

DESIGN THINKING AS ENABLER OF INNOVATION IN ENGINEERING ORGANIZATIONS

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ABSTRACT

The relationship between design and innovation has lately been given much attention in the business press, where not least the concept of “design thinking” tends to be “hyped”. Despite this, few empirical studies have investigated a directed implementation of design thinking in engineering organizations with the aim of improving innovation capability. As part of such a project this paper aims at identifying key characteristics of research on innovation and design thinking based on a literature review of the fields. These characteristics are considered relevant to address when designing an implementation process and the paper will also present tentative thoughts on how they may influence such a process. A central notion is that it is vital to address the different epistemological traditions of the fields. It is also argued that an approach needs to avoid compartmentalizing design thinking into the format of a method or tool. Rather the approach should resemble an emergent learning journey where hands-on experimentation, broadening of perspectives and challenging of mind-sets needs to be at the fore.

Keywords: innovation, creativity, design, design thinking, design theory

1 INTRODUCTION

After years of efforts to rationalize product development to improve efficiency it now seems that this development has gone so far as to impede the very ability to innovate, the “irrational” logics supporting innovation and creativity clashing with the rational functionalist management styles. In this situation industry has increasingly turned to creativity-intense professions like design and art in search of clues on how to revitalize innovation. The design process has been popularized in books (e.g. Kelley, 2001; Boland, 2004) and business press. Scholars like Boland and Collopy (Boland, 2004) and Martin and Dunne (2006) actively promote the concept of “Design Thinking” as do prominent design professionals like Tom Kelley (2001) and Tim Brown (Mendonca, 2008). The message is clear: with design thinking more holistic and user-oriented innovations can be achieved.

This development can be regarded as the resurrection of pre-modern practice-based knowledge and creativity which disappeared when the professions of engineering and management were shaped after rational scientific discourses (e.g. Rosell, 1990; Johansson, 2008). The pre-modern knowledge, however, survived during modernity within other professions, like design, which is now being pulled inside business as a benevolent Trojan horse with hope of innovation and growth based on designs processes, culture and work methods. However what is missing are empirical studies on how to implement design thinking in “non-designerly” organizations, such as engineering firms. This paper is a first part of an empirical study aimed at this.

The aim of the paper is to present key characteristics to consider when designing an implementation process. These key characteristics have been “drawn out” of a literature review of innovation and design research, which is presented in sections two and three. In section four the key characteristics identified are summarized and in the final section some tentative thoughts on how these may influence an implementation process are presented.

2 RESEARCH ON INNOVATION - A BRIEF THEORETICAL REVIEW

Innovation research is a wide research field and the below only represents some of the more common understandings of innovation as a concept and process. To facilitate a comparison between design and

innovation, the keywords “Perspective”, “Problem Type”, “Process” and “Knowledge tradition” are used.

Perspective

The concept of innovation was for long solely related to the application of science and technological development through products (e.g. Utterback, 1994; Dougherty, 1996). However the understanding of what can be included in the concept of innovation is expanding. Today scholars also include innovation of processes (e.g. Schroeder, 1990), services (e.g. Thomke, 2003) and management practises (Birkinshaw, 2006). This can be regarded as areas traditionally *within* the discourses of engineering and management. However, some researchers step outside of these discourses, like Verganti (2006) who argues that the concept of innovation should also include messages and meanings and Mensch (1979) who proposed that innovation also concerns social aspects.

Problem type

Typically within innovation literature, problems addressed have quantitative properties to which an optimal technological solution is possible (Rosell, 1990). Ideas, typically in the format of technical inventions, have traditionally been regarded as readily available for industrial companies to “pick from the shelf” of R&D. Today however concepts such as “Open Innovation” (Chesbrough, 2003) and “User Driven Innovation” (von Hippel, 1988) suggest that companies need to look outside for sources of innovation while “Open Source” more fundamentally challenge the current business rationale of innovation (Raymond, 1999).

Process

Just as the product development process has been streamlined through concepts like the “Stage-Gate System” (Cooper, 1988) and “Lean Product Development” (Karlsson, 1996), so have attempts been made at applying such models to R&D and the “fuzzy front end” of product development (e.g. Khurana, 1997; Koen, 2001; Burchill, 1997). Others however argue that the innovation process does not follow a linear trajectory and Van de Ven (1999) describes the innovation process instead as a dynamic “journey”. Despite such recent notions, few empirical studies have investigated the initial generative “fuzzy” phases of the innovation process (Elmquist, 2007). Traditionally, problem solving within engineering has been based on analytical models handling quantitative properties. A large body of research describe such design processes. These are generally either *product* or *process* oriented (Evbuomwan, 1996) and do not integrate creative thinking (Hatchuel, 2003). One exception is C-K theory (Hatchuel, 2002). In engineering practice tools such as “Brainstorming” (Osborn, 1963) or “Lateral Thinking” (de Bono, 1992) are utilized to facilitate idea generation. TRIZ (Moehrle, 2005) represents another type of tools promising systematic innovation based on scientifically classified principles behind innovation.

Knowledge tradition

Since the 17th century engineering has been “refined” to fit within the rationalist science tradition and knowledge has been centred on quantitative, measurable facts (e.g. Rosell, 1990; Ramirez, 1998; Schön, 1985; Simon, 1996). Espoused methods are theory based (Rylander, 2008) and Edeholt (Ilstedt, 2007) suggest that “typically, engineers work as efficiently as possible from a well-defined problem towards an optimal solution”. Both in training and in firms, knowledge is connected to product properties and technologies. In addition to this, firms are often organised accordingly. From an innovation perspective this may lead to the establishment of persisting “mental models” in organizations which conserve technological knowledge and resist innovations threatening “dominant logics”(Assink, 2006).

3 RESEARCH ON DESIGN PRACTICE - A BRIEF THEORETICAL REVIEW

Most design research departs from the practice of design. The field by and large mirror how art-based design was not affected so much by the modernist tradition. On the other hand, and quite paradoxically, design as a profession is at the same time a direct result of modernity (Johansson, 2008). Since the 70s attempts have been made at framing the practice of design with important contributions by for example Lawson (1980), who launched the term “design thinking”, as well as Cross (2006) and not least Schön (1985).

Perspective

Innovation, or rather the generation of novelty, is an inherent aspect of the profession of design (Lawson, 2006). The concept of innovation as understood by engineering and management discourses is, however, rarely used in design practice or research. Further, “from the designer’s point of view ... the concept of innovation implies (the belief of) achieving a more “radical innovation”, while “incremental innovation” will consequently be bundled up together with what Schumpeter coined as “routine work”.” (Edeholt, 2006:2). In a general sense the designer is not partial to a certain technology or mode of production. The designer instead favors the perspective of the user and the maintaining of an open mind to any types of solutions which may improve a situation (e.g. Lawson, 2006; Cross, 2006).

Problem type

Designers typically deal with what Rittel and Webber called “wicked problems” (Rittel, 1973). Such problems which are initially “ill-defined”, and where an optimal solution cannot be found, are typically also “multi-dimensional” with a “need to devise an integrated solution to a whole cluster of requirements” (Lawson, 2006:59). Typically such problems include qualitative properties to which no one correct solution can be found. Rather the problem and solution emerge in parallel during the design process to result in a “*matching problem-solution pair*” (Cross, 2006:102).

Process

Attempts were made in the 60’s at describing the design process in a systematic manner. The most well known is Simon’s “Science of Design” (1996) based on problem solving theory. Other models within were those of Alexander and Jones on the format of “analysis-synthesis-evaluation” (Lawson, 2006). Lawson argued (1980) that these models fails to capture the more “irrational” nature of design and suggested that design should be understood as a creative, intuitive, reflective and largely embodied process. When describing the creative process the ability to deal with wicked problems is at the core. Designers employ an “explorative process” where problem and solution emerge in “*putative action*” (Cross, 2006:52). This process is often compared to C.S. Pierce’s concept of “abductive reasoning” (Alvesson, 2008). The designer moves back and forth between problem and sub-problems, between solution and sub-solutions. The principal tool in this process is sketching which let the designer engage in a “*reflective conversation with the situation*” (Schön, 1985:26). During the process, the problem is actively challenged through attempts at “framing” it in different ways (Schön, 1983). Here visual thinking, metaphors and analogies are actively used (e.g. Kelley, 2001).

Knowledge tradition

The knowledge of the designer can be regarded in several ways. According to Utterback *et al.* (2006), the knowledge is about technological opportunities, user needs and product languages. Cross express that “a significant branch of designerly ways of knowing ... is the knowledge that “resides in objects”. Designers are immersed in this material culture, and draw upon it as the primary source of their thinking.” (2006:26) This thinking is not least visual, “hands-on” practical and embodied. Others pronounce experience based knowledge established through studio based training in art schools (e.g. Schön, 1985).

4 SUMMARY OF KEY CHARACTERISTICS

A direct comparison between the fields of innovation and design is difficult. The vast field of innovation research is conducted from the perspective of innovation while design research departs from the perspective of design practice. A paradox is that within innovation research the creative process within “the black box of innovation” is little researched, while innovation within design is inherent to the design process but is rarely articulated.

To facilitate a comparison between the fields I have used keywords recurrent in different descriptions (e.g. Boland, 2004; Rylander 2008). The key characteristics in Table 1 should only be understood in a very broad sense. Practice is less restricted to these dichotomies. It will serve only as rough guide when designing a process to implement some of designs characteristics in engineering organizations.

Table 1 Summary of key characteristics of the fields of innovation/engineering and design

<i>Keywords</i>	<i>Innovation/Engineering</i>	<i>Design</i>
<i>Perspective</i>	Product, Technology, Problem	User, Holistic, Solution, Novelty
<i>Problem type</i>	Defined, Quantitative properties	Wicked, Qualitative properties
<i>Process</i>	Analytical, Linear, Problem solving	Abductive, Explorative, Emergent
<i>Knowledge tradition</i>	Formal, Intellectual, Analytical	Practical, Embodied, Synthetic

5 THOUGHTS ON HOW KEY CHARACTERISTICS MAY INFLUENCE AN IMPLEMENTATION STRATEGY

The following are thoughts on how the fields of design and innovation, as made explicit by the mapping out of the key characteristics above, may interact in a process of implementing some aspects of design thinking in engineering organizations.

Perspective

Engineering and design have quite contrasting product perspectives. The designer has a more holistic perspective and departs from the user's point of view. As many innovations have their origin in situations and needs rather than technological opportunities, it may be beneficial for engineers to experience the design perspective. This may also help overcoming "dominant logics" connected to existing products and technology. Design can provide a range of tools to challenge existing concepts and provoke new ideas.

Problem type

To let the organization encounter a typical "wicked problem" should be at the core of a learning process. A more or less fictional innovation case with the typical properties of a wicked problem can be established and worked on practically. How realistic such a project is depends on the needs of the organization, but it is probable that a problem *within* the area of expertise may spur motivation. However, a problem *outside* the area of expertise might provide a better learning experience.

Process

When dealing with a wicked problem through a practical case it is crucial that the embodied experience and practical hands-on creativity design is utilized. This means not least sketching and modeling. Here is where the process will depart from established ways of working and initially it might be difficult for the organization to value and prioritize this kind of work. To spur interest and boost motivation it is probably vital to let a practicing designer lead and inspire the work as a "coach". This strategy emphasize the notion that it is the "wieldy" and multi-facetted representation of the design practice that needs to be at the fore, rather than a compartmentalized version in the shape of "design thinking" as a tool or model – an easy trap to fall into with all the hype.

Knowledge tradition

Theories pronounce characteristics which are perhaps less articulated in practice. Nevertheless, at the core of implementing aspects of design thinking in engineering organizations, is the meeting between different epistemologies. It is probably not possible, or even desirable, that engineering "convert" to "design thinking". Departing from Edeholt's notion that "a real diversity of perspectives" (2006:6) and a team based approach benefit innovation, the hopes are twofold. Firstly, that established rational discourses within engineering firms are sensitized to how other epistemologies and perspectives may contribute to innovation. Secondly, that problem solving as a process is widened and enriched to also include applicable art-and-design means to deal with wicked problems. The belief of the research project at hand is that this "meeting" of discourses is at the heart of innovation, and that it can be actively facilitated.

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SERVICE DESIGN DESCRIPTORS: A STEP TOWARD RIGOROUS DISCOURSE

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ABSTRACT

Although Service Design has been practised and taught, during a recent study, we were surprised to find no established terminology that is Service Design specific. There is certainly some equivalence in Service Management, but we hesitate to use them uncritically. As Krippendorf (1995) has pointed out, the design field lacks its own discourse and as a result, it is prone to being colonized by other fields. We believe it is through developing specific service design concepts that we might have more rigorous discourse and more ready to claim service design as a field. To this end, we have created a set of 'service design descriptors'. These descriptors are created mainly intuitively and should be taken as our hypotheses as how service is designed. We have grouped the descriptors into two main categories, namely CONTEXT and FORM. This decision is based upon the concepts from Alexander (1964) and Simon (1996). They conceive design as an activity in the INTERFACE region between FORM and CONTEXT and which aims at the creation of the fit between them. Simon argues that the link between FORM and CONTEXT is created by means of the purpose of the artefact. Even more obvious than that in product design (where the fascination with FORM may prevent the designer to concentrate on the true purpose of the artefact) INTERFACE indicates the focus of service design efforts. Nevertheless, INTERFACE can only be designed via / by means of FORM. We have used the descriptors to analyze existing services and have been able to match the different design elements with these descriptors. We will describe these descriptors together with these examples with the intention to facilitate discussions.

Keywords: Service Design, Terminology, Service Design Descriptors

1 INTRODUCTION

1.1 Overview

Although Service Design has been practised and taught for a good period of time, during a recent study, we were surprised to find no established terminology that is Service Design specific. We were investigating service design transfer which results are also presented at this conference. We collected over 220 existing mobile internet services, services in general and performing art practices. We needed first of all to sort these into different categories. Secondly, in order to analyze the services, we needed to break them down so to describe them in details. In order to do these two tasks, we needed a set of service design concepts or terminologies to guide us. Certainly, we had some in mind but found it important to review existing categories. We did quite extensive literature search but found little published or when published, we found them incomplete. We found also some equivalence in Service Management, but we hesitated to use them uncritically. There had been some highly interesting developments that endeavoured to relate management to design. For example, Boland et al (2004) explored Management as a design discipline. Despite this effort, until and unless the relation between management and design is well established, we think it important and necessary to develop designerly concepts and terms. As Krippendorf (1995) has pointed out rightly, the design field lacks its own discourse and as a result, it is prone to being colonized by other fields. We believe it is through developing design concepts that we might have more rigorous service design discourse and more ready to claim service design as a field.

To this end, we have created a set of 'service design descriptors'. We have organized the descriptors into two main categories, namely CONTEXT and FORM. This decision is based upon the concepts from Alexander (1964) and Simon (1996). They conceive design as an activity in the INTERFACE region

between FORM and CONTEXT and which aims at the creation of the fit between them. Simon argues that the link between FORM and CONTEXT is created by means of the purpose of the artefact. Even more obvious than that in product design (where the fascination with FORM may prevent the designer to concentrate on the true purpose of the artefact) INTERFACE indicates the focus of service design efforts. Nevertheless, INTERFACE can only be designed via / by means of FORM.

1.2 The concept of form

Alexander argues (1964: 15-19) that “*The ultimate object of design is form.*” and continues:

... every design problem begins with an effort to achieve fitness between two entities: the form in question and its context. The form is the solution to the problem; the context defines the problem. In other words, when we speak of design, the real object of discussion is not the form alone, but the ensemble comprising the form and its context. ... we may even speak of culture itself as an ensemble in which the various fashions and artifacts which develop are slowly fitted to the rest.

... The form is a part of the world over which we have control, and which we decide to shape while leaving the rest of the world as it is. The context is that part of the world which puts demands on this form; anything in the world that makes demands of the *form is context.* ...”

What means *form*? A systems theoretical insight says that terms / concepts only make sense in difference to their counter-terms. So, what are the potential, mostly implicit, counter-terms of form?

Form – Content evokes the widespread artistic concept of an autonomous “opus”, created by an “author” who is solely responsible to him/herself. Design (*Formgestaltung*) in this sense is useful art, at best, if the content provides a valuable function for some third party. Such a *form* – as a museum piece, for example - can have eternal validity.

Form – Context implies an *interface* between the form and a psychic, social, cultural, economic, ecological, etc. environment. Human-centered design aims at optimizing this interface; a difficult task since forms in this sense can lose their validity very quickly, if their environments change or if the ascribed meanings no longer correspond with those actually perceived.

Form – Medium denotes a still more fluid configuration. In a hybrid medium of initially just loosely coupled or uncoupled elements of any kind more stable closer coupled configurations or *forms* emerge temporarily, similar to Latour’s (2005) collectives or Luhmann’s (1997) social systems: traffic systems, web-based communities, health-services, discourses, etc. Here the interfaces, or better transition zones, between *form* and medium are fuzzy, ephemeral, mainly self-organizing, only partially controllable.

The third meaning of *form* is becoming more and more significant and means an enormous challenge for design. Concepts such as “author” or “opus” become meaningless. Here we keep the more general and established notion of Context. The older difference to content points to the shape / the aesthetic of a service design artefact, an issue which is hardly understood yet.

To describe CONTEXT, we use four concepts: 1 Category (type of service), 2 Function (purpose of service), 3 Stakeholders involved and 4 Infrastructure / resources needed. For FORM, we have five concepts: 1 Steps / components of service process, 2 Medium of communication / channels, 3 Type of interaction, 4 Touch-points, tangible interactions and 5 Unique characteristics. We have used the descriptors to analyze existing services and have been able to match the different design elements with these descriptors. We must mention that these descriptors are created mainly intuitively and should be taken as our hypotheses as to how service is designed and their values are still to be tested. Therefore, by describing these descriptors together with the examples, we intend no more than to facilitate discussions.

2 SERVICE DESIGN CONTEXT DESCRIPTORS

2.1 Category (Type of Service)

For the study in service design transfer, we have searched for existing internet services, services in general and performing arts practices and compiled over 220 sources. Given the amount, we needed

to sort them into types of services to create meanings. So we needed some categorization scheme. We decided to consult with experts but found few established or agreed service categories. We found that service types are categorized as Business to Business Services, Business to Consumer Services, Internal Services, Public Services and Not for Profit Services (Evopark 2008). In our conversation with Nicola Morelli, he also mentioned that Business Service should be treated differently from non-profit services. Although we could see the reasons behind these categories, we were not sure if they were always applicable or whether they were the most suitable for design. For example, in marketing people are categorized basically by buying power. Although buying power is not irrelevant to design, it might not be the most critical one when designing for people. We believe that we still need to examine and argue about service category from a design point of view. As categorizing is always done with interest and for a reason, we have decided to develop our own by grouping and regrouping the sources together until we felt satisfactory about them, see below:

Categories of internet services: information, communication, entertainment, sale, transmitter, comparison,

Categories of services: public, security, business, amusement, education, social

Categories of performing arts: high-culture, individual, traditional, mass.

Through the mapping of existing internet services and services in general, we have found out accidentally that currently majority of internet services are under the categories information and communication. But other areas of services, such as public services, security, amusement, are not extensively internet supported. This means, there is a substantial space for design service exploration. The point to be made here is that if we would use the business, non-profit type categories, we might not have identified this space. Category creates frame of reference and perspectives, so it is probably very helpful to have different sets of category. And what we need is a way to identify when to use which category.

2.2 Function (Purpose of Service)

According to Jan Michl (2002), there are three meanings for “function” in design. Firstly, function means purpose as in ‘form follows function’. Secondly, function means the actual functioning and this is why ‘function follows form’. Thirdly, function refers to a metaphysical concept – the essence of thing. Here we use function to mean purpose of service. Purpose (the solution) is very similar to need (the problem) and a proper formulation of the need is the purpose or the function of the service. Function and purpose are discussed in service design literature. Function is sometimes termed values of the service. Hollins (2007) also mentions the important of having a ‘service design brief’ which should document and describe the primary purpose of a service. He also mentions ‘service specification’ to prescribe the requirements to which the service has to conform. Certainly, function, purpose, brief and specification are not new concepts and have been in use in design for a long time. It seems reasonable that it is included in describing service design. In hindsight, we realize that we have intuitively sort the services by functions. We identified the function for different categories of internet services: Information: to learn and to know, Communication: to make contacts, Entertainment: to relax, Sale: to make money, Transmitter: to compete, Comparison: to choose the best.

2.3 Stakeholders

The concept stakeholder has been much elaborated by Krippendorf (2006) in design. According to him, stakeholders are those who claim a stake (interest) in the development or consequence of a design and their ideas, value and goals should be respected. In the service design literature, there is also the mention of the wants and needs of the users and also the service providers. However, there is less discussion on the rest and we suggest that stakeholder is more encompassing and more holistic a concept than users. The stakeholders of a service include the service provider, designer, staff, users, and people affected by the service.

2.4 Infrastructure & Resources

Infrastructure and resources are material or human aspects that enable or constraint the execution of the service. There are two existing concepts that have the same meanings. ‘Resource Model’ describes the needed resources in order to carry out the service (Institut für Zukunftsstudien 2008). ‘Service

Landscape' refers to the environment in which the service takes place (Knaus 2008). Besides facilities, the competence and experiences of staff are also considered as part of the infrastructure and resources.

3 SERVICE DESIGN FORM DESCRIPTOR

3.1 Steps & Components of Service Process

Steps and components of service are what people likely think of when they talk about service design. There are different expressions for this, such as 'service blueprint' (Hollins 2007), 'service journey' (Design Wales date unknown), 'stage, roles & scripts' (Mager 2006) or 'operational process' (Scholl 2002). In our study of internet based services, components of the service include self-generated content, collection, download, comparison, search, overview etc.

3.2 Medium of Communication

Medium of communication is less discussed in the service design literature but we think it is quite important. Each medium has its advantages and disadvantages and has different effects. It is much like different materials in product design. Medium of communication might include face-to-face, telephone, internet, video, stand alone computer terminal, print etc. Having pointed them out, we believe that we can more systematically investigate each of this medium for improving service design.

3.3 Type of Interaction

For type of interaction, we refer to the user point of view and are thinking of active, passive, and interactive; plus individual, small group and mass. For example, on the internet, some computer games are small-group or mass-interactive. But news service on the internet is mostly individual-passive. We see that some more systematic research here will also be useful.

3.4 Touch-Point

Touch-Point (Design Wales date unknown) is the point of contact between the user and the service and is a known concept in Service Design. It is also referred to as 'Customer-Staff Interaction' (Stauss date unknown).

3.5 Unique Characteristics

Unique characteristic refer to the overall quality of the service. It is related to the concepts 'High Touch' 'Key differentiator' (Design Wales) and the often discussed emotional quality of the service. A service should have high trustworthiness, responsiveness. In our study, we find also other qualities, such as being current and updated, quick, comfortable, interesting, and useful.

In our study, we use the descriptors to examine individual services, for example, the library was described in the following ways:

Category: Public

Function: Give everyone access to literature and knowledge

Stakeholders: The public, taxpayers, librarians, publishers, writers, architects, engineers, builders, designers.

Infrastructure & Resources: Building, information & communication equipments, catalogue, staff, location, transportation availability,

Steps & Components: Access to library catalogues, search for books online, get the books, check-out, take home and read, get reminder of due date, return books.

Medium of Communication: Computer terminal, telephone, face to face

Type of interaction: active, individual or small group

Touch points: Building, reception, librarians.

Unique Characteristics: Organized, size of catalogues.

4 CONCLUSIONS

We believe that the descriptors are not unfamiliar and we have merely conceptualized them more

systematically and perhaps also in more details. These descriptors, we hope, might help us teach and design service more holistically. And also they might serve as points of discussion and research. Each descriptor poses questions as how it might be considered. As mentioned already, what are the categories of service and when should they be used? How might function of service be identified? What are the methods for stakeholder involvement? How might infrastructure and resources be utilized optimally? What are the representations or models of steps of service? What are the various ways to use media? What might be other types of interaction and touch-point? How to create unique characteristics? These are just some of the questions that might be raised following the map of descriptors.

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DESIGNING FROM THE OUTSIDE IN: THE KEY TO ORGANIZATIONAL CHANGE?

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ABSTRACT

Despite the increasing popularity of its use, the idea of designing from the outside in has yet to be explained. The aim of this paper is to establish the elements that contribute to and facilitate designing from the outside in. The author establishes designing from the outside in as one of the central themes of human-centred design and as one, if not the key, to design's ability to effect changes within organizations.

Keywords: Organizational Change, Human-Centred Design, Designing from the outside in

1 INTRODUCTION

Product development is often viewed as a problem by organizations, not as an opportunity. Since products and product development concern relationships, it is extremely difficult in a complex organization to see a product through to its final phase. A government official once told me: "If you ever want to change anything in a bureaucracy you better touch base with everyone and make sure that they are on your side." Building relationships, however, involves time and strategies to develop arguments and to build trust. New design practices, especially those involving human-centered approaches and systems perspectives are beginning to address these internal organizational problems successfully by "designing from the outside in."

The concepts of people as insiders and outsiders have their roots in the social and behavioural sciences, especially sociology and cultural anthropology. Kenneth Pike (1954) introduced the concepts of "emic" and "etic" perspectives to study a society's cultural system. In very simple terms, "emic" means to be part of a specific culture that we understand and allows us to interpret situations, language, and actions from the perspective of a cultural insider. "Etic" is someone who looks at the very same situations, language, and actions but is not part of this culture and therefore interprets everything from an outsider's perspective. There are many different uses and interpretations of designing from the outside in. For some, it is synonymous with "approaching a design task from the perspectives of usability and function rather than from technical and software frameworks" (O'Reilly 2005). For others, it represents a "design philosophy" that "requires an understanding of where the product is today and, second, consideration for where the product wants to be, or needs to be, when it grows up and is released to the world" (Leon 2000). Rutherford uses the term "designing from the outside in" to describe how designers use concept sketches at a specific moment in the design process to elicit feedback from the design team, management and potential users: "At this point, the designer is designing from the outside in, and sometimes detail is not part of what is communicated." (Rutherford 2002, p. 308). In the context of the organization, the concept of designing from the outside in is viewed as a way to retain and acquire "empowered customers"—people who demand that the organization he or she engages with offers services and products on their terms. For Shapiro (2002, p. 22) "designing from the outside in" is identical with an organization that is customer-focused. In his definition, an organization that is designed from the outside in makes sure "to stand in the customer's shoes and observe the processes in action, to focus on redesigning customer processes rather than internal processes, to create customer needs rather than just respond to them. To be an organization that is 'easy to do business with.'" Being customer-focused, Shapiro finds, is one of twenty-some organizational abilities that can be diagnosed and remedied. In consequence of these and other developments, Service Design has emerged as a new domain of design practice that closely links with the concerns of Customer Relations Management (CRM).

None of these current uses of the concept shed much light on what it is that human-centered design thinking and design methods contribute to the ways organizations learn about themselves, nor do they show the links between designing and organizational change that can be significant when designing from the outside in. What we do see from the above uses and interpretations is a recognition that organizations and product developers need to re-focus on the people who buy, use or interact with products and services. But what constitutes designing from the outside in from a human-centered design perspective?

2 DESIGNING FROM THE OUTSIDE IN: A HUMAN-CENTERED DESIGN PERSPECTIVE

Human-centered product development (here used synonymously with human-centered design as the I view every design process to result in a product of some form) allows organizations to see the world differently from what they usually see. It introduces the perspectives and experiences of “other” people—people that are not familiar with acronyms, processes, hierarchies or standards created by internal experts. These people include customers, suppliers, and employees alike. The role of designing from the outside in is to make organizations and their products work for people *inside* and *outside* of the organization. This includes the creation of clear pathways into the organization that give people guidance and confidence in making decisions and taking actions (Buchanan 2004). A human-centered design approach begins with the experiences of people external to an organization. However, its aim is comprehensive and does not stop at re-designing “touch points” or “service encounters.” Instead, from a human-centered design perspective, these particular experiences are the starting points for an inquiry into the organization—thereby moving from the outside (the external experience) in (to the organizational system which links to the experience of internal people). The purpose of such a design project is to inform, involve and support the organization in reshaping its internal operations, strategies and vision around the ideas of useable, useful and desirable products and services. One of the assumptions of a human-centered design approach is that in order for an organization to accommodate new services and news products, it also needs to develop capability to think differently and acquire the necessary design skills to follow through. Design thinking and design methods become tools that can be directly applied to the organization itself, as it, too, can be thought of and experienced as useful, usable and desirable.

But where and how do designers and managers begin to make use of a human-centered design approach for their organization? We can look to the United States Postal Service’s (USPS) Domestic Mail Manual Transformation Project (DMM Transformation Project) and to the Library redesign project at Lancaster University to gain insights into this question. The DMM Transformation project began in 2001 with a six-week pilot project conducted by five Master Students at a US university. This led to a major re-design project that ran until 2005 and produced significant changes within the organization (Junginger, 2006). The library re-design project is currently underway as a six-week pilot study, conducted by only four Master Students as part of their coursework. The second project generated momentum, interest and participation among the library staff and even the head of the library, who initially dismissed the project. Indeed, the significant difference between the DMM Transformation Project and the library project is that the USPS commissioned the DMM Transformation project. The library project, in contrast, has been picked by the students and their teacher to apply design research methods to a real project while gaining first hand insights into the issues, practices, processes and roles of design in the organization.

Nonetheless, the paths into the organization through design are strikingly similar: They began on the organization’s periphery with the involvement of only one or two key people in the organization and managed to gain credibility and respect for their work as they went along presenting their research, involving employees and making them feel part of the team. This allows us to identify some key characteristics for designing from the outside in that aims at instilling, implementing or institutionalizing organizational change.

3 CHARACTERISTICS OF DESIGNING THE ORGANIZATION FROM THE OUTSIDE IN

While one needs to be careful in drawing general conclusions from two projects, it is nonetheless interesting to point out some of the key characteristics that facilitated the collaboration between the

design team and the organization. These key characteristics include: 1) an early agreement on the principles of human-centered interaction design by all sides; 2) a consensus that the initial pilot project is conducted using design research methods to gain insights into people and the organization itself; 3) a design problem that concerns a wide range of people (every mailer in the USPS project; every library user for the university library); and 4) an explicit understanding and use of an emerging process.

3.1 Initial Agreements: We are in this together

- *Agreement on the principles that drive the design project.* In both cases, the design team and the people they work(ed) with in the organization were articulate and explicit about how they viewed design and products. Following Buchanan (1995), the designers took a human-centered interaction design perspective that 1) treats products as mediators of relationships between people and 2) perceives of “products” in a wider sense than consumer goods or tangible objects.
- *A Systems Design Perspective:* Both design teams understood the project as a problem of system design in accordance with fourth order design. One of the goals therefore was to identify all relevant elements (Junginger 2008).

3.2 Characteristics of Purpose: Learning and Improving

- *to discover and clarify user pathways* into and through the organization that correspond to the experience of people as they use the organizations services and products. How visualization and other design skills facilitate this has been explained by Buchanan (2004).
- *to bring product development activities into the organization* (rather than keeping it limited to the product development department, for example), utilizing design thinking and design methods to develop products with the purpose to improve individual organizational interactions that increase overall efficiency.
- *to actively involve people in the design research* that are generally thought to be external to the design process, thus literally bringing people from the outside in.
- *to allow people inside the organization to experience the organization as external users:* customers, field employees, suppliers, etc.
- *to generate new knowledge and insights*, thus facilitating organizational learning and contributing to knowledge management.

3.3 Characteristics of the Design Process: An Inquiry Into the Organization

- *project starts at organization's periphery:* Both pilot studies began at the organizational periphery. Neither project interfered (initially) with any ongoing work. In both cases, organizational experts initially viewed the projects as inconsequential. This provided a “safe” space for design research to take hold.
- *design team and organization agree on a systematic approach* that links and unifies the four elements of the organization (Junginger 2008) and therefore views product development as a relationship building activity.
- *design activities are stated as an inquiry into the organization.* They do not begin with a specific product in mind.
- *the design activities target big audiences to identify fundamental needs* before tending to small specialized groups of people whose needs are more complex.
- *design activities begin with the exploration of general issues* before their focus incrementally moves to more particular issues and problems.
- *the process is steered by the design team* but supported by an organizational champion who enjoys the trust and/or legitimate authority within the organization.
- the process is made visible to everyone involved and includes visualizing, mapping, diagramming and other forms of visual communication. The design team maintains an online project space that can be accessed by members of the organization and serves to share information and give updates on activities and project status.
- *the process involves story telling* and scenario development

- *the process involves real people* not artificial personas.
- *the process involves iterative prototyping* so that members of the organization can respond to ideas and concepts early on.

3.4 Characteristics of the Design Strategy: Sideways!

- a “*horizontally*” generated and directed organizational change rather than a top-down or bottom-up approach common to ordinary organizational change approaches. However, the line is not neat or straight. Rather, the iterative and inclusive nature of human-centered design creates a path that “zigzags” through the organization from the outside in—and also from the inside out. Because a project actively invites and engages members of the organizations on different levels to co-design, the reach of a human-centered design approach goes deep into the organization and allows it to effect the structure of an organization.
- an overall design strategy that clarifies complexity by discovering the core principles and purpose of an organization first. This then allows the organization to develop future products and services in line with this strategy.
- an acute awareness by the design team that any design project adds additional stresses and burdens onto members in an organization who cannot ignore or withdraw from their daily workload.

All the above characteristics have been present in the two cases described. These characteristics are also evident in at least one more case I am currently studying and where the organization has undergone even more dramatic change. Nonetheless, the list cannot guarantee a successful outcome for a design project. Too much depends on the personalities and abilities of individuals to build relationships and trust in others. Yet, I am confident enough to argue that overlooking any of the above aspects will have a detrimental impact on any design project that aims to reach into the organization to effect significant change.

4 CONCLUSION

It has been long established that the activities of designing involve intentional change (Simon 1968; Nelson and Stolterman 2003; Mau 2004). There is increasing evidence that product development can be a vehicle for organizational change (Junginger 2008; Gerber 2008). It is these commonalities that begin to inform the design practice of designers and managers alike in attempting organizational changes through designing. The paper concludes that designing from the outside in plays a key role in organizational change and represents one of the core assets designers can bring into an organization. Because this is difficult to do in real design practice, the paper identified the common characteristics two projects where design teams were successful in “entering” the organization and in involving members of these organizations in the design process, ultimately allowing them to co-design and participate in changing their own organization.

Human-centered design continues to be dismissed as a viable approach for organizations. As one project manager of a large and troubled intranet application argued: “We are not able to ask everyone, we would never get done and they would never agree.” This statement does not point to the impossibility of redesigning with people in the organization, it merely points to the lack of understanding human-centered design in general and its methods in particular. Instead of investing in a systematic design inquiry, this human services agency has been hosting a room full of IT experts from a renowned management consultancy who keep struggling to make the system work with adapted off-the-shelf solutions.

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Acknowledgements

The authors would like to express their thanks to the University and Research Council who have sponsored the research presented in this paper.

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