EXISTING PROTOTYPING PERSPECTIVES: CONSIDERATIONS FOR SERVICE DESIGN

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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.

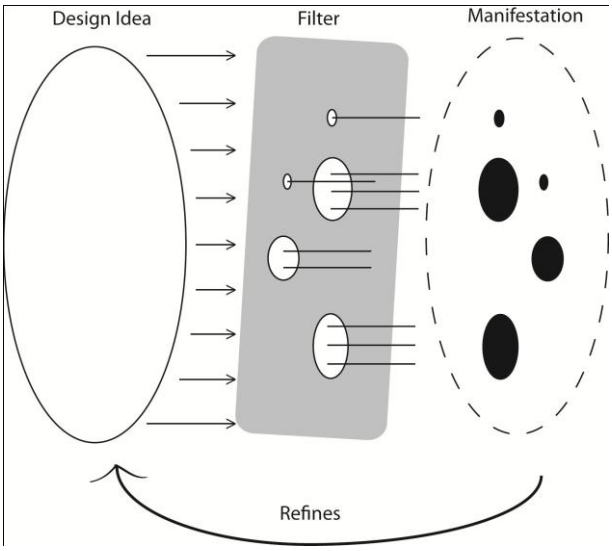

Figure 1: Prototype dimensions in relation to design idea (interpreted from Lim et al., 2008).

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 & Zomerdijk, 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 & Zomerdijk, 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; Samalionis, 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.

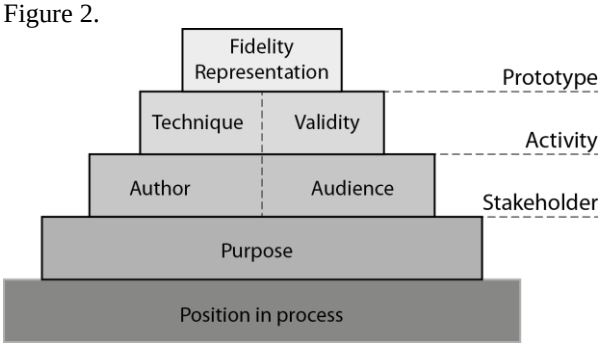

Figure 2: The framework of perspectives on prototyping and prototypes.

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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