individual pod is reliant on the beans which are gathered and grow inside it. The bean makes the pod, and the broadbeans make the shape of the gathering apron. All of these thoughts in regard to the possible actions of the resulting apron are gleaned and utilised in developing its design.

Other gleaned information was formative in shaping the broadbean apron. A survey of vintage, domestic style aprons in my personal collection, with which I have an aesthetic affinity, was influential. As a garment, aprons may be seen as purely functional items of clothing, however there are many different styles and versions, even within this small sample. Here there are various markers of what aprons represent. Domesticity is visually coded in many ways through the fabric, patterning, print, or motifs, and suggestive of what may be gathered, eaten, experienced, thought about and ultimately gifted when wearing the apron.

The completed apron is viewed within the reflective space, from the perspectives of both the workroom and the patch (Figure 5).

The varied viewpoints, and different lighting conditions within the gleaning studio, facilitate reflection and emphasize the diverse acts of gleaned that shaped the apron, being:

- The use of material waste – the leather from previous projects and the lace from my mother-in-law's toilet window curtain.
- The style/shape of the apron and the motif design, both influenced by vintage examples.

- The techniques of utilising small pieces of leather waste, developed through earlier projects.
- My experience of picking, preparing and eating broadbeans.
- The actual gleaned of broadbeans using the apron as a vessel (Figure 6)



Figure 5 – The apron for picking broadbeans, viewed from the patch (left), and from inside the workroom (right)



Figure 6 – The apron full of broadbeans (left) and the beans inside (right)

The apron evokes the gleaned activities that shaped it, and it is hoped that the essence of this gleaned will be transmitted to the eventual user of the object. At this stage of the research, it is difficult to predict how this will play out. An awareness of redirection could be incited, but at the very least, the growing and picking of broadbeans will be encouraged.

## DISCUSSION

The research to this point raises questions regarding future practice, the agency of designed objects and a potential redirective template. I have suggested that in meeting the challenges of redirection, there is a need for reflection within design's process, in which inward and outward expansion are both essential. By utilising the generative metaphor of gleaned, useful attributes, both inside and outside of the practice are discovered. This suggests that future fashion practices will be influenced and have influences within a broader sphere in relation to issues of sustain-ability.

The metaphor of gleaned, in relation to the designed object, also imparts an insight into its design and make. Furthermore, considering the continuing agency of the object - what it will glean, what it will gather, gives a sense of how it presences itself through time. Within my practice-based research, the design output hopes to offer experiential engagement for the eventual user,



connecting them with design's process alongside its aims of redirection. My selected design work, the broadbean apron, attempts to embody these ideas, potentially giving its user means for performing actions which are compatible with sustainability.

In summary, the developing template for this fashion practice achieved the following:

- Expanded the design space to include another sphere of being, in both physical and cerebral ways for the designer.
- Developed unique reflective conversations within design process which emerged from the expanded space
- Speculated on the agency of design outputs, and what these designed objects should be.

Could fashion design in the future be practiced in this way?

### CONCLUDING REMARKS

The design outcomes within this research are mechanisms of reification which embody fulfilled aims of redirection and reflection. Although the research is continuing and in its formative stages, the results to this point suggest that an effective template for redirection is in development.

In meeting the challenges presented through Fry's (2009) strategies of redirection, Schön's (1983) methodologies of reflective practice have been applied and proven to be a good fit. The generative metaphor of gleaning, derived through reflection within design's

situation, is an overarching and fruitful concept which permeates all aspects of the research.

This hypothesis of redirection/reflection/gleaning requires further testing through practice-based research to realise its full potential and prove its worth to future fashion design praxis. Work in the gleaning studio will build on this foundation and the emergent design situation will continue to unfold.

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# REGARDING DESIGN AS A CONSTITUTING PRACTICE MATTERS

BO WESTERLUND

LINNÆUS UNIVERSITY, SCHOOL OF DESIGN

BO.WESTERLUND@LNU.SE

This paper explores how the two concepts of *representing* and *constituting* are used in relation to design practice. The terms representing and representation are often used to describe the relation a model or prototype has to the end result. In this exploratory paper we investigate the potential impact of a change in terms, from represent to constitute. One inspiration is the writing of John Stewart on the post-semiotic approach to communication. The examples used in the paper are from practice rooted in both traditional industrial design and co-design. I argue that it is important to see design work as a constituting practice rather than a representative one. Supporting this standpoint are both the fact that the future does not yet exist and therefore is difficult to represent, and the strong argument that knowledge is created in dialogue and constituted in action. Thus, when we stop interpreting design matter as representations, design can matter to the world.

## INTRODUCTION

This paper explores the use of the two concepts *representing* and *constituting* in relation to design practice. Representing and representation are often used to describe the relation a model or prototype has to the end result. In this exploratory paper I investigate what the potential impact of a change in terms from represent to constitute. I will use three points of departure and two examples in order to discuss this.

As one point of departure I am inspired by the writings of John Stewart (1995, 1996) on the use of language as a constitutive activity. He argues that words are not used to *represent* (things) but are used to *constitute* the dialogue. By using language in dialogue the participants create knowing and understanding.

John Stewart quotes Heidegger regarding communication; he says it is “not a matter of transporting information and experiences from the interior of one subject to the interior of the other one.” Rather, it is “a matter of being-with-one-another becoming manifest in the world, specifically by way of the discovered world, which itself becomes manifest in speaking with one another” (Heidegger in Stewart 1995:110).

Stewart further explains how experiences cannot be represented in language, but are instead constituted through the dialogue because “the same phenomenon cannot be both constitutive and representational” (Stewart 1995:113). One must choose one model at a time, whether constitutive or representational, and Stewart advocates strongly for the constitutive:

“This languaging is the way humans ‘do’ understanding and, in the process collaboratively ‘build,’ ‘remake,’ or ‘modify’ worlds. To be a human is to be an understander, which is to engage in processes of coherence building or sense making, processes that occur communicatively and that enable humans to constitute, maintain, and develop the worlds we inhabit” (Stewart 1995:115).

Klaus Krippendorff (2006) proposes a similar approach to artefacts when he suggests that we “follow Wittgenstein’s suggestion to locate the meaning of artefacts ... in their use ... not as referring to other things” (2006:77). He says that designers should embrace a non-representational theory of meaning. The meanings that stakeholders ascribe to artefacts are constituted in conjunction with the use of the artefacts.

One other point of departure is co-design work where people work together collaboratively on creating propos-

als (e.g. Sanders & Stappers 2008). Most design work is collaborative to some extent. Even when an “expert designer” does the work, at least one other person is involved in the process. And when co-design activities are conducted, much collaboration is occurring constantly.

The third input is design discourse: we need a vocabulary to be able to talk about the artefacts we create. Designers use artefacts to explore issues and aspects of future artefacts in relation to the future situations of use. In HCI and interaction design these future artefacts are often called prototypes, and in industrial design they are often called models.

Artefacts created during design processes and used as prototypes or models are often described as representations. The artefact is seen as representing something to come. In HCI and interaction design textbooks we read that a prototype “is a limited representation of a design” (Preece et al. 2002:241) and “a concrete representation of part or all of an interactive system” (Beaudouin-Lafon & Mackay 2003:1007). The use of a representational theory is also common in contemporary research discourse: “Designers generally use ‘mock-ups’ as artifacts to represent early design concepts” (Mander & Arent 1993:203) and as “stylized versions of the artefact to be designed represented by simple cardboard or foam props” (Brandt 2006:63).

To explore the use of the two concepts *representing* and *constituting* in relation to design practice I will now present two examples.

#### EXAMPLE 1: TOOTHPICK HOLDER

As the first example we will look at a rather traditional industrial design assignment: design a toothpick holder for people with weak hands. A company that produced plastic toothpicks had learned that people with various diseases, for example rheumatism, take several medications, which is often bad for their teeth. These people also have difficulty taking care of their oral hygiene by themselves because their hands are weak and stiff. My aim, as an industrial designer, was to make it easier and more comfortable for the people to also use toothpicks when cleaning their teeth.

We started to work on an idea for a sort of pliers that would extend and enlarge the small, thin toothpicks. We had to create something that would both allow them to reach into the back of their mouths, and provide a better grip.

In addition to the cleaning activity, the holder also had to allow the user to insert and change the small toothpicks. We thought it might be problematic for users with weak hands to open the grip in order to change the toothpick. We had been testing several models ourselves, trying to imagine what it would be like to use the handle and change toothpicks with weak, and otherwise disabled hands.



Figure 1.  
Changing toothpick with an elbow on the toothpick holder's handle.

We realised that we did not have enough knowledge about the difficulties we might encounter during the design work; therefore we arranged for a group of people with varying disabilities in their hands to help us by testing our ideas and prototypes.

One day we took our rough prototypes and visited the people who had volunteered to test them. We visited them one by one in their homes or workplaces in order to learn from them how the different prototypes worked.

I still remember my total surprise when a woman laid a prototype of the handle on the table and quickly and with no problem at all pushed it open with her elbow and changed the toothpick with her free hand. In my thoughts about how the handle could be used, this unorthodox and creative approach had never occurred to me (Westerlund 2009).

I see this as a dialogue where I “ask questions” by letting people use different models; through their actions they “answer” these questions and explain how they experience the models. She proposed a way of use that I had not thought of. The woman does this, not by using words, but by acting, by presenting to me a way of practically handling the toothpick holder. Heron (1996) suggests that we should consider four kinds of knowing; experiential, presentational, propositional and practical (1996:33). During design work it is crucial to be aware of all four aspects, not only the propositional one, the spoken words.

The combination of the woman's and my activities with the prototype *constitute* this session.

#### EXAMPLE 2: CO-DESIGN WORKSHOP

During an exploratory workshop three women were working in a group with the assignment of critically examining their current working environment and practice. Their aim was to identify aspects that they find problematic. Then they were to regard these as opportunities for improvement and generate ideas for solutions. They were to act out these ideas in the form of scenarios with



Figures 2 & 3.

The sound hats in the video prototype *Happy company* enable people to talk in the workroom without disturbing their other colleagues.

the help of props they would create. These acted-out scenarios were then videotaped in order to create video prototypes.

The women created three video prototypes that were strongly related to their current work situation. They were clearly created out of their own experience of the frustrations they did not want to encounter again in the future.

One of the video prototypes is called *Glatt umgänge utan störning (Happy company, without disturbance)* and begins by showing how difficult it is to work in a call centre when colleagues are talking nearby. This is an account of the current situation; after that the group shows their suggestions for interacting with each other in the future without disturbing their colleagues. They need silence when talking on the phone but also want to be able to talk to one another while engaged in other duties, for the sake of relaxation and the many other reasons why workmates want to talk with each other.

The video prototype then shows how two women put on paper boxes used for copying paper and relabelled as *Ljudmössa (Sound hat)*. They walk around in the room and seem to be able to talk freely to each other without disturbing their colleagues (Figure 2 & 3).

The proposal shown in the video is most probably not an acceptable solution, i.e. it should not be seen as a *representation* of the final system. But it should be interpreted as a precise description of the affordance (Gibson 1979) that the system should have. The actual boxes that the participants put on their heads should be seen as an approach, a first attempt to ‘discuss’ the idea. They are one step in *constituting* the video prototype. The video prototype should be interpreted as a contribution to a discussion in which the artefacts together with the activities could be interpreted as an *index*, definitely not as *symbols*, as something representing a possible future system.

## DISCUSSION

This way of describing the artefacts used in the design work as representing something else is problematic for many reasons. This would mean that these artefacts are communicative signs, symbols, standing for something. In design work you are concerned with creating “that-which-does-not-yet-exist” (Nelson & Stolterman 2002:10). Therefore it is very difficult to understand how a prototype can be seen as representing something that does not exist. This is of no real use as I see it.

In some cases the actual artefact or prototype is not of that much use unless one is aware of the context where it was created and its intended affordance and use. Sometimes the participants in a prototyping session use available items as prototypes or props in the video. In one workshop people used a tape dispenser to illustrate the use of a small recording device. In this case the tape dispenser itself is not of much use in the work of designing the recorder if removed from that particular activity.

Kjørup says that most things should not be regarded as symbolic signs (2004:50). Obviously there exist artefacts that many people regard as communicative signs, like traffic signs, signs on toilet doors, but this is not the kind of artefacts that we are discussing here.

Crilly et al. (2008) discuss at some length whether or not designed artefacts can be considered as communication; their main arguments against it are severe problems with containment and authorship. In this context when we are discussing the artefacts created during a design process the critique of containment is very relevant. They write that meaning should not be seen as “contained within messages that can be sent from one party to another. Instead, critics claim that meaning is actively constructed by people and that there is no necessary correspondence between intent and response.” (:435).

Previously at Nordes there has been several discussions on how to interpret artefacts in different contexts and how meaning is created. Van der Velden, Bratteteig and



Finken present how the realities of a station “are constantly produced in the practices of the people who use the station” (2009:1).

Many other people are opposed to regarding artefacts as communicative signs, as symbols. Klaus Krippendorff writes that artifacts seldom represent something; instead, they do something (2006:77). Moreover, because meaning does not reside in products (:141, 230) there is no necessary correspondence between intent and response (:54). Alfred Gell (1998) writes that “most artefacts should not be considered as signs in themselves and they cannot have stable meanings in them.” Here, Gell obviously means symbols since he supports the use of the indexical sign concept in order to discuss and interpret different artefacts. Discussing art and artefacts in museum contexts, he describes indexes as “material entities which motivate abductive inferences, cognitive interpretations, etc.” (:27).

If we put relevant questions to the artefact we make it into an index, which is a sign of something (Kjørup 2004:9). Footsteps in the snow can be interpreted as signs of someone who has walked there. Nothing is an indexical sign in itself; it only becomes one if someone chooses to regard something as such and decides to interpret it (Kjørup 2004:50). Index seems to be an appropriate tool for analysing prototypes. Indexes of things, words, and actions together with intentions, awareness, etc. can be seen as *constituting* the design process.

Guy Deutscher argues that the language we speak influences the way we think and surely it is the same way with the concepts we use, i.e. it is a fundamental difference between thinking of something as representing something else or as itself being part of constituting the process. This can have an impact on our way of working and also on the results of our work. Therefore we must be cautious and choose to use concepts that support our awareness, not least of the aspects that are difficult to verbalise.

## CONCLUSION

I have argued that it is important to see design work as a *constituting* practice rather than a *representative* one. Both the fact that the future does not yet exist and therefore is difficult to represent and the strong argument that knowledge is created in dialogue and constituted in action, support this standpoint. Thus, when we stop interpreting matters of design as representations, design can matter to the world.

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# DESIGN CASES



# THE MUSIC SLEEVE: FABRIC AS AN ELECTRONIC INTERFACE MEDIUM

RAMYAH GOWRISHANKAR  
MEDIA LAB HELSINKI, AALTO UNIVERSITY  
RAMYAH.GOWRISHANKAR@AALTO.FI

KATHARINA BREDIES,  
ROSAN CHOW  
DESIGN RESEARCH LAB, UDK BERLIN  
KATHARINA.BREDIES/R.CHOW@UDK-  
BERLIN.DE

## ABSTRACT

In the area of fabric interaction, (also known as wearables or smart textiles), innovation often comes from technological advances. Interface designers, on the other hand, take the role of exploring fabric as a medium for interaction. In this paper, we will describe and analyse the design of the 'Music Sleeve' – a fabric controller for a music player on a mobile phone. The development of the Music Sleeve was an experiment in open-ended design approaches. As a case study, it represents an interface solution that emphasizes the functional fabric qualities in the interaction, complementary to other, either more expressive or more pragmatically designed interfaces. In the paper, we will therefore not only describe the design process, but also reflect on our insights: How the fabric properties guided the development of fabric interface elements; how the functions associated with the interactions were guided by the form of the final prototype; and how concept development and prototyping were closely intertwined in the process. We conclude with a reflection about how aesthetics and function interrelate in the fabric interface.

## INTRODUCTION

Conductive fabric and thread are a new interface technology that spread from medical and military products into the consumer market. Hence, wearable technology is becoming more common and for interaction designers, under the labels of smart textiles, e-Textiles or wearable computers. At the beginning, developers have often referred to existing interface solutions used for electronic devices. When doing so they also often adopted the common and familiar user interfaces such as control buttons and symbols from music players. Therefore the potential of the fabric to



Figure 1: Music Sleeve and phone

provide new interactions has seldom been explored. Although these products were often cutting-edge technologies, they did not create new experiences for the users. More recent research has matured. For example, works like E. R. Post's master thesis on an embroidered jacket interface (1999) and an interactive tablecloth (2000) represent early works on appropriating fabric production techniques for electronics. Similar to the use of embroidery, J. Berzowska experimented with jacquard weaving technique to produce complex fabric circuits (2005) and investigates the incorporation of fibered electronic materials, such as nitinol, in interactive garments (2008). While these projects mean to

appropriate fabric as displays and kinetic surfaces, L. Buechley's works demonstrate various detailed investigations on gracefully integrating electronic components into the fabric (2009). Similarly, H. Perner-Wilson developed a large number of low-fi textile sensors from scratch (2010).

The important achievement of those works is to regard textiles and electronics equally as technologies to be mixed and appropriated for each other. By revealing their 'technical' qualities once again, the aforementioned researchers find a compelling and surprising way of creating new functional and expressive meanings for both electronics and fabrics. They also investigate electronic fabrics in an experimental and open-ended way.

In this study, we follow a similar direction as these researchers, but investigate fabric physical properties as sources for new interactions with electronics instead of focusing on innovative production of electronic fabric. We will describe and analyze the design of the 'Music Sleeve' – a fabric controller for a music player on a mobile phone.

We will describe the design process, as well as reflecting on a number of questions arising from the study: How did the physical properties guide the development of the fabric interface elements? How the specific functions associated with the interface elements in turn were guided by the form of the final prototype? How were concept development and prototyping intertwined in the process?

Through these reflections, we learned that opposing qualities between fabric and electronics hold the most potential for new modes of interaction and user experience.

## FABRIC AS AN INTERFACE MEDIUM FOR ELECTRONICS

The Music Sleeve was designed and implemented in three months as a part of a doctoral dissertation on experimental interface design in fall 2010. We first give an overview of the Music Sleeve, its design and workings. Then we continue by explaining how the Music Sleeve was profoundly influenced by material and physical qualities.

### THE PROTOTYPE

The Music Sleeve is a wearable controller for playing music on a smartphone. Shaped as a knitted closed tube that can be slung across one's shoulders, it functions as a music controller when one puts a handful of coins in it.

The Sleeve can be moved around the shoulder to shuffle the coins inside, which will always fall to the bottom due to gravity. It has four pull strings on the outside, dividing it in four equal sections. When tied together, the strings block the coins inside or lock them in a particular section of the sleeve. The location of the coins in the tube and the combination of strings trigger a



Figure 2: a) An opening that allows coins to be dropped into the sleeve. b) The sleeve is worn across one's shoulders. c) Rotating the sleeve moves the coins within. d) The movement of the coins can be obstructed by tying the string.

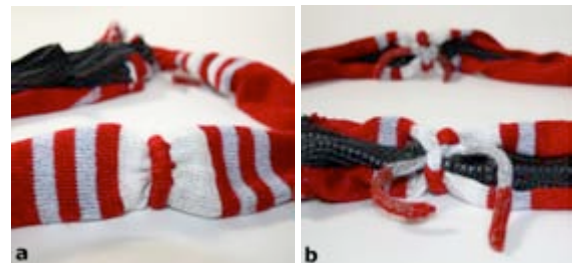


Figure 3. Active zones a) White areas act as the location switches. Grey lines are direction indicators. b) A closed string switch.

function (see figure 4). The different states of the sleeve (off, pause, play, shuffle mode, volume mode, skip tracks) are transmitted to the mobile phone via a Bluetooth module on a LilyPad microcontroller, and interpreted by an Amarino application on the phone. The four pairs of knitted-in 'location switches', located on each side of the pull strings, consist of two oppositely charged parallel rows of conductive yarn knitted on the inside wall of the sleeve. When coins pass through, they activate a switch. The strings, the second kind of switch, can be pulled and tied in particular combinations to access different functional modes. They will also lock the coins in certain regions of the sleeve.

Tying all strings will switch the music off, opening all of them will switch it on; blocking half of it will activate the shuffle mode, blocking a quarter triggers the volume control, and blocking one single switch with coins on both sides will pause the music (see figure 4). The switches and strings are distinguished by colour as 'active zones'. Different numbers of stripes at each switch hint to how the sleeve behaves in action. E.g., when all the coins are locked within one quarter section of the sleeve, the switch with one line will decrease the volume of the music; the switch with two lines will increase it.

We propose that the Music Sleeve interface is an

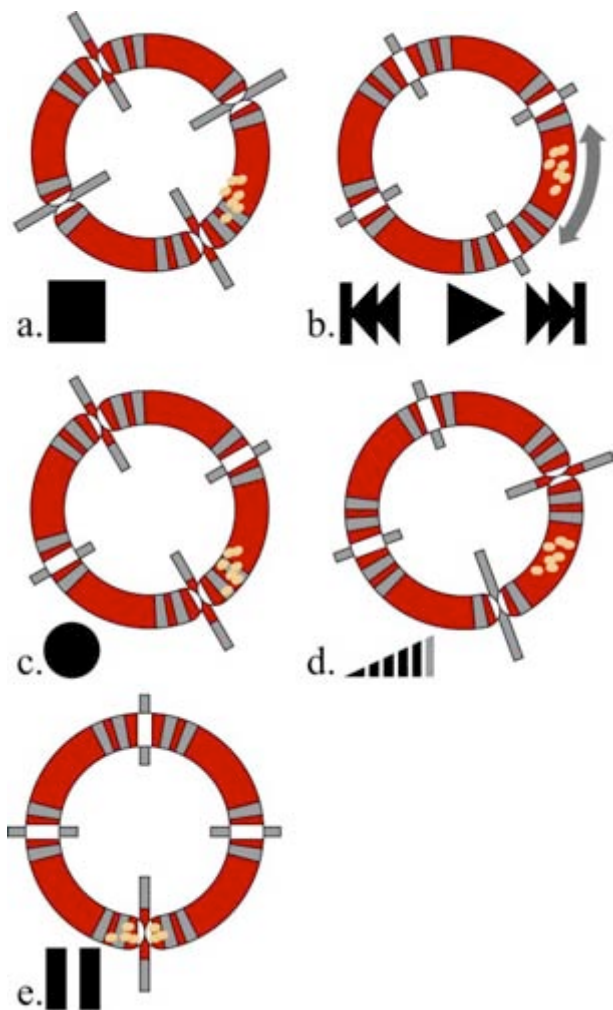


Figure 4. Position of coins and state of strings mapped to functions of the music player. In a., all strings are closed to stop the device; b. shows the coin movement to play and skip tracks; in c., opposite strings are tied for the shuffle mode; d. displays the volume mode with consecutive strings tied; e. to pause, tie the string with coins on both sides.

example of how the material quality of fabric can be central to the interaction. In other words, how can the fabric material be exploited as an interface medium for electronics.

### THE DESIGN PROCESS

At the beginning of the design process, we deliberately decided that the physical qualities of the fabric as the necessary and central aspect for creating new interactions, i.e. **to address fabric as a medium for the interface**. Our process thus involved the following steps:

1. Identifying the significant properties of fabric as an interface, e.g. the stretchiness of fabrics;
2. Collecting visual references on fabric interactions to appropriate them for electronics;
3. Sketch and prototype fabric interface elements (see Figure 5);

4. Assemble single interface elements into a more complex whole and map electronic functions with them.

After several iterations at step 1, we have come to an emergent insight between fabric and electronics: The opposing qualities between them hold the most potential for new modes of interaction and user experience. When one combines electronics with fabric, it is most interesting to use the opposing qualities. For example, the softness and versatility of the fabric open up new ways of interacting with electronics, which are normally stiff and hard. One can make a switch by tying two textile strings. One can make an electronic contact by folding. One can increase or decrease a resistance value by stretching. Tying, folding, stretching and many more interaction modes are afforded by the physical quality of fabric. We investigated many of those interaction modes through sketching and prototyping, although we did not employ all of them in the Music Sleeve.

As a result of step 2, we realized that any interaction with fabrics would of course happen within a context that included other conductive objects as well, like small change, bike frames, pots and pans etc. We then systematically searched for conductive objects that would interact with fabric, and fabric objects that would come in contact with conductive artefacts. We were especially looking for those combinations that pointed to interesting ways of using the fabric's softness: For example, the metallic frame of a bicycle also evoked riding the bike in a rainstorm, and the fight with skirts or raincoats to keep them from lifting up or blocking sight, and coins in a wallet reminded us of holes in trouser pockets, or the residues collected in the bottom corner of a backpack. Those scenarios and contexts were developed in step 3 and 4, and chosen based on the range of their interaction potential for conductive objects with fabric.

### DOUBLE MEANINGS: USING COINS AS SWITCHES

We chose to work with coins as conductor in the end for the Music Sleeve because we found their material properties as well as their aesthetics and meaning sufficiently rich and versatile: They produced a nice distinct sound and feel, were nice to handle and play with, and at the same time their stiffness and weight could be juxtaposed with light and soft fabrics to create an interesting contrast of materials and textures.

We first investigated different variations through sketching: adding pressure to the coins within a pocket or sling through knotting or sitting on them; using gravity to locate their position within a pocket, lump or spread the coins, or sort them by size. We tried multiple design options to increase the reliability (see figure 5) of the electronic connection between coins and fabric. Finally we decided to only detect the presence of coins rather than their amount, and thus to use them for digital switches. Closing a circuit by putting coins between its



two open ends just needs a slight contact to work and avoids the high noise inherent in the bad connection of fabric and coins.

#### ADOPTING FABRIC SHAPES: STRANGE FORMS FOR FAMILIAR ACTIONS

As a result of our insight to contrast fabric and electronic properties, we wanted to define **unfamiliar independent fabric shapes that invited familiar actions** like folding or crumpling. Our aim was less to merely use familiar fabric shapes as interface metaphors. The interaction should be meaningful, but leave enough room for new interaction and experience.

After first having produced a broad range of object-fabric interaction scenarios in step 3, we refined them according to how well we could actually detect them electronically through the shape of the fabric alone – i.e. without additional electronic sensors. For example, the action of 'spreading' a piece of cloth on a table can be used to detect its shape, according to how the folds around the table fall (this will look different for a small, round table than for a big squared one). Unlike the tablecloth scenario, we could not come up with similar fabric-based solutions for some other situations (like the amount of wind that a piece of fabric is exposed to), because the electronic components required more stability and reliability than our prototypes could provide.

After having prototyped a large number of those interaction possibilities in fabric, we assembled the most reliable ones into a coherent interface. Usually, the electric contact between coins and fabric was too unreliable, despite our various attempts to improve it. This resulted in too much noise in the circuit that made it difficult to clearly read a range of concise values, indicating a distinct number of coins. For the final prototype, we combined the interactions of slinging a bag around the body, enclosing stuff by knotting it in, and moving things in a pocket by shifting them around inside. We developed the narrow shape of a hollow, closed sling as the final form for the interface. The hollow shape assured to keep the coins inside in a cluster that would act as one conductive body. The coins could move freely inside the sling, and the location of the coins could be detected as they triggered the respective switches on the inside. The strings on the outside would block the flow of coins when pulled, while working as fabric switches at the same time.

#### FUNCTION FOLLOWS FORM: MAPPING FUNCTIONALITY TO THE SLEEVE

We neither wanted to design an electronic fabric interface for a specific purpose, nor make the prototype's electronic function necessarily the most important one. While we were already detailing the form and interactions, we left the purpose of the sling undefined: The interface as such could have been mapped to control all sorts of electronic functions where a continuous directional movement was useful.

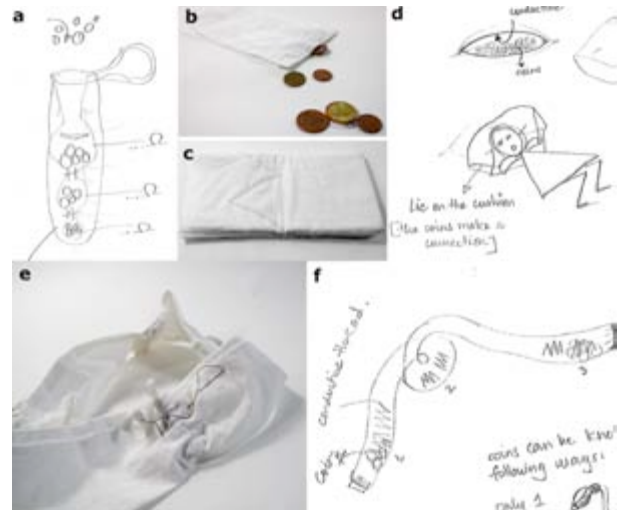


Figure 5. Examples of initial prototypes and sketches that use coins with fabric. a) Gravity coin sorting pouch – When coins are dropped in, they get sorted into the different compartments according to their size. b) A prototype for a coin sorter – Only small coins pass through the slit at the end of the bag. c) Prototype of a cushion concept that has triangular conductive areas and can be filled with coins. The connection is made when someone applies pressure by sitting or rolling it up. d) A concept sketch for interacting with a coin filled pillow. e) and f) Prototype and sketch for using the action of knotting coins within a sling form.

However, the sense of direction in the flow of coins within the sleeve and the ability to break and manipulate the movement of coins fitted well with the function of a music player, as the movement reminded us of scrolling through tracks. The coins in the sleeve thus took on the role of the 'play head' on a tape recorder. Similarly, the idea that the 'pause' function freezes the movement of the play head got translated into blocking the flow of coins in the sleeve.

Using fabric output as well as input would have been most consequential, but turned out to be too energy-consuming for our project. At the same time, stiff and heavy components in the fabric interface itself would have made it clumsy and obstructed the rotational movement. Thus, we externalized all necessary components by connecting the fabric sling to a mobile phone via blue tooth to keep the softness and flexibility of the fabric interface intact. The mobile phone thus takes the role of a multi-purpose minicomputer where electronic components are included and safely stored away.

#### REFLECTIONS

The materials and production techniques provided the unavoidable material constraints to our design. We literally had to bend these techniques to our purpose, and explore their potential in a foreign medium. Figuring out the most intriguing use for a particular production technique was similar to identifying intrinsic material interfaces. Both processes were very tightly coupled. They went through the following stages:

1. exploring the opportunities and constraints of





Figure 6. Opened view of reversed side of sleeve - Conductive yarn knitted in rows to form a location switch circuit.



Figure 7. Close ups of the rows stitched in the jersey to carry the data lines securely.

the production techniques,

2. combining them into single interface elements,
3. working out solutions to assemble a more complex prototype,
4. learn from 1-on-1-prototyping about the feasibility of the design.

1. We used **sewing and knitting** in the final prototype. The knitting machine allowed us **to knit our own custom fabric** with unique properties in terms of conductivity, stretchiness, pattern, colour and dimension. With the machine, we could produce closed hems, where the conductive yarn would be protected on the inside, and strings of different thicknesses with conductive yarn plated to the outside.

2. We **combined those techniques to create the string switches**. Similar to this, the location switches on the inside of the sleeve had to be parallel lines of conductive knitted fabric, following the direction of the machine (see figure 6).

The connection from the switches to the microcontroller had to run in vertical direction, while being just as stretchy as the knitted fabric. **We thus used jersey to carry the soft circuitry**, as its elasticity matched that of the wool.

3. To insulate the data lines in the sleeve properly, **we thus them into narrow cordings, coming from the switches**. These parallel tubes would contain the (un-stretchy) conductive thread, insulate it and at the same time create a nice ruffle-pattern, thus giving it a unique aesthetic quality (see figure 7).

4. The available production techniques thus had a big impact on how we planned the interaction in detail. **It was only in the concrete implementation that we could decide how the interface should finally work**. Our design process therefore was highly bound to the material and its physical limits.

## CONCLUSION

In this paper, we described a design research project on fabric interaction to find out some interface possibilities intrinsic of the material at hand. We developed the interface constrained mostly by the material properties. This constraint inspired us to determine alternative interface elements in the medium of fabric, with different aesthetics and interactions as a result. We shared our experiences from developing the Music Sleeve and explained our design decisions based on the fabric properties. We now draw some hypotheses on the further development of fabric interaction, and the mutual impact between material constraints and aesthetic impressions that our fabric interface evokes.

## DEVELOPING FABRIC INTERACTIONS

The development of the fabric interaction elements was a highly iterative process between sketching and prototyping. It was common to have beautiful ideas on paper but fail in practice when prototyped.

However, the interaction elements literally had to be shaped as a parallel development between concept and material, sketching and prototyping. Details, like the thickness of the conductive thread, the length of a sewing stitch, or the distance between conductive stripes in a piece of knitted fabric was crucial to failure and success. This conversation with the material, in turn, inspired us to new interface elements. We realized that our experiences were very much in line with the pragmatist account of thinking, as expressed by John Dewey (Dewey, 2005, pp. 61-62) and addressed in Design Research on experiential knowledge.

## HOW FUNCTIONAL DECISIONS INFLUENCED THE AESTHETICS

By judging our production techniques mainly by their adaptability as electronic element, we treated their aesthetic expressions as secondary. However, we intentionally looked for translatable elements in fashion, which carries a lot of expressive meanings. Also, we were using familiar objects like coins in the interface that should also evoke diverse associations. While we did not develop our interface primarily by the aesthetics, we deliberately tried to avoid well-known 'electronic' interactions, like pressing buttons.

As a result, we suggest that our prototype displays ways to use fabric as an interaction element rather than a substrate for electronics. Accordingly, the sleeve is aesthetically quite different from standard electronics: it reminds us of shawls, leisure sweaters or elegant pullovers, it is feminine and delicate, collapses nicely when laid down on a table, it can be worn over the shoulder or around the neck, it stretches under the weight of the coins, which jingle with each movement.

By adopting the material and production means, we were adopting the interface aesthetics of fabrics at the same time. We therefore suggest that merging two different media – electronics and fabrics – on a functional level also leads to new aesthetics and functions for both domains. However, while a functionally designed form automatically has an expressive meaning, an expressively designed form does not automatically have a functional meaning as well. We suggest that our project can be understood as such an example of how to explore new aesthetics from a functional point of view.

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# SUPPORTIVE TOOLS FOR COLLABORATIVE PROTOTYPING

WILLEM HORST  
SPIRE CENTRE, MADS CLAUSEN INSTITUTE,  
UNIVERSITY OF SOUTHERN DENMARK  
WILLEM@MCI.SDU.DK

## ABSTRACT

The development of interactive products requires the integration of different disciplines, such as interaction design, design engineering, marketing and R&D. This paper explores how these disciplines can be involved in the prototyping process by introducing a set of tools. In the literature, various tools and toolkits are described that support interaction designers in the design and modification of prototypes in the early stages of a project. Although these make prototyping easier for interaction designers, it remains challenging to involve other disciplines in a *collaborative prototyping* process.

In this design case I describe a set of tailor-made tools that were designed to support the collaborative development of an interactive prototype in an industrial setting. I demonstrate how these tools supported collaboration and communication across functional units, and allowed different stakeholders to make concrete design contributions. I propose that investing in the development of such supportive tools is beneficial to product development, as they allow different stakeholders to use the prototype as a development tool, facilitate cross-functional

collaboration and enable appropriation and repurposing of the prototype across different departments.

## INTRODUCTION

The development of interactive products requires the integration of different disciplines, such as interaction design, design engineering, marketing and R&D. Interaction designers play a central role in defining the user interface of the product and prototyping is an important activity in this process. It is not only the outcome, i.e. the prototype, but also the process of prototyping that is relevant for development. As designers make the prototype they engage in what Klemmer et al. (2006) describe as “thinking through prototyping”. The iterative prototyping process is a reflective learning process, where the prototyper develops a deep understanding of the implications of both big and small design decisions on the use experience.

Although the importance of prototyping in the design of interactive products is well understood, making interactive prototypes is not trivial. Prototyping requires some technical expertise and can be costly. Depending on the complexity of the product and the fidelity of the prototype, the expertise required could be programming, electronics, graphic design and/or hardware integration; and the costs are related to the time it takes to make them and components necessary to assemble them. In the next section I briefly review two approaches in the literature that support designers to make prototypes. Then I describe my involvement as an interaction design consultant in the development of a programmable radiator thermostat in an industrial setting where I designed tools to support members of a cross-functional team to develop a prototype. I describe the supportive tools and their relation to the prototype itself and describe how they supported cross-functional collaboration in the prototyping process. Finally I present my conclusions and discuss opportunities for future research.

## SUPPORTING PROTOTYPING BY DESIGNERS

Making interactive prototypes is an important design activity, but can be difficult and expensive. In the literature there are two main approaches that support designers in making prototypes by making it easier and less costly to develop them.

One approach to overcome the high cost and expertise required to prototype is to lower the fidelity of the prototype, for example through paper prototyping (Rettig 1994), using cardboard mock-ups (Ehn & Kyng 1991), or PowerPoint-based prototypes. This lowers the technical expertise required and drastically reduces the cost of prototyping. These prototypes are certainly useful in some contexts, but are less useful when dynamic aspects are an important part of the use experience (cf. Sefelin et al. 2003 on the limitations of paper prototyping).

Another approach has been the development of toolkits to support designers in making interactive prototypes that are more complex. The goal of such toolkits is to enable designers to make prototypes in the early stages of a project to explore (physical) interfaces including the design and evaluation of the dynamic aspects. These toolkits contain various components that can be used in a variety of projects, and some environment to easily configure and program the prototypes without writing extensive code. Examples of such tools and toolkits are Phidgets (Greenberg & Fitchett 2001; Greenberg & Boyle 2002), the iStuff toolkit (Borchers et al. 2002; Ballagas et al. 2003), the Calder toolkit (Lee et al. 2004) and d.tools (Hartmann et al. 2006).

Although these approaches make prototyping easier for interaction designers, it remains challenging to involve other disciplines in the prototyping activity in an industrial context. Involving members of a cross-functional team as well as management in prototyping activities is important for them to be able to contribute to its development. As Schrage (1996) notes when this does not happen “the prototype becomes a medium for persuasion, rather than a vehicle to evoke discussion. It is used to prove a point, rather than to create a platform for a design dialog.” (p. 200) This is especially true for top managers that are involved late in the design cycle and then “are being asked to approve—rather than to review or assist—new-product creation” (ibid.) In the remainder of this paper I describe how the use of a flexible prototype in combination with supportive tools was an effective way to open up the prototyping process to these internal stakeholders in an interdisciplinary product development project.

## RESEARCH CONTEXT

This paper is based on my involvement in the development of the Danfoss living eco® radiator thermostat (eco®) at Danfoss Heating Solutions. The eco® is a programmable radiator thermostat containing electronics and a user interface, which can be mounted onto any radiator and has a similar form factor as a

conventional radiator thermostat. Based on the schedule set by the user and the temperature measured by the temperature sensor, a small motor controls the radiator valve to regulate the temperature. The product offers users a convenient way of saving energy, by for example automatically lowering the temperature at night and/or working hours.

The Danfoss Heating Solutions department responsible for its development normally develops mechanical products, such as conventional radiator thermostats, and the eco® is the first of its kind for this department. Since the department did not have all the necessary expertise in-house, the internal development team had to collaborate with different internal and external partners. Examples of external partners in this project are usability consultants and interaction design consultants, and examples of internal partners are other departments in the wider Danfoss Heating Solutions organization with expertise in software or electronics.

## RESEARCH AND DESIGN ACTIVITIES

In this project I was involved as an Interaction Design Consultant to develop interactive prototypes of the user interface. As a part of my research project in the role of prototypes in interdisciplinary product development, I designed and deployed three supportive tools to enable members of a cross-functional team to use the prototype as a development tool. During a 4 month period I worked closely together with the Design Line Specialist (DLS), who was responsible for the Man-Machine Interaction (MMI) as it was referred to in the company. As an external consultant, I did a lot of my work remotely, and communicated with the DLS via email. In addition to this I worked face-to-face with him during seven days spread over the 4 months and was part of 3 prototyping workshops at Danfoss Heating Solutions. After my involvement in the project the interactive prototype was used extensively for various activities over a one-year period.

This paper is based on various data sources that were collected in two stages. In the first stage during the intensive 4 month period, I gathered 9 hours of workshop videos, 60 emails and 70 prototype iterations. One year after my involvement in the project stopped, I conducted 5 semi-structured interviews reflecting on the use of the prototype as a development tool with the Design Line Specialist, the R&D Project Manager, the R&D Senior Director, the Global Webmaster and a Product Marketer.

## ABOUT THE PROTOTYPE

Very early in the project it was planned to do several usability tests of the interface, and it was clear that the user interface would have to be revised multiple times. Therefore the interface and the exact features were not frozen until these tests were done, although some decisions were made on aspects that related to the product hardware. These hardware decisions provided the framework for choosing an appropriate prototyping approach and medium.

It was decided that the product would have 3 buttons (up, down and enter), and a circular segment display with a diameter of 25 mm. The choice for a segment display, as opposed to e.g. a matrix display was an important constraint. With a matrix display, the exact icons can be changed at a later stage of the project at low cost because it is possible to make them in code. With a segment display, all segments (icons, digits, etc.) have to be specified and ‘frozen’ during the electronics development. The (cost of the) chip required to drive the display depends on the number of segments it has to control. Moreover, segment displays are tailor-made, and once such a display is made it is very costly to change it. Therefore, defining the (minimum) number of segments required to make up all the possible screens, and finding the right layout with appropriate icons on the right scale was an important objective. For this reason the interactive prototype had to be very detailed with regards to graphics and be on the right scale, without the high cost of changing the segments. To do this we chose to use a touchscreen PC running a virtual prototype of the interface scaled to the real dimensions (see figure 1), which meant we could do valid tests on the legibility of the icons in usability tests and change the virtual segments if necessary at low cost. This is a different type of prototype than the company usually uses during development:

*Usually when we talk about prototypes, then we are much further in pure hardware terms before we can call it a prototype. So it is perhaps the final display we sit and play with, which then gives us a lot of limitations, because now we have this display and we cannot go back. So that is where the value really kicks in, that we have something that resembles reality early on.* (Design Line Specialist in interview)



Figure 1: The virtual prototype

Using a virtual prototype, i.e. a piece of software which can run on a computer, has the advantage that it is easy to share, which was particularly relevant since I was working remotely. The Design Line Specialist also shared it internally and mentioned this as a clear benefit to both get input from various people, and allow them to use the prototype in their work:

*You could say that everyone who tries it internally comes with comments. Especially in the early phase, when things can be improved. So in that way you of*

*course also get an enormous amount of input, when it has been so easy to share this piece of software. The whole thing became one long test. [...] It has been so nice and easy to have been able to share this piece of software with internal people, so they could sit with it on their computer, either to play with it, or to use it concretely in their work.* (Design Line Specialist in interview)

## SUPPORTIVE TOOLS FOR NON-DESIGNERS

Designing the user interface of this particular product interface involved paying a lot of attention to the details. Because the interface surface was very small – everything had to fit on a display with a diameter of 25 mm – every detail could affect the product's usability. These details could be the exact size of an icon, how fast icons would blink, what heating schedule should run by default, or how long the backlight would stay on. These details are difficult to specify without trying them out and seeing how they work in a dynamic prototype, and evaluating them with others. Supporting other developers to ‘play around’ with these values, involving internal stakeholders as well as users, would enable them to use the prototype as a development tool. This could be done in evaluation sessions or in collaborative prototyping workshops.

To do this, I designed three supportive tools to be used together with the prototype. Two of these tools were designed to make changes to the prototype without coding: the first to edit basic parameters, such as blink-frequencies and timeouts, and the second to edit the virtual segments. Finally, I built in an export tool into the virtual prototype to export a picture of the current screen with a single key-press, to support effective communication as most of my work was done remotely. The prototype itself is structured around external files, such as graphic resources and sounds, and textfiles describing the layout of each screen and values for settings and parameters. The tools take advantage of this flexible structure and make changes to some of these external files (see figure 2). This enabled making changes to these aspects of the prototype without changing code or compiling a new version of the prototype. Some changes did of course require coding, and this could only be done in the Adobe Director environment, which I used to develop the virtual prototype. In the following subsections I briefly describe each tool and how it was used in the development process.

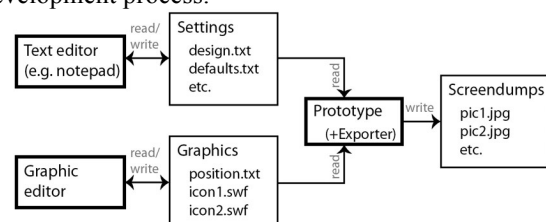


Figure 2: The relation between the prototype and the supportive tools

### PARAMETER EDITOR

To enable other developers to make changes to the parameters and settings of the prototype I stored all the



settings in separate textfiles. In DesignSettings.txt I stored all settings that had something to do with the overall look and feel of the interface. This could be the click-sound to use, the blink-frequency or various timeout values. In gDefaults.txt all the global defaults were stored. This could be the default temperature, the default date and time, or maximum and minimum values for the temperature. I also provided a readme textfile where each parameter was described and what type of values it could have (see figure 3).

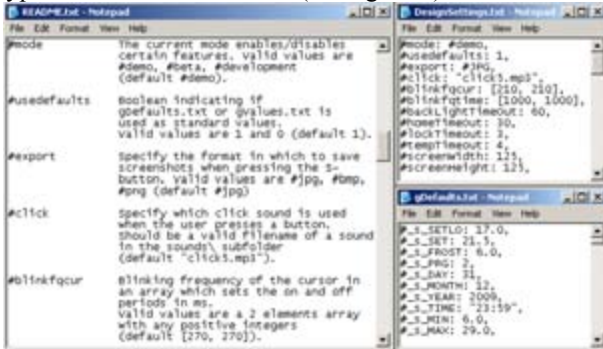


Figure 3: Text files with parameters and readme

These textfiles could be easily edited with standard software, such as Notepad or TextEdit, and enabled others to try out different values. Before I structured the parameters like this, I was the only one who could change these values, and would for example get emails with a request to change something:

*Could we try out a frequency of 1 to 2, so that it is gone twice as long as it is shown? (Intern – email)*

After the other developers could change these settings they first used it to find values they preferred themselves:

*I think it starts making sense to me. I do however get a bit confused and have a tendency to get stressed with all the blinking, but I can just try and change the speed and see if that helps. (Intern – email)*

Later in the process this was also done in collaboration with end-users:

*The good thing about this tool is that you can try things out immediately, especially with these ‘soft-coded’ things, where you can very easily change a parameter and test it right away. [...] Things we have played around with a lot are the default values in it: blinking frequencies, time-outs and such things. You call it participation workshops, where you test directly with a user and correct immediately, until you reach a satisfying result. [...] As a developer you lose the feeling for those parameters, time-outs and frequencies and things like that. So there it was very easy to go in and find the values, by being able to adjust them until the end-user says: “Now it is good.” [...] It is of course about being able to correct things onsite, directly, instead of having to write something down, and tomorrow you have forgotten what it was you had to correct and what it was he said, and these kinds of things. So to get it adapted to the test person you are sitting with, immediately, has also sped up the process*

*tremendously, and moreover you get everything. (Design Line Specialist in interview)*

#### GRAPHIC EDITOR

All graphic assets used by the prototype were stored externally in a separate folder to allow for easy updating of graphics. To further facilitate making changes to graphics without the need for either using external graphic design tools or coding, I developed a graphic editor which provided an overview of all segments of the display and allowed making basic changes to existing graphics, such as repositioning, scaling and deleting, as well as importing new graphics or replacing graphics (see figure 4). New graphics would have to be developed with a graphic design tool, such as Adobe Illustrator – the editor had no drawing capabilities. Using the tool made it easy to make changes to icons that would carry through the whole prototype without any code, and made making 'cosmetic changes' to address cosmetic usability problems easy.



Figure 4: Graphic editor

The graphic editor was very useful in collaborative prototyping session, since it enabled me to quickly make changes to the graphics, e.g. change the size or position, on any computer. Before I made the editor, I would have to edit the graphics in Adobe Illustrator and export them, which took some time and could only be done on my computer, since nobody in the development team had this program installed on their computer.

#### SCREEN EXPORTER

I developed a screen exporter that was integrated in the virtual prototype; pressing the 's'-button would take a screendump and store it in a specific folder. I envisioned it would be used primarily to facilitate communication between the Design Line Specialist and me, but it turned out it was used for other reasons as well. The pictures were used for internal presentations, making the user guides, software specification and the product website. This tool was used both during and after the development of the interface by different departments: *The exporter has been used extensively for presentations, and then gone straight into the manual. The quality has been so high that there has been no need for drawing anything in. So that is also a lot of*

time saved. [...] When we come to the documentation part of the user interface and the handover to the programmers, well then it was of course also incredibly helpful and timesaving for me to be able to use this. Especially the export function; instead of writing it down with words, the specification actually consists of hundreds of small comic strips. (Design Line Specialist in interview)



Figure 5: 'Comic strip' from the exporter (annotated in PowerPoint)

When changes had to be made to the prototype, e.g. after a usability test, the Design Line Specialist would send me 'comic strips' annotated in PowerPoint with the changes (see figure 5). In a similar way, the exporter was used to document the interface to the software developers.

After the interface development was finished, I made a stand-alone version of the screen exporter specifically for the user guide developers (see figure 6). They requested a higher resolution, and a glowing effect to indicate the icon that was highlighted. This also came with a parameter editor, which enabled the user guide developers to change the highlight-glow size, strength and colour.



Figure 6: Stand-alone version of the screen exporter

## CONCLUSIONS AND FUTURE RESEARCH

In this paper I have presented three supportive tools for collaborative prototyping that were used in a product development process. The tools enabled me as a designer to effectively work together with different members of an interdisciplinary development team. The role of the prototype also changed, because it was no longer static, but could be tinkered with by non-designers. The Design Line Specialist compared this

prototype to another virtual prototype developed by another company:

*You could say that the [virtual] prototype [developed by another company] is not flexible; we cannot change anything. I cannot change anything in it myself. I can use it as a communication tool, or some status update: "Well, now it is like this." But I have no possibility to modify it, or develop with it, you could say.* (Design Line Specialist in interview)

Developing and maintaining the different tools took 12 hours (on a total of 172) of development time (which includes 8 hours to optimize the screen exporter for the people making the user guide). The supportive tools added value during the interface development, and extended the lifespan of the prototype far beyond development – due in large part to the screen exporter. My findings suggest that investing in the design of supportive tools in the context of cross-functional product development is well worth it, which was underlined in the interviews:

*I am sure that we have saved both money and time in this project using this tool. It has been involved in so many different parts of the project. So it is not only to settle the Man-Machine Interface, but also as documentation in different ways.* (R&D Senior Director in interview)

The flexible prototype and its supportive tools were also used in collaborative prototyping events (described in more detail in Horst and Bogers, forthcoming) and enabled *live prototyping*, i.e. making changes to the prototype on the fly based on input from various participants. As such, these tools supported these participants to engage in the prototyping activity, which gave them a better understanding of the design constraints and implications of design decisions. This supported the collaborative and interdisciplinary development as the prototype and its tools acted as a boundary object for the different stakeholders involved. The tools presented in this paper can be improved and expanded in several ways. A special tool to edit the parameters, integrating the instructions of the readme and the actual values could be an example of making the tools more user-friendly, where the users are the interdisciplinary development team in this context. Specifically designing these supportive tools based on the needs and skills of the different developers involved is an area to explore further.

My original intention with these tools was to open up the prototyping process to the developers I was collaborating with. The fact that the prototype and its tools were so easy to share made it possible to open up the prototyping process to a much broader range of people, who used and appropriated it in ways I had not imagined, without my involvement. Designing supportive tools that open up even more of the prototype to enable different stakeholder to contribute to its development in a collaborative process is an interesting area for future research.

## ACKNOWLEDGMENTS

I would like to thank the people involved in the project described in this paper at Danfoss Heating Solutions for their support during the project and their cooperation afterwards. Special thanks go to Anders Østergaard Clausen for his support and engagement throughout the process.

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# DESIGNING FOR UTILIZATION

## PUTTING DESIGN PRINCIPLES INTO PRACTICE

PAULA KASSENAAR<sup>1</sup>, KATHARINA BREDIES<sup>2</sup>, ELISE VAN DEN HOVEN<sup>1</sup>

<sup>1</sup>EINDHOVEN UNIVERSITY OF TECHNOLOGY

INDUSTRIAL DESIGN DEPARTMENT

EINDHOVEN, THE NETHERLANDS

<sup>2</sup>DESIGN RESEARCH LAB

UDK BERLIN

BERLIN, GERMANY

### ABSTRACT

Designers do not only create usable products for a predefined purpose, but also to explore new materials and technologies. In doing so, they should not restrict themselves to existing conventions, but develop new ones out of the medium at hand. These new interface forms should encourage users to appropriate an object for their own purposes – i.e. utilize it. In this paper, we will describe the development of a fabric interface prototype that should exploit the material and encourage utilization of the interface. We discuss how our theoretical perspective was translated into a concrete design, and how appropriate we judge it for utilization. We conclude that design without final goal is surprisingly hard to do, but can show the value of the medium used.

### INTRODUCTION

Since the 1980s, it is widely agreed in design that the aim of designers is to create usable, desirable and useful products – that is, things that people will understand and that will enable, empower or enrich them. Often subsumed under the term ‘User-Centred Design’ (UCD), various methods for analysis and implementation have been developed and successfully applied (Nielsen 1993; Preece, Rogers et al. 2002; Visocky o’Grady and Visocky o’Grady 2006). Today, they are often mentioned as best practice in design (International Organization for Standardization 1999) to ensure the comprehensiveness and meaningfulness of newly designed products.

However, there are not only limits to how well we can make a design fit with the user’s existing knowledge. It is

also an important purpose of design to introduce something new and unfamiliar to the world (Jonas 1993), which does by definition only partly relate to existing situations and behaviour. We feel that it is this playful ‘exploration of the new’ that needs to be emphasized more clearly in UCD methods.

Such methods would then need to focus not on problem-solving, but on possibilities, regardless of their immediate rational applicability. Instead of a readymade problem scenario, users would only get to see a ‘solution’ and have to construct the problem – the purpose of the artefact – in their own ways. The designer would then need to design **without a clear purpose in mind**, to leave the artefact open for interpretation and utilization, beyond the designer’s original intentions.

It is only recently that this kind of reuse and appropriation has been regarded as a potential to be addressed by professional designers. The few examples and principles to ‘design for utilization’ are still about to be translated into design methods and processes. In this context, disruptive, surprising or ambiguous design has been proposed by different researchers in HCI and design as appropriate strategies to open artefacts for reinterpretation in use (Dourish 2003; Gustafsson and Gyllenswärd 2005; Gaver, Bowers et al. 2006; Höök 2006; Sengers and Gaver 2006; Dix 2007). This might e.g. be achieved by **creating discontinuities in a design**, like contrasting a soft form with a hard material (such as a pillow made of concrete, see Ludden, Schifferstein et al., 2008). By confusing the established meanings of a product, the user has to rethink them anew, possibly coming up with some original and surprising interpretations.

The translation from abstract (theoretical) principles to concrete actions and results has always been a challenge within design. In this paper, we will therefore present our ‘design-for-utilization’, an interactive quilt blanket, and its design process, to document this very translation. We describe the operationalization of abstract design principles into a design, report on the practical challenges during the process and reflect on the suitability of our approach.



## THE DESIGN PROCESS: TRANSLATING PRINCIPLES INTO ARTEFACTS

For our design project, we translated two abstract principles into an actual object: one principle was to ‘create discontinuities in the design’ and the other was to ‘create a design with no predefined use purpose’. Both principles should lead together to an artefact that would be more open for diverse interpretations than purposefully designed artefacts. In the following sections, we will detail on the design process we set up to implement these principles, and unfold some of the decisions made in detail.

### DISCONTINUITIES IN THE DESIGN

Discontinuities in a design potentially deceive a user’s understanding of an artefact by displaying unfamiliar or contradictory forms, functions or materials. Such unexpected and surprising features require a person to re-evaluate and reconsider an artefact, thereby stimulating exploration and utilization (Sengers and Gaver 2006; Bredies 2008).

For our project, we decided to create functional-material discontinuities in an electronic artefact by **choosing a novel material, and form, i.e. conductive textiles, for an existing electronic function**. Fabric items and electronic devices are both familiar from everyday life, yet a mixture of the two is still rare. The material qualities of electronics and fabrics are almost opposites: while fabrics are soft, stretchy and allow for imprecision, electronics are stiff, edgy, hidden away in black boxes, and require high precision. Additionally, fabric electronics have been developed only recently, so unlike more established areas, there are not yet any agreed conventions for textiles as an electronic interface material. Creating discontinuities by merging electronics and fabrics thus promised to lead to a reasonable contrast to familiar and existing products.

### NO PREDEFINED USE PURPOSE

The purpose of an artefact results from the relationship of its use context, function and form. A bottle has a different purpose when it is used for holding precious wine compared to when it is converted into a Molotov cocktail.

To translate our second principle, ‘design without a clear purpose’, into practice, we wanted to leave the specifics of the use context and function of the artefact as unanswered as possible. To start with the otherwise common analysis of context and user study was therefore not suitable for our project.

Instead, we chose to apply a method called ‘**Rip and Mix**’ or ‘**Case Transfer**’ that was developed by Chow and Jonas (2010) for this kind of open-ended design projects. It represents a structured approach to analogy-building, which is itself very common in design. Based on the idea that existing artefacts contain transferable design knowledge, the method starts with collecting such artefacts or ‘visual sources’ on swatch cards. ‘Local’ sources represent artefacts from the same domain and serve as a benchmark for the new design. ‘Regional’ sources have to come from a similar, not the same, domain – e.g., if the design goal is to create mobile phones, these sources could be mobile objects of all sorts. These sources are pointing to new forms, functions, contexts and purposes that can then be transferred. In the following sketching sessions, one or more features from those sources are used as inspirations and combined into a new artefact. After such a design transfer session, the results are sorted, evaluated and refined in the next iteration.

For our project we collected local sources from both electronics and fabrics domains. While for local electronics sources, we were mostly interested in transferring the artefact’s function, the local fabric sources should represent the variety of possible forms and interactions with the material. For the regional sources, we collected artefacts with a property similar to a fabric property, derived from a collection of terms on a thesaurus map. For example, a bomb shelter was part of the regional sources, as it would represent the property of ‘covering’, which was similar to ‘wrapping’ and ‘being flexible’.

We used the Case Transfer method in three iterations, in which we collected visual sources, created analogies in sketches based on the sources and categorized them to decide how to proceed in the next iteration (see figure 1).



Figure 1: A schematic overview of one iteration of the Case Transfer method





Figure 2 [top row]: Various prototypes for an unstructured textile interface



Figure 3 [bottom row]: Various prototypes for a structured textile interface

#### FABRIC INTERACTION

An important learning point in using the case transfer method was to determine what the distinctive properties of fabrics are. Such properties provide the greatest contrast with electronics and may therefore create the biggest design discontinuity. Through using the various fabric sources as inspiration we realized that those ideas that use the fabric merely as a substrate (i. e. not as an interaction medium) seemed less interesting. An example is curtains that light up when you close them in the evening. Ideas that used interactions inherent to fabrics (like crumpling, folding, tying or reversing) were more thought provoking and seemed to create greater discontinuities in the design. An example is a pair of bed sheets that, by the amount it is crumpled in the morning, determine your clock's alarm sound.

We explored these fabric interactions in two directions. On the one hand, we investigated rather unstructured fabric textile objects that solicit specific fabric interactions, similar to those with a sari, turban or papyrus roll (figure 2); and more structured objects that on occasion also make use of peripheral artefacts, such as a wallet or tool belt on the other hand (figure 3). We believe that both concept directions possess the potential to become utilizable designs in different ways. For our prototype we chose to continue exploring unstructured fabric textile objects since these allow for more different fabric interactions. These objects can also be prototyped more easily and reliably, as we found through our prototyping efforts.

#### ELECTRONIC FUNCTION

Folding and crumpling a fabric object can be linked to a large number of electronic functionalities, for example

taking a snapshot, calling someone, communicating with a social network or controlling a television. When reflecting on which functionality to select, we realized we found it important to couple the functional feedback directly with the fabric object, in order to overlap action and perception space. We wanted to avoid a big gap between action and reaction over space as well as time, as it would have been the case with for example connecting the object to an online social network. We also valued a functionality that could be used in different contexts for different purposes, which ruled out e.g. using it as a television remote. Last it should be feasible to implement within a three month timeframe, not too heavy, bulky or energy consuming, and robust in use. This led us to select the functionality of sound recording and playback.

Recording sounds is a reasonably general activity to fulfil a myriad of purposes (e.g. note keeping, music mixing or diary) and is therefore open to a variety of use situations. It can be implemented with simple electronics and requires few hard and bulky parts. We also expected it to give easily perceivable feedback when users would explore the prototype without knowing its function.

#### BRIDGING INTERACTION AND FUNCTIONALITY

To make the fabric object work as a sound recording interface we would need to track the crumpling and folding of the fabric. As inspiration on structuring fabric objects we used the Japanese furoshiki. A furoshiki is a cloth that you use to wrap gifts, home accessories or items for transport (Ho 2009). The folding and knotting thus adds structure to the otherwise loosely structured fabric. This inspired us to use the structure created by folding the fabric as part of the interaction.

Despite the general openness to utilization, the user should still be able to discover the electronic functionality. Accordingly, we searched for a meaningful way to provide subtle information about the interface's workings. Therefore we used patchwork patterns as a symbolic way to structure and communicate the interface functionality. Patchwork is a traditional technique to structure large fabric surfaces into patterns, with a rich repertoire and its own history of meanings. E.g. it is a popular myth that patterned quilts were used as road signals on the Underground Railroad (a 19th century network of slave escape routes in North America, Schmech, 2009). This inspired us to use the patchwork pattern to communicate the interaction that accesses the electronic functionality.

### THE FINAL PROTOTYPE

The resulting design, shown in figure 4, is a patchwork blanket of roughly 1,5x1,5 meters. When folded together in different ways it triggers the recording and play back of eight different sound samples. The patchwork pattern hints to ways to fold the quilt that create effective electrical connections. Twelve magnets distributed in the quilt are used to detect the way the quilt is folded. The electronics are in a detachable pouch on the backside in which the circuit is distributed over seven layers of fabric.

Folding the quilt in such a way that corresponding coloured fabric strips match up records or plays back one of the eight sound slots (figure 5). The way the centre of the quilt is folded determines whether you record or playback, and the folds in the periphery of the quilt determine which of the eight memory slots you access.

To determine which of the twelve magnets make contact, we connected them to six different voltage lines and six analog input port lines. The combination of voltage levels arriving at the analog ports encodes the folds in the quilt. To ensure that the voltage lines can only connect to the analog lines in the quilt, the connection points were fitted with opposing polarity magnets. Dollops of conductive yarn, in the middle of the magnets piercing through the fabric, make contact only when opposing polarity magnets attract, as shown in figure 6.



Figure 4: The final prototype of the sound recording quilt

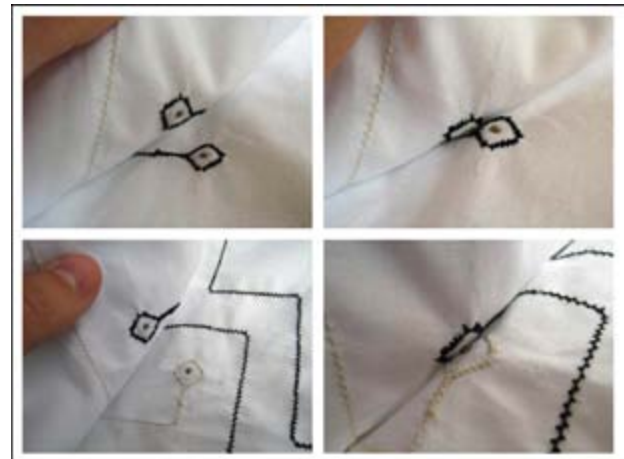


Figure 6: Connection points unable to make electrical contact (top) and making contact (bottom) in a test prototype

### DISCUSSION

In our project creating discontinuities with a novel material resulted in all the difficulties inherent in the combination of contradictory materials: unreliable connections, shortcuts, troubles with the high resistance of the conductive thread, long and tedious troubleshooting and problems to establish well-working production methods within reasonable time. In many cases, we had to compromise on our intent to replace standard electronic elements with fabric and use either sturdy fabric accessories such as snap buttons, or fall back on the original electronic component such as shielded wire to carry the audio signal.

Through this challenge of combining contradictory materials we created a design that can be interpreted in different ways. In its visual appearance, material and style, the patchwork pattern appears as a decorative pattern, being made with traditional prints and fabrics and established pattern techniques, while at the same time, it provides clues to the sequential interaction of recording and playing back sound samples. The shape of the patchwork, without the removable electronics, could be used in many ways, e.g. as a bed spread or wall decoration.



Figure 5: The prototype folded together to record a sound sample

The magnets, incorporated to ensure a good electric contact, can be used to hold magnetic objects or attach the blanket on magnetic surfaces, such as storing notes on it with kitchen magnets or using it as a key rack.

Whether these opportunities to use the quilt in different ways invite exploration during use still needs to be empirically evaluated and is part of ongoing research. However, we believe that the complexity of possible interpretations makes the prototype suitable for utilization: the interface definitely offers more interactions than a traditional sound recorder, and is unconventional enough to require users to interpret and experiment with the quilt.

## CONCLUSIONS

In this paper, we described how we translated two abstract principles into concrete design actions. The aim of the presented project was to create an interface that would invite utilization. We defined two design principles, namely ‘design without a predefined purpose’ and ‘create discontinuities in the interface’ to help us achieve this. We used the ‘Rip and Mix’ method to translate these principles into a design process, creating functional and formal analogies with fabrics and electronics as design mediums and inspiration and determining various use contexts based on visual sources. The result is an interface prototype that juxtaposes the contradictory qualities of fabric and electronics, and can be used as both a fabric and electronic object.

## CREATING DISCONTINUITIES

We propose that our approach – to create discontinuities on a material and functional level – was an appropriate translation of the principle because the resulting sound recording quilt challenges both its identity as a fabric and electronic object. In appearance and material, the quilt encourages handling as a fabric object. The electronic functionality can be discovered through that use, thereby providing a discontinuity in the users understanding of the artefact as a fabric object. Further studies are

necessary to investigate if this discontinuity is perceivable in use, as we expect it to be.

In the use of the Case Transfer method, we had to be explicit about the kind of discontinuity we wanted to design. Collecting the visual sources and analyzing the idea sketches proved to be a quick and thorough way to define the discontinuity that we believed to have the most potential: exploiting the interactions inherent to fabrics – and complementary to electronics. During the design process the reconciliation of contradictory material demands forced us to come up with new interface elements and interactions. Bridging fabrics and electronic gave us opportunities to create design discontinuities and the case transfer method help in this process.

## NO PREDEFINED USE PURPOSE

We learned that ‘designing without final goal’ is not a straightforward and common process for designers, probably because any purpose – as open as it might be – is a prerequisite for further design decisions. However, the case transfer method helped us to generate design ideas for fabric electronics while leaving much of the purpose open and finding new purposes along the way. We suggest that our indecision with regard to the purpose, combined with physical prototyping throughout the project, enabled us to discover the possibilities and limits of combining our two contradictory media freely.

In our case, designing without final goal made us realize what the intrinsic values of the selected materials were. Therefore, as a translation of our principle, we believe that our approach is particularly suitable in designing products that explore the potential of a new technology: projects with no final goal.

## ACKNOWLEDGMENTS

We want to thank Sebastian Wolf for assisting in the technical execution of the prototype, Ine Kaldenbach for her quilting hands, and Patchwork Promotions for providing us with high quality Hoffman fabrics.

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# MOTH WING SCREEN

RAB MCCLURE, ARCHITECT  
ASSOCIATE PROFESSOR  
DEPARTMENT OF INTERIOR DESIGN  
SCHOOL OF THE ARTS  
VIRGINIA COMMONWEALTH UNIVERSITY  
RMCCCLURE@VCU.EDU

## ABSTRACT

Inspired by contemporary Nordic design—characterized by fluidity of form, material innovation, tactile warmth, natural reference, and ties to a strong craft tradition—the Moth Wing Screen is a modular partition and design research project. The following essay describes the work’s goals and origins, beginning with first person reflections by the author on the sensory and tactile lessons of water skiing, a formative childhood preoccupation. Paired with excerpts from essays on seeing, drawing, and sensing by Juhani Pallasmaa, these reflections frame the discussion and provide a means of viewing the work through a lens of tactile warmth and softness. A description of the project follows, alongside drawings, diagrams, prototypes, and illustrative examples from the work of Alvar Aalto, Finn Juhl, Tapio Wirkkala, and others. The project and its description argue in favor of creating a role for softness in modern design, with softness defined in terms of form, surface, density, materiality and meaning. The Design Case Paper format provides a rare opportunity to present the project’s conceptual underpinnings—in the form of a formal paper presentation—alongside an exhibit of prototypes, original drawings, and the built artifact.

## ORIGINS

*An excess of childhood is the germ of a poem. (Bachelard 1971: 100)*

Growing up, I spent summers with my family on a wooded lake in the northern part of the United States, in rural Michigan. My friends and I rode bikes and played sports. We made up games and waited for the sun to burn the dew from the grass, anxious for the warm part of the day, because whenever possible, we spent our time in and on the water.

Most families on the lake had boats, and among the many shapes and profiles I had a favorite. Made of wood, it rode low at idle, thrumming with power and poise like a predatory animal, able to spring to the surface and roar off with a thrust of foam and spray of water. Its deep glossy finish seemed inspired by the flashing, enigmatic surface of the lake itself, and I imagined its curved wood sides—like the body of a cello—amplifying the throaty resonant power of its inboard engine. It was a ski boat, able to pull a dozen skiers at once. But my favorite spectacle was to see it pull a single skier at twilight, the skier weaving a graceful sinuous pattern back and forth across the boat’s wake, trailing a silver curtain at each turn, the startled, hovering water filled with the day’s last light.

In time I also learned to ski, working through the awkward initial stages, gaining confidence and developing a feel for the water. Water skiing is a balance of opposing forces—the push of the water against the pull of the tow rope—translated through the body of the skier. It involves rhythm and anticipation, the skier at times moving twice the speed of the boat, at other times nearly stopping, sinking momentarily in the pivot of a turn as the boat gathers slack in the rope and moves ahead.





Figure 1. Skiing at twilight: water at its softest

When I was eleven or twelve, I saved money and bought a ski of my own. Unable to afford something new, I bought a used wood ski from a neighbor, its finish peeling, its rubber bindings cracked, outmoded, short, and stiff. I worked that winter to strip its finish, removing the old fin and bindings, and subtly (or so I imagined) shaping its bottom surface and rails to improve its performance. The ski was made from three narrow strips of wood, two symmetrical dark lengths surrounding a light wood center. When I bought the ski, I liked this feature; I found it attractive. When I began stripping and sanding the ski, I realized there was more to it: the light colored wood at the center (probably ash, in retrospect) was harder; more difficult to sand, and stiffer. The many hours I spent, carefully sanding the ski by hand, working incrementally up through the numbers from course to fine grit sandpaper, were also hours spent daydreaming, imagining myself skiing, practicing technique in my head, and reading ad copy from ski catalogs. I did my best to duplicate the form of skis I saw in magazines.

In subsequent summers I skied at every opportunity, any time of day. If someone would pull me, I'd ski; whether it was windy or still, sunny, or raining. Through its flex, slice, and bounce, I felt the many states of water. Water is fluid and forgiving, but as anyone who's done a belly flop knows, it can also be hard enough to leave one breathless.



Figure 2. Developing a feel for water

Done correctly, a skier's anticipation, balance, and movement create the appearance of fluid, continuous motion, but the reality is a series of disjointed, singular

sensations. The water, as sensed through the ski, feet, legs, and body, feels different at each stage and under every unique condition. On a windy day, the water surface is a staccato slap, slap, slap. Crossing the boat's wake is a jackhammer to the senses. Accelerating out into smooth clean water on a calm day or at twilight, the surface is so velvety smooth the ski hums, practically purrs beneath one's feet.

### A SENSE OF SOFTNESS

Naturally, these sensations and tactile memories live inside my consciousness. There is more similarity between carving a tight, smooth slalom turn on a water ski at thirty miles an hour and sanding a shallow depression into the surface of a piece of wood than one might imagine. Both acts require complex body movements, real-time judgments and adjustments translated through what Finnish architect Juhani Pallasmaa has called the skin of the self. In his essay, *The Thinking Hand*, he writes:

*Our contact with the world takes place through the skin of the self by means of specialized parts of our enveloping membrane. All the senses, including vision, are extensions of the tactile sense; the senses are specializations of skin tissue, and all sensory experiences are modes of touching, and thus related to tactility. (Pallasmaa 2009: 100)*

The preoccupations of my youth continue to inform my sensibility as an architect today. My preferences are tied indelibly to countless physical/mental experiences and tactile sensations. Like my favorite wooden ski boat from childhood, certain works and genres resonate. Reading again from *The Thinking Hand*:

*When entering the extraordinary space of the marble-paved courtyard at the Salk Institute...by Louis Kahn,...I felt immediately compelled to walk to the nearest concrete wall surface and sense its temperature; the suggestion of silk and live skin was overpowering. Louis Kahn actually sought the grey softness of 'the wings of a moth' and added volcanic ash to the concrete mix in order to achieve this extraordinary inviting matte softness. (Pallasmaa 2009: 103)*

Pallasmaa's sense of softness in Louis Kahn's concrete recalls the title of Peter Høeg's 1992 novel, *Smilla's Sense of Snow*. The title refers to the lead character's capacity to see beyond the surface of a mysterious case, to sense something sinister in what others perceive to be nothing more than a set of footprints in the snow. Her background and training allow her to see connections, to intuit deeper meaning, to see what lies beneath the obvious surface. Likewise, Pallasmaa's sense of tactile vision tells him something extra-sensory: beyond what we know empirically about the hardness of concrete,

Kahn's careful treatment yields a surface that feels soft like silk, live skin, or the wings of a moth.

### MOTH WING SCREEN

Inspired by this passage, I have undertaken a small research project examining the nature of softness, paying careful attention to several ways an object can be perceived as soft: based on form, surface, density, materiality, or meaning. Called the Moth Wing Screen, it consists of ten modular translucent resin blocks attached to a rigid steel frame. The blocks, though rectilinear in profile, have fluid, undulating surfaces (see figure 6).

Taken as a whole, the ridges and hollows recall natural forms sculpted slowly by the effects of time and weather. Like boulders in the stream behind my house, for example, the blocks are literally hard, but visually soft. Daily, I observe the various pathways traced by water, down through cracks and fissures in these boulders, carving deep channels in places, producing broad, smoothly curving hollows in others. The Moth Wing blocks benefit from these observations.

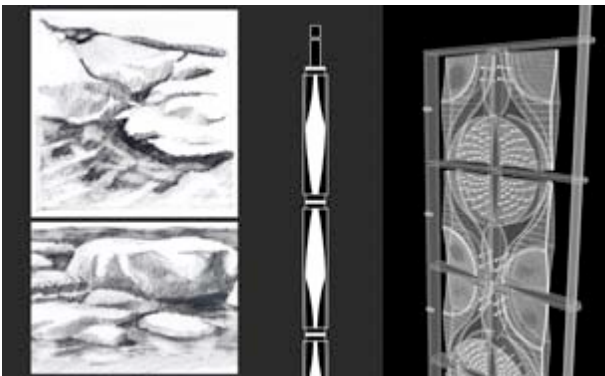


Figure 3. Boulder sketches and details, *Moth Wing Screen*

In addition to being a vehicle for studying softness, the screen has a functional role as well. Designed to add definition, privacy, and elegance at the entry to my house, the proportions and rhythms of the Moth Wing Screen match an adjacent set of glazed wood doors.

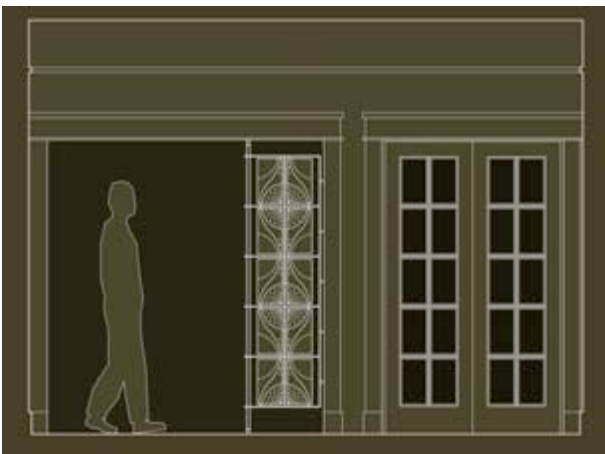


Figure 4. *Moth Wing Screen*, elevation in context

The screen is a hospitable gesture, designed to soften the act of arrival, placed to accommodate the gracious reception of visitors arriving from the porch. Its translucency and radiating hole patterns provide a veiled glimpse beyond the entry, through to the living spaces beyond.

Early studies for the screen were more directly derivative of wing forms, or scales, leading me to research a number of other modular room dividers and privacy screens, including Airflake, by Stefan Borselius (See figure 7). Airflake, made of molded polyester fiber and a laminated textile surface, attaches to a wall or hangs like a curtain, making a delicate edge within a space, softening a room visually and acoustically through a thoughtful balance of solid and void. Its elegantly simple geometry creates a rich pattern of secondary circular figures. These characteristics inspired a productive tangent and a new direction for the Moth Wing Screen.

Looking more closely at patterns and profiles of moths' wings, I noticed the spots some species have evolved as protection from predators. It occurred to me these "eye" spots could inspire a strategy for composing bolt holes and points of connection. As a result, exposed connections create a symmetrical pattern in the assembled screen, each resin block bolted through the thick portion near its center. The joint, thus articulated, recalls the delicate, tapered connection between a moth's wing and torso.

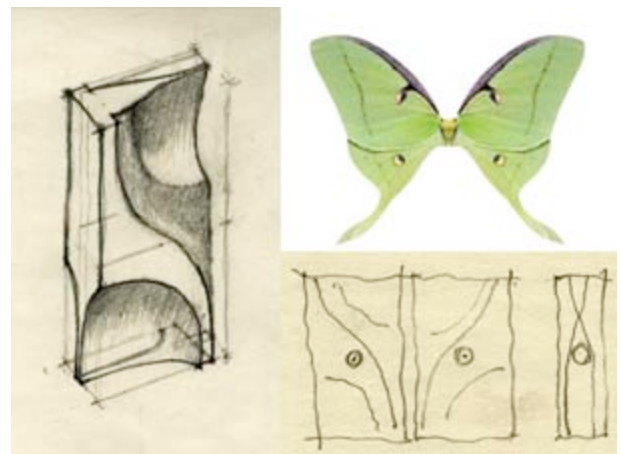


Figure 5. Moth wing inspiration and studies

Using my computer and benchtop CNC milling machine, I have made several half-size study models of the Moth Wing block. The CNC mill yields a roughly machined form, with geometric tool paths incised into the wood. After milling each face into opposite sides of a block of basswood, I used a table saw to slice them free, then glued the two halves together. Next, I sanded the entire block, patiently smoothing its faces and rounding its corners, an especially gratifying step.

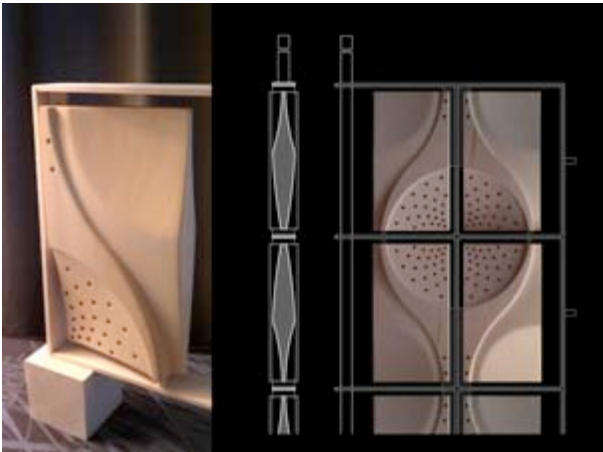


Figure 6. Prototype, section detail, and partial elevation

## FORM AND SURFACE

*As we look, the eye touches, and before we see an object, we have already touched it and judged its weight, temperature and surface texture. The eye and the hand constantly collaborate; the eye carries the hand to great distances, and the hand informs the eye at the intimate scale. (Pallasmaa 2009: 101-2)*

Further inspiration for the Moth Wing Screen came from Teppo Asikainen's *Swell Soundwave*, an acoustical panel made of recycled polyester fiber (see figure 7). This material, soft like felt or wool, lends the project its acoustic properties, but *Swell Soundwave*'s sense of softness also comes from its form and surface: a repeating grid of semi-spherical, raised domes. Each square tile contains a central dome, with its four corners terminating in raised quarter domes. Assembled, the pattern completes a gridded, bumpy field.

Unlike *Swell Soundwave* the Moth Wing module is rectangular, rather than square. Instead of raised domes, it is composed of concave hollows, scooped from opposite corners. Between hollows, a sinusoidal curve runs from top left to bottom right. This line is designed to connect and flow in modular fashion when multiple blocks are assembled. The flat plain between the perimeter of one quarter-circle hollow and this sinusoidal curve creates a figure that recalls the swallow tail dangling from the tip of a Luna Moth's wing. Carving back the surface adjacent to this swallow tail figure, in a gently sweeping convex curve, the swallow tail protrudes beyond adjacent portions of the block and frame. With its edges slightly rounded, light plays softly across its surface.

This characteristic of softened edges and eased transitions owes a debt to the work of Tapio Wirkkala—in particular, the *Silver Wing Table Service* designed in 1955. Like Wirkkala's silver, undulations and indentations create a shimmering topography of light and shadow, an invitation to touch.



Figure 7. Inspiration: Teppo Asikainen, *Swell Soundwave* (left); Stefan Borselius, *Airflake* (right)

This tactile appeal is vital, because, as Pallasmaa points out, "The sense of touch mediates messages of invitation or rejection, nearness or distance, pleasure or repulsion. [It] provides a domicile for the touch of our bodies, memories and dreams." (Pallasmaa 2009: 102)



Figure 8. Tapio Wirkkala, *Silver Wing*

Few designers produce work so graceful and inviting as Finn Juhl. The fluidity of line and profile on pieces such as the 1951 Baker Sofa and Model 45 Armchair (see figure 9) provided clues about how to vary thickness and mass on the Moth Wing Screen module. The Baker Sofa's wrap around back—with its flared lobe ends, and cozy, enveloping, cave-like space—inspired the hollowed voids sculpted into the surface of the Moth Wing block. Juhl's handling of the relationship between wood frame and upholstered seat body also proved useful.



Figure 9. Finn Juhl, seated comfortably in a *Chieftans Chair* (left), *Baker Sofa* (top right), and *Model 45 Armchair* (bottom right)



In both the Baker Sofa and the Model 45, the seat and back float within the wood frame, clearly expressing the role of each part. The Model 45—with its curving, tapered armrests, and its turned, attenuated wood legs—inspired the soft, rounded, leading edge of the Moth Wing block (see figure 6). This smooth, tapered edge, facing away from the frame, is the Moth Wing Screen’s most fluid, touchable moment.

## DENSITY, MATERIALITY, AND MEANING

As discussed, form and surface are two important qualities contributing to a sensory impression of softness. Next, I would like to discuss how density, materiality, and meaning are also informing development of the Moth Wing Screen.

In the work of Alvar Aalto, one can find numerous examples of spaces softened with baffled, indirect light and obscured views. Inside the front door of the Villa Mairea, a series of vertical poles partially screen one’s view upon entering. More poles surrounding the adjacent stair further filter the view. The uneven, apparently random placement and spacing of the poles creates an effect similar to being in a forest, surrounded by slim vertical tree trunks. Having arrived in the house from the surrounding Finnish countryside, this visual analogy would be obvious and would provide a sense of familiar comfort, entering into what would otherwise be a foreign, strikingly innovative house. The Villa Mairea’s front door handle similarly combines notions of modernity and softness, cast in bronze, but shaped to recall the natural wood branch traditionally used as a door pull for rustic Finnish cabins.

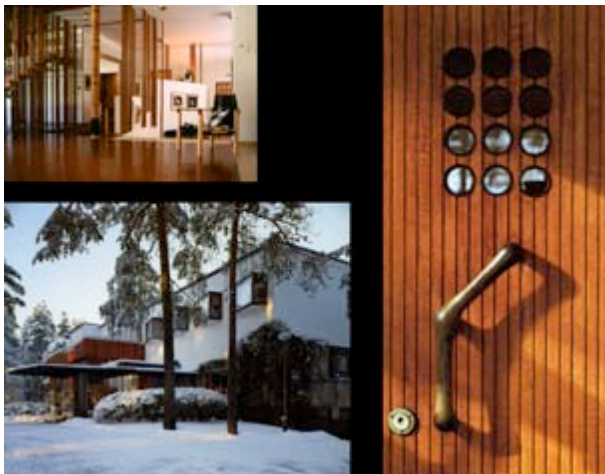


Figure 10. Alvar Aalto, *Villa Mairea*

Around the same time Aalto designed the Villa Mairea, he also designed the Aalto Vase (see figure 11). Partly a pun, the word *aalto*, in Finnish, means wave. The softness of the vase’s wave form combines with the material characteristics of glass, its transparent glow creating a softness and warmth that takes advantage of glass’s inherently liquid, flowing elegance. These combined features observed in Aalto’s work, of partially screened views, subtle, abstracted reference to the

familiarity of place, and a liquid, transparent flowing materiality will drive ongoing development for the Moth Wing Screen.



Figure 11. Alvar Aalto, *Aalto Vase*

The next step is to generate a silicone rubber mold from the half size model I’ve made. With the mold, I will cast transparent resin prototypes, studying density, degree of transparency, and color, seeking the liquid glowing warmth of amber.

Positioned as it is, near the entry to my house, the amber resin will be touched by sunlight early and late each day. Its curving surfaces will collect and hold this light, shimmering like the silvery curtains of water tossed up by a water skier at twilight. The regular return of this tinted, softly glowing light will, I hope, recall the steady flow of water across time-softened boulders, the light gradually draining down through the screen’s softly scooped hollows, a silent tribute to the passage of each day.

## REFLECTIONS

Why begin an essay on softness with a description of water skiing? Because the feel for water is an essential force within me. Because activities and obsessions from childhood—the source of tactile experiences and memories—are the root of empathy, and empathy is the bridge to newly encountered objects and spaces. Carved wood, in the hands of Tapio Wirkkala—even when studying a knife to be made of silver—becomes soft, fluid, and eminently touchable. Finn Juhl designs wood forms that taper, flare, bend, sweep, and connect so gracefully they appear just as smooth and soft as the upholstered cushions they support. Alvar Aalto spent his career combining the avant-garde language of the new functionalist architecture with softer, curving forms, natural materials, and patiently crafted ergonomic details tied to Finnish tradition. Juhani Pallasmaa visited Kahn’s Salk Institute and came away describing the concrete in terms of silk, live skin, and the soft grey wings of a moth.

Charles and Ray Eames wrote, “Take your pleasure seriously.” Water skiing is an important resource to my sense of softness, and it is this sense of softness that provides a key to appreciating projects on a visceral level. Having spent hours weaving back and forth behind a ski boat, a sine curve now holds special meaning for me; I appreciate its form mathematically, *and* viscerally. I look at water and imagine how it would feel, skimming beneath my feet at thirty miles an hour. The ability to imagine the impact of a designed project on an observer is linked to this repository of visual, tactile sensations. By empathizing with this imagined observer, the soft project reaches out to people, offers a handshake, and invites literal and figurative connection. The link between memory, empathy and imagination are vital; bound indelibly together, they lie at the heart of the design process.

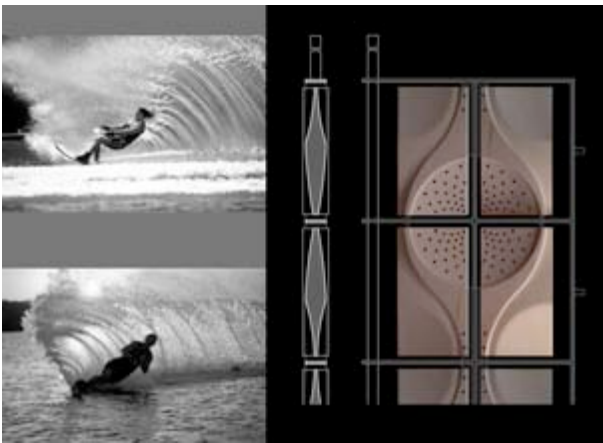


Figure 12. Detail, *Moth Wing Screen*

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