

Service Prototyping in Design of Healthcare Services

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ABSTRACT

The Norwegian healthcare is in need for change. It will have to meet the needs of the citizens and the challenges of a changing population. For improvement and innovation within healthcare, the potential value of service design has gained attention by discovering the importance of its user-centered and holistic approach accompanied with service design tools. Moreover, service prototyping is considered as an important tool for communicating, evaluating and visualizing by service designers, but according to research there seems to be a lack of knowledge in this field. Literature is used to answer what a service specific approach is, how to prototype a service, and how service prototyping can be used as a contribution to development of healthcare services. The article gives an overview of challenges in healthcare sector, innovation in healthcare, and suggests that learning by simulation can be seen as a contribution to service prototyping. Service designers should be open for taking advantage of knowledge across other domains. Further the article argues for utilizing service prototyping throughout the design process as it is helpful for gaining a common understanding, engaging people and raise awareness of the challenges that need to be considered.

KEYWORDS: service design, service prototyping, healthcare, innovation in healthcare

1. INTRODUCTION

The healthcare services are facing big challenges, as there will be a change in the population (HelseMidt-Norge, 2016; NOU 2011:11, 2011). People are questioning if the healthcare sector will collapse if we continue delivering services the same way as today (Livework, 2017). The external pressure from a rapidly developing world forces services in the public sector to cope with challenges of how to provide more, better, and faster for less. These are all complex and wicked problems (Mager & Service Design, 2016).

At the same time there is an increasing global trend towards more patient involvement and the use of patient experience when improving the

quality of healthcare, with a growing attention to the value of using service design in the shaping and development of services (Donetto, Pierri, Tsianakas, & Robert, 2015). In Norway, this trend has been taken into consideration by the government, seeing that their goal is to renew, simplify, improve services and include the users (Helsepartiet, n.d.), where service design is one of the mentioned methods (NOU 2011:11, 2011).

Prototyping as a tool in most design disciplines is regarded to be an important part of communicating and evaluating, both internally within design teams and externally with stakeholders. Service prototyping should be no exception. Actually it might be more important for service design because of the attributes of

services as design objects (Blomkvist, 2010), i.e. intangibility, heterogeneity, inseparability, and perishability (Zeithaml, Parasuraman, & Berry, 1985). However, there seems to be a lack of understanding what a service specific prototyping approach is (Blomkvist & Holmlid, 2010).

This article will be used to gain a deeper understanding of how to prototype a service, what kind of techniques are relevant, and how service prototyping could contribute to innovation and improvement of services in healthcare.

The article is based on a literature review within the fields of service design, healthcare, service design in the healthcare sector, prototyping in service design and innovation in healthcare, to gain theoretical insight. The search was conducted through general academic databases, design specific databases, through references in relevant articles and textbooks on service design. Theory on service design, prototyping and service prototyping will be presented, followed by an overview of challenges in the healthcare sector and innovation in healthcare, and how service prototyping can be used in design of healthcare services.

2. SERVICE DESIGN

During the last decades service design has gained attention, however it is a relatively new domain of design (Segelström, 2013). Like other design domains, service design shares some attributes. Principally, all design disciplines intend to change a current situation into a preferred situation (Blomkvist, 2014).

To better understand what service design is we also need to understand the meaning of what a service is. Blomkvist (2010) suggests that a service can be seen as a journey that consists of many stops, service moments, where a customer interacts with a service provider. At each service moment there are interactions, such as a conversation, an interaction with a web page, a phone call, and much more. Without these

interactions the service wouldn't exist. As co-creators, by buying or using services we are taking part in different services at the same time. However, this is not a thing most people think of since services are invisible and without surface – intangible. These interactions with services are called touchpoints, symbolizing how the user “touches” the service (Blomkvist, 2010).

Even though there are many ways to look at service design, most of them agree that it is a user-centered, co-creative, iterative and holistic approach that can be used as a powerful tool for finding the right solution to the right problem. Segelström (2013, p. 27) states that, “it is the use of a designerly way of working when improving or developing people-intensive service systems through the engagement of stakeholders. It can be used to improve an existing service or to create a new service from scratch, with the goal of meeting the user's needs for that specific service (InteractionDesignFoundation, 2018). One of the biggest challenges is to make the invisible visible (Polaine, Løvlie, & Reason, 2013), as service design aims to improve complete service experiences across touchpoints, service moments, physical spaces, virtual places, graphical objects and social interactions (Blomkvist, 2010).

The process of designing services is nonlinear, complex and iterative in its approach and can be divided into four phases: **exploration**, **creation**, **reflection** and **implementation**. It is important to keep in mind that it might be necessary to take a step back and design both in detail as well as holistically (Schneider, Stickdorn, Bisset, Andrews, & Lawrence, 2010).

3. PROTOTYPING

The word prototype means a “first or primitive form” and comes from the Greek word *prototipos*, which is a combination of the two words *proto* “first” and *typos* “impression” (Harper, n.d.).

Prototyping can be seen as a fundamental element of the design process in most design

domains (Blomkvist, 2014), where the **main idea** is to **move from the world of abstract ideas**, analysis, theories, plans and specifications **to the world of concrete, tangible and experiential things** (Coughlan, Suri, & Canales, 2007).

People might associate the term prototype with the “product prototype” with a form similar to the final product or tangible things (Blomkvist, 2012, 2014). However, it is likely that in different design disciplines the term prototype is ambiguous. This could be molded foam models, sketches, storyboards or user interfaces (Blomkvist, 2014; Houde & Hill, 1997). Nevertheless, the most important is not what they are made of, but how they are used to explore, demonstrate or represent a future situation or artefact (Houde & Hill, 1997).

Even though some industries and companies refers to it as highly resolved versions that are close to final products, it is more common that prototypes could be used as “learning tools” at any level of resolution, in any stage of the design process (explore, evolve, and/or communicate ideas) (Coughlan et al., 2007).

3.1 Service prototyping

Service designers consider service prototyping to be one of the most important aspects of their work (Blomkvist & Holmlid, 2010). On the other hand, there seems to be a lack of knowledge about what a service specific prototyping approach is.

Prototyping services could be more challenging compared to other design objects due to its, among other, intangible characteristics (Rodrigues & Holmlid, 2017). However, according to Blomkvist (2014) it should be possible to transfer techniques and approaches used in other design disciplines to service design. To do so they need to be specifically adapted and tailored, by taking advantage of existing knowledge and practice of prototyping and adapt this to the design material and the aims of the service design discipline.

In an attempt to make a distinction between a traditional prototyping- and a service prototyping approach more accessible, Blomkvist (2012) presents an illustration with four distinguishing features as levels on which prototyping can be conducted: **artefact, use, context and service**. Figure 1 below shows the three first levels.

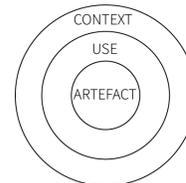


Figure 1: Three first different levels of prototyping. Artefact, use and context (Blomkvist, 2012).

In the first level, the **artefact** is in focus as a tangible object, looking at properties as layout, disposition, color, size etc. The second level, **use**, is about the interaction between a person and the artefact, including external stakeholders. The third level, **context**, widens to include social, relational and contextual factors, to gain insight into future scenarios with the use of prototyping techniques such as experience prototyping, bodystorming and focus groups. The fourth and last, figure 2, is the **service level**, which builds on a representation of more than one service moment, that **separates service prototyping from approaches on the other levels**. To create and form a service prototype, many such moments are needed.

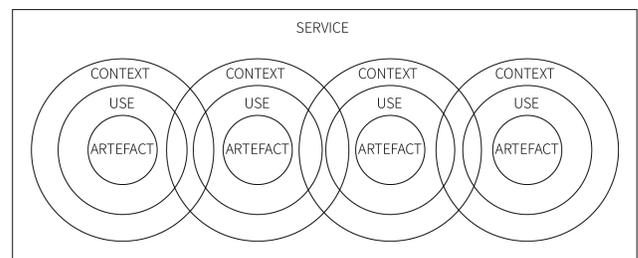


Figure 2: The service level of prototyping (Blomkvist, 2012)

Even though there is little knowledge on the fourth level, it should be focused on the transitions of different service moments and how they correspond to each other. Meaning that the

complexity increase on this level to include how the service is understood and experienced as a whole (Blomkvist, 2012). Figure 3

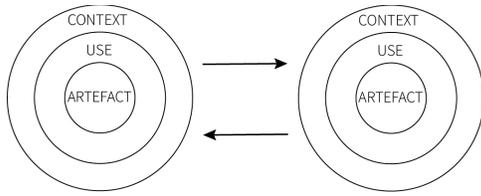


Figure 3: Service prototypes can explore relations between service moments (Blomkvist, 2012)

Blomkvist (2012) suggests that all prototyping levels can be useful in service prototyping. However, service moments or chains of moments, which consist of sequences of artefacts, use-situations and contexts, are the only representations of service prototypes (levels) – i.e. represent whole services. In this way, the service level could be seen as a holistic prototyping level.

3.1.1 How to prototype a service?

So how do you prototype a service? According to literature there are a lot of insight and theory on prototyping in general. The challenge is how we take advantage of this knowledge to understand how we should prototype services.

As mentioned earlier, one of the biggest challenges in designing a service is to make the invisible visible (Polaine et al., 2013), which also applies for prototyping a service, where one goal is to bring tangibility to the intangible experiences. It is a useful tool to illustrate how the experience might play out over time and gather feedback about what is working or missing, built around the needs of the end consumer (IDEO, 2017).

As IDEO (2017), a global design company, states: “It’s impossible to be awesome at everything all the time, so it’s critical to identify the key moments that matter in the experience”. A service is likely to exist of various challenges, across different levels. In this way service prototyping can be used in light of finding the

most important challenges to focus on. IDEO (2017) shares six tips for prototyping a service:

1. Determine the moments that matter. Understand what is important to the people participating in the service by spending time in their lives. What excites them and what irritates them? What personas or segments are you prioritizing?

2. Be on the lookout for early indicators. It’s easy with early prototypes to race toward metrics and evidence. But early indicators that something is going to be better are critical with these rough prototypes.

3. Tap the creative potential of those who are delivering the service. Rely on the instincts and insights of the people living in these moments every day. Engage the ultimate stakeholders as designers. Ask good questions about how things will play out

4. Use time-based moments. Think about the arc of experience over time, how do you help people anticipate the next engagement moment?

5. Ask people to imagine a more idealized version. What is the idealized experience that addresses some of the known challenges? Low fidelity prototypes – are helpful because the users often want to give feedback to help design something that meets their needs.

6. Use constraints to force yourself to stretch. Push beyond the normal mediums you use, for example through space, people, signs, etc. Organizations and industries tend to have a bias toward certain channels. Healthcare has a bias toward using people to deliver a service.

3.1.2 When should we prototype?

Blomkvist (2012) argues that service prototyping can be used in several stages of service development, and for more purposes than usually assumed. What matters is that the methods for prototyping services should be chosen in the light of the particular stage in the service development process (Holmlid & Evenson, 2007). This argues for that service prototyping can be utilized throughout the process, for ideation, concept development and implementation, and can be seen as an aid to divergent thinking, convergent

thinking, evaluative purpose or other purpose (Holmlid & Evenson, 2007).

3.1.3 Who should be involved in service prototyping?

According to Coughlan et al. (2007) it seems to be a long tradition of “prototyping” with the intention of bringing organizational change in design research. However, when working with clients most of them are not familiar with this approach. This could be a challenge when it comes to who should be involved in the process of prototyping, as generally in service design a lot of people need to be able to take part because of its cross-disciplinary and co-creational approaches. There should be room for evaluating, understanding and discussion (Blomkvist & Holmlid, 2011), were the design team, stakeholders and service audience representatives should be enacting in.

3.1.4 Important reasons and motivation for prototyping

There are several reasons for prototyping services. Blomkvist (2014) sorts them into three categories:

- Prototyping supports communication. Both internally and externally.
- Prototyping saves resources. Mainly in terms of time and money.
- Prototyping affects the mind-set of the participants.

Additionally, there are motivational factors that are important to mention:

- Include different stakeholders
- Gain a common understanding
- Fail and learn early, and throughout the process
- What the service feels like, visualize and experience a possible solution
- Increase the possibility of implementation

3.1.5 Service prototyping tools

There are different tools of prototyping, and like other design disciplines prototypes generally change based on the stage or level of a project. Service prototyping tool distinguishes according

to the level of interactivity. At the early stage they can be rough, simple and offer little interactivity. Later, they are more interactive, and actions will change the prototype. At the end they may offer full interactivity, and answer questions about whether the service will work or not. Blomkvist (2012) presents three examples of levels of service prototypes:

A **service sketch** could be customer journeys, storyboards, service blueprints or similar techniques. What they have in common is that they visualize the service concept and show selected parts of the process, system and multiple service moments. This kind of prototypes can be useful at an early stage, and mainly focus on the service concept. Moreover, they can be useful to get everyone to share a similar idea about what should be designed. Because of the tangible and accessible approach, they are good for gathering quick feedback and communication. However, they are not appropriate for evaluating services since they are static representations.

Service walkthrough is interactive with a higher level of detail. Some of the service processes and systems are represented, which builds on a service concept. The idea is to stage the whole service and go through it from start to finish. The use of product mock-ups and other artefacts as props and setting, create a representation similar to the intended service concept. Experience prototyping, role-playing, bodystorming, and drama approaches are used to explore or verify stakeholder roles and interactions in the service.

Live prototyping uses actual representatives from stakeholder groups in its intended context. It is equivalent to a pilot run of the service. However, it has a more “designerly” approach. This prototype is often based on previous service sketches and walkthroughs, where the main purpose is to allow evaluation of the designed service. It is also useful when verifying if the service could be delivered and see what will happen when the service is scaled up.

4. UNDERSTANDING HEALTHCARE

There is no doubt that healthcare services are under hard pressure. To deal with a varied set of public challenges, the use of design tools, methods and approaches are increasing. In a series of three blog posts, the Norwegian design company Halogen systematically illustrates how service design can revolutionize Norwegian healthcare. As stated in the blog, results from completed service design projects show that hospital trusts that focus on service design achieve increased efficiency and better flow across units, better interaction and working environment, and better treatment outcomes (Romm, 2015b).

Within the healthcare system, coordination processes are more complicated as they involve different systems and stakeholders (Wetter-Edman & Moritz, 2015). Additionally, the healthcare sector has been designed for a complicated rather than a complex world. To break problems down so they are easier to handle, silo and hierarchical structures are ideal, and make sense to the business units. On the other hand, they are not the best when it comes to complexity, and make no sense to the user who should see the experience as one (Burns, Cottam, Vanstone, & Winhall, 2006; Freire & Sangiorgi, 2010; Polaine et al., 2013, p. 22). Consequently, we see that the healthcare sector is having trouble adjusting to a more complex and fast developing world.

According to the report to the Norwegian Parliament about Quality and Patient Safety (Helse- og Omsorgsdepartementet, 2016) the healthcare service in Norway has ongoing challenges in the areas of communication and involvement of patients and relatives, competence, learning and management. Additionally, it is said that the Norwegian health service is good at survival, yet the total experience is not so good. In order to reduce and prevent patient injuries, unnecessary waiting and extra stress for patients and their relatives, it will be necessary to improve interaction,

coordination, communication and participation (HelseMidt-Norge, 2016).

Moreover, there has been a shift in evolution of healthcare services. From centralized and sequential models of value creation to more distributed and open paradigms. Users are seen as co-creators of their own wellbeing (Freire & Sangiorgi, 2010). From a conference in Oslo 2017 with focus on Service Design in Healthcare, it was stated that it is crucial seeing health and healthcare through patients' eyes by adopting an outside-in approach when developing new services (Livework, 2017).

According to a study on patient involvement and patient experience in quality improvement in Norway, policy documents and regulations points out that the main emphasis on the patient's future role indicates intentions to develop patient involvement in a direction from reactive towards more proactive approaches. This as a response to more competent and well-informed patients and recognition of the benefits of cooperation with patients and patient groups in service planning and development (Wiig et al., 2013).

However, in spite the fact that patient centered care has been gaining attention, healthcare services are planned from the respective organizations perspectives, resulting in seeing the patient as objects rather than individuals (Wetter-Edman & Moritz, 2015). This can be seen in connection with the healthcare services not having traditions of including the patient in relevant information and decisions, as Halogen states in their blog (Romm, 2015a).

5. INNOVATION IN HEALTHCARE

For improvement and innovation within healthcare, design thinking and practice, and service design in particular, are increasingly gaining attention (Bate & Robert, 2008; Wetter-Edman & Moritz, 2015). In a study, Innovation in healthcare: Issues and future trends, Thakur, Hsu, and Fontenot (2012, p. 564) seek to answer how executives and practitioners define the term

innovation in healthcare and describe it as “those changes that help healthcare practitioners focus on the patient by helping healthcare professionals work smarter, faster, better and more cost effectively”. Furthermore, the study also provides implications for healthcare executives and practitioners, related to the generation of innovative strategies they should use when presenting innovative ideas. Firstly, they should be open to any suggestions and/or changes, and adjust their decision-making strategy with the mission of the company and at the same time keep in mind the government regulations, for organizational success. Secondly, healthcare executives and practitioners should strengthen interaction across departments to trickle-down (relating to a situation in which something that starts at the top of an organization, system, etc. spreads to all of it (Trickle-down, n.d.)) the innovation (Thakur et al., 2012).

Two different strategies have been adapted for innovation in healthcare by designers: working within organizations to introduce design methods and suggest new service configurations or acting outside the system to generate radically new solutions. At the same time, as mentioned earlier, there has been a shift in evolution of healthcare services. The innovation strategies supplemented with design methodologies are moving towards a co-creation philosophy, where the users are shaping the services by being central in the production and development (Freire & Sangiorgi, 2010).

Even though there has been a notable improvement in the healthcare industry, inefficiency is still an issue, and there is little obtained in understanding how to use innovation to deal with it (Thakur et al., 2012). This is crucial for the future, as we will have to treat more patients with relatively fewer employees that require continuous improvement of work processes and patient progress. To ensure a sustainable development with a holistic approach it means that we need to use new technology and service innovation (HelseMidt-Norge, 2016).

6. USING SERVICE PROTOTYPING IN HEALTHCARE

Service prototyping and prototypes can be useful to gain an understanding of the concept that is being developed. By transforming ideas about future concepts into something external or sensible, it makes them shareable and open for communication across different stakeholders and within the design team (Blomkvist, 2014). Kept in mind that the healthcare sector traditionally struggles to involve different people when it comes to developing new services, as they don't prioritize or have time, this is an important argument for why service prototyping should be emphasized. As well as testing the solutions throughout the process, and allow for everyone involved in the project to better understand the concept and be a part of the development process. In the long run this can save both time and resources because of the decrease of misunderstandings (Blomkvist, 2014).

At the same time, learning through simulation is a method that is becoming more popular in education and training of health professionals (Kongsvik, 2017). This is a method that is established in other industries, such as the Armed Forces, Airline and Offshore Industries. It has been used in the healthcare sector since the end of 1990's, with an increase from the mid 2000's to today. According to Eva Linnerud, Development Coordinator at the Center for Medical Simulation at Akershus University Hospital, SimAhus, there is a future paradigm shift, in which Norwegian medical simulation network in the healthcare service, MedSimNorge, was established in 2016. The goal is to contribute to valuable and relevant training for many and different groups in the healthcare service across professional groups. All hospitals now operate with simulation training in some form, and will help to create competent teams focus on management, communication and decisions in complex, unknown or emergency situations (Kongsvik, 2017).

7. DISCUSSION

This paper has attempted to give an understanding of what service prototyping is, how to prototype services and identified the key reasons for prototyping a service. Challenges in healthcare and innovation of healthcare have been highlighted. Furthermore, service prototyping as a contribution to design of health services will now be discussed.

Service prototyping can be used as learning tool at any level of resolution in any stage of the design process. However, they need to be specifically adapted and suited, so they fit the aim of the service design discipline, where one of the main goals is to bring tangibility to intangible experiences.

Research shows that it is beneficial to make the distinction between a traditional prototyping- and a service specific prototyping approach more accessible for how we understand the difference between them. As shown by Blomkvist (2012), there are four levels on which prototyping can be conducted: **artefact, use, context and service**. All levels can be useful in service prototyping. However, what makes it a service prototype is the representation of more than one service moment, and how these moments correspond to each other, which is important when designing for a holistic prototyping level.

As stated, the three categories of reasons for why we should use prototyping when designing services are: that it **supports communication**, it **saves resources in terms of time and money**, and it **affects the mind-set of the participants** (Blomkvist, 2014). It is interesting to see how this corresponds with healthcare services, as the biggest ongoing challenges they face are in the areas of **communication, coordination and involvement of patients**. In addition to cope with how to **provide more, better, faster for less**. This illustrates the importance of why service prototyping should be a contribution in design of healthcare services as it might have an impact on how they are developed and improved.

A service is seen to consist of many different aspects that might need improvement. As stated earlier, it is impossible to fix everything at the same time, and therefore it is crucial to identify the key moments by understanding what is important to the people participating in the service (IDEO, 2017). The same applies for the healthcare sector that traditionally has been designed for silo-mentality and hierarchy resulting in lack of communication. Service prototyping can in this way help to obtain a common understanding and raise awareness across all parts involved. Informing and explaining through prototypes supports greater engagement and ensures better communication. This increases the possibilities for a good collaboration between the design team and stakeholders, and across departments of healthcare executives, practitioners and patients.

Service designers need to keep in mind the ongoing challenges, the context and circumstances when designing in healthcare. They must understand the needs and the environment to be able to improve the service. It is important to be aware that introducing new methods or service concepts for adjusting or renewing old procedures in healthcare can be challenging, and there might exist a fear of behavioral change. As well as involving and engaging people because they don't prioritize or have time to take part in a project. Service prototyping alone is not enough to cope with these challenges and should be a contribution rather than a solution.

Since it is not done much research on prototyping in service design, there is still lack of knowledge. One challenge is that some of the underlying theory is rather product oriented, this way service designers might struggle when it comes to prototyping and testing services in complex environments, such as healthcare. Therefore, in addition to use knowledge from other design disciplines, this article argues for learning from other domains to transfer and adapt existing knowledge to strengthen a service specific prototyping approach. In this case, how they use

simulation in education and learning in healthcare services. Simulation is a way of training for complex and unforeseen incidents, by staging a situation and the interactions between healthcare personnel and patients (Kongsvik, 2017). Simulation can for example be used in a service walkthrough for exploring or verifying stakeholders' roles and interactions in the service.

Furthermore, simulation together with service prototyping might be helpful for involving people and create engagement. In addition to make the system communicate better, as simulation supports collaboration between different groups. This makes it suitable for connecting distinctive needs and perspectives. Service designers and health personnel need to be open-minded and realize the advantages of learning from each other. The use of simulation as a contribution to service prototyping could be a way to widen the field of research and ensure a sustainable development of healthcare services.

8. CONCLUSION

The goal has been to understand how to prototype a service and how service design, service prototyping in particular, can contribute to innovation and improvement of healthcare services. The article argues for utilizing service prototyping throughout the design process, and findings show that the three categories of reasons for prototyping correspond with some of the biggest challenges facing healthcare sector.

Service prototyping tools, like service sketches, service walkthrough and live prototyping are helpful to gain a common understanding and raise awareness of the challenges that need to be considered. This is crucial as the healthcare sector consists of many different stakeholders across different levels and departments, with different needs.

Service prototyping is a field that needs further exploration and research, including the issues of how to prototype whole services, benefits, and

outcomes. However, further work on how to learn, use and apply existing knowledge from other domains, in this case simulation in healthcare services, could be a contribution to gain a deeper understanding.

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