

# From products to services: reflections on the challenges in designing for services

Martijn ten Bhömer\*, Christine De Lille\*\*, Oscar Tomico Plasencia \*, Maaïke Kleinsmann\*\*

\* Eindhoven University of Technology, The Netherlands, [m.t.bhomer@tue.nl](mailto:m.t.bhomer@tue.nl); [o.tomico@tue.nl](mailto:o.tomico@tue.nl)

\*\* Delft University of Technology, The Netherlands, [c.s.h.delille@tudelft.nl](mailto:c.s.h.delille@tudelft.nl); [m.s.kleinsmann@tudelft.nl](mailto:m.s.kleinsmann@tudelft.nl)

**Abstract:** In this paper we will point to implications for designers who support organizations in the transition process from products to services based business models. These implications are based on four important challenges when designing for services: the designerly mindset, collaboration, empathy with stakeholders and implementation. These challenges have been identified by analysing the previous work of the second author, in which interviews were conducted with people in practice that consider themselves self-trained service designers and work as design consultants in service design projects. To further explore these challenges we will compare them with the experiences of the first author, who has been trained as product designer specialized in the design of intelligent products, and is currently part of the Smart Textile Services project as design-researcher. This project deals with the textile industry, which is traditionally focused on manufacturing but now in the transition towards delivering services. We will reflect on the moments that the design researcher felt uncomfortable as product designer and ran into similar challenges as the self-trained service designers. Based on the comparison of the self-trained service designers and the design-researcher we will point to implications for designers who are designing services in transitioning industries.

**Key words:** *self-trained service designers, transformation economy, stakeholder networks*

## 1. Introduction

The role of products and the product design process has changed tremendously in recent years. The transitions from the industrial economy to the experience economy and currently the knowledge economy to the transformation economy [1] requires businesses to keep adapting and revalidating their value propositions [2]. In management studies this shift is also visible in the transition from goods-dominant logic (G-D Logic) to service-dominant logic (S-D Logic) [3]. Goods-dominant Logic in New Product Development (NPD) and Service-dominant Logic in New Service Development (NSD) are two different perspectives in organizations. Both have been well documented, the former from a product design perspective [4], the latter from a management perspective [5]. Where NPD is focusing mainly on tangible products and a clear defined process leading from idea generation to market introduction, NSD has a broader scope. Kimbell explains that designing for services is as "creating and developing proposals for new kinds of value relation within a socio-material world" [6, p. 42]. An example of these new value relations in the transition from NPD to NSD perspective, are the extension of vertical product chains into value networks existing from several companies that collaborate for the development of specific products and services [7].

To manage the transition from being product-oriented towards being able to deliver services as well, companies are looking to the field of design. When made a part of an organization's work processes and competencies, design enables an organization to embrace change as a normal part of managing its business [8]. In this sense, design is not only used for aesthetic purposes, but also for strategic purposes to achieve key business objectives and enable change in an organization [9]. That design can be of great value for organizations in strategy is covered in many different sources [10–12]. Organizations see design as an opportunity to develop new services and change their organization to create more value for their customers. Segelström and Holmlid argued that designers who are developing these new services (called "service designers") see their "design object as events and performances in interaction and co-creation between humans, supported by other means" [13, p. 7]. This co-creation goes further than the relation with end-users only, because designers are dealing with multiple stakeholders of NSD projects. These characteristics require making, emphatic, and entrepreneurial skills from designers to initiate innovation [14]. Three skills comparable to producing, facilitation, and leading categories of approaches, identified by [15] in NSD, which designers use to manage multi-stakeholder involvement.

A large part of the designers consists of "self trained" service designers with a background in product design. These product designers have recognized that more and more that products do not stand alone. They are part of so-called Product-Service Systems. For many of these product designers the service component is new and encompasses challenges. To be able to participate in and have control over these new design processes, self-trained service designers had to develop new skills and a particular mindset. There is some literature on specific skills required for service design [15–17], but the implications of designing for services for product designers is missing. The goal of this paper is to give insight in what challenges product designers face when designing for services. We will first discuss the challenges that followed from interviews with self-trained service designers. Four challenges have been identified: designerly mindset, collaboration, empathy with stakeholders, implementation.

## **2. Four design challenges from the perspective of "self-trained" service designers**

To explore the challenges of service design for product designers, one of the authors [18] has interviewed 14 product designers in practice that have developed themselves to become "self trained" service designers. These designers make use of their expertise in product design in a different way and became self-trained service designers through experience in projects. The interviews were semi-structured, focusing on the process they used, the specific design skills that were valuable and the challenges they faced (more details on the research method can be found in [18]). In this section we will take a look at the four main challenges the second author identified by analysing the interviews with self-trained service designers: the designerly mindset, collaboration, empathy with stakeholders and implementation. In each category we will explain the findings using existing literature.

## 2.1 Designerly mindset

Product design often starts with a formulated design brief. Service design, as the interviewees said, started before a design brief was formulated. Because of the complexity and impact service design has on an organization, defining a focus was difficult and took time. It was part of the responsibility of a service designer to support organizations in addressing the urgency for service design, defining focus and creating a vision. Often organizations did not really know what they needed and had to surface the underlying “what & why” questions first before thinking about “how”. As an example, a client of one of the interviewed self-trained service designers mentioned during the interview [18]: “We hear lots of things about apps, should we have one as well?” The client lacked asking himself what the underlying problem is and why.

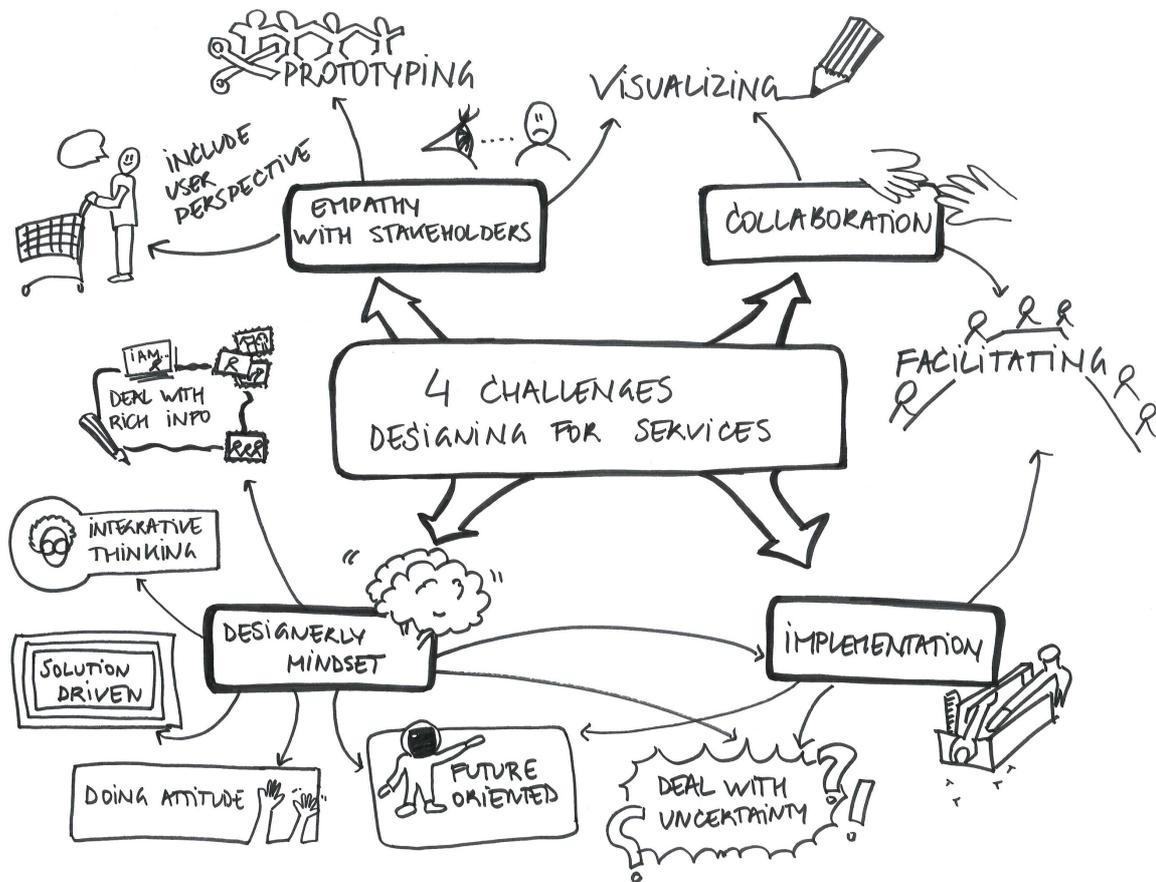


Figure.1 Illustration of four challenges that were identified during interviews with self-trained service designers

Designers are not only capable of visualizing, prototyping, including the user perspective, which are often named as their most valuable contribution in innovation. It also requires a mindset: being intuitive, sensitive, and holistic and to be both convergent and divergent [19]. The real value of designers lies in its combination with this mindset. Designers tend to see problems as opportunities for the invention of new alternatives. They think more in terms of creating new possibilities than in terms of selecting between existing alternatives [20]. This makes designers able to deal with uncertainty, to take risks and to work in the fuzzy area of the design process.

## 2.2 Collaboration

The service designers dealt with two types of stakeholders. Internal stakeholders were people involved in the project or internal experts. External stakeholders were users, external experts, clients of the company or distributors. In the process of connecting internal with external stakeholders, the self-trained designer took the role of connector and facilitator. This skill of engaging stakeholders in the process came down to facilitating collaboration, through communication using the skills of visualizing and prototyping (this was especially important in large organizations, see for example Figure 2). One of the interviewees in [18, p. 8] even stated: *“50% of our actual time is spent on creating insights and ideas, the other 50% of our time is spent on communicating these through collaboration. For example by facilitating workshops.”*

Facilitating collaboration is a skill crucial in the skillset of designers and often overlooked. Mattelmäki and Sleswijk Visser [21] state that in co-design the designers (or design researchers) typically facilitate the collaborative process but often also participate in the process as one of the contributors. The co-design activities typically aim at searching new potential directions and producing design ideas and solutions. Not only is facilitating collaboration a skill necessary to tackle the specific characteristics of designing for services, through facilitation, shared ownership is created on the project. Creating shared ownerships enables stakeholders to make sense of the topic or expressing experiences collaboratively. It is specifically in this direction that the interviewed service designers use their visualization and prototyping skills in enabling stakeholders to express experiences and support them to make sense of the topic.

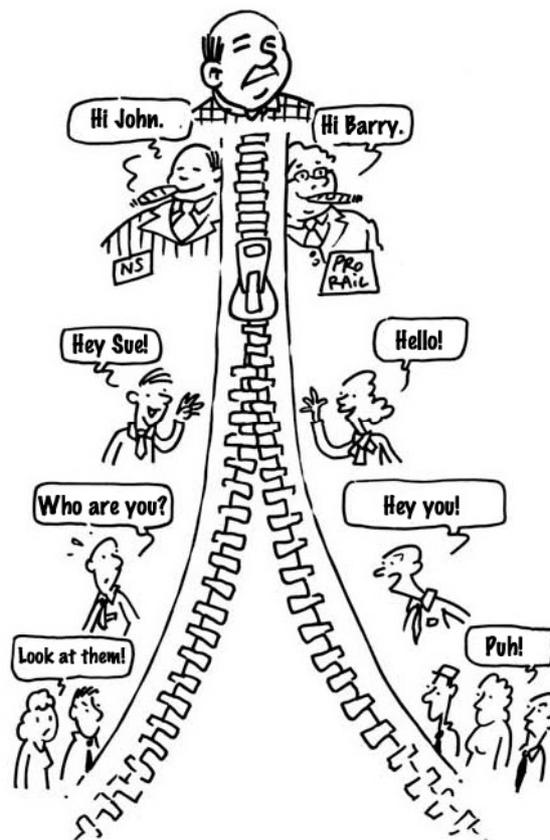


Figure.2 Visualizing the situation in an organization helps them to identify the actual problem  
(Peter Quirijnen for DesignThinkers)

### **2.3 Empathy with stakeholders**

The interviewed service designers acknowledged the use of their skills not only to generate “content” (designed services) but rather for strategic purposes, especially to visualize urgency, facilitating collaboration and engaging different stakeholders in and from different organizations. The interviewees also mentioned that service design had a larger impact on the organization than product design. They dealt with a greater variety of stakeholders and had to be able to deal with business stakeholders. They needed to understand the importance of business and what mattered to them. By enthusing and engaging stakeholders, making results theirs, the interviewed service designers attempted to get the developed services implemented into the organization.

Collaboration with stakeholders often leads to a large amount of data and insights. Designers use visualization and prototyping skills to create new forms that are useful within future-oriented design projects [16] and in the process will generate new insights and feedback. Rapid visualization may give stakeholders a concrete image of the future solution that words alone could never convey [22]. As Schön [23] puts it, designers interact with these visualizations in a conversational way. Designers uncover unmet consumer needs, wants and desires and use these insights to inform future generation products. Empathy with users and different methods of capturing users experiences through prototyping is another skill of designers, and is needed during different moments in the design process [19], [24], [25]. Empathic understanding can also be used when collaborating with different stakeholders. Using empathy, the designer can identify needs of the different stakeholders and react upon them.

### **2.4 Implementation**

Enabling organizations to deliver services is not a matter of a designer applying his skills, but to really sustainably enable organizations in doing so. The mindset of these organizations needed to be changed by making the transition from goods-dominant logic (G-D Logic) to service-dominant logic (S-D Logic). This transition is not obtained by applying tools, but is a slow step-by-step process that increasingly involved stakeholders from the organizations and created a broad basis for support within the organization. Engaging stakeholders in the process of designing services is considered a responsibility of the service designer, however traditional educated product designers lack experience in engaging a large number of (especially internal) stakeholders to this extent. The interviewed service designers mention this capability as one of the most important capabilities they had to learn.

The shortest time it takes to produce a product and get it on the shelf is a couple of years. Sometimes it can be 10–15 years. Therefore, designers are already dealing with the future when they sit at their desk in the morning [26]. As nothing in the future has been decided upon, designers also need to deal with large amounts of uncertainty. For an organization, it is difficult to deal with this uncertainty as they are used to innovate by reflecting on the past. Making decisions about what to invest in is always a challenge, and in many cases organizations seek for numbers that can help them to make a choice. Only the past can be caught in fixed numbers. The future is still uncertain and for this reason numbers are not available or certain. Designers can support an organization as they can draw on their experiences in designing future products. Designers know how to adopt their way of work to the context and changes in their project.

In the next section we will use the previous explained four challenges to reflect on moments of a service design project in which the product designer felt out of his comfort zone, realizing service design is different from product design. These moments will help us to reflect on the four challenges, to find out where they matched, and more importantly, where they didn't match.

### **3. Reflections on designing Smart Textile Services by a design researcher**

Smart Textiles is the area of the combination of soft materials and high technology, Smart Textile Services (STS) are value propositions in which profit is not only based on the sales of physical products. We choose this context to base our reflections on this case since a tremendous change is taking place in the textile industry, companies realize that it is necessary to shift from an New Product Development (NPD) approach to an New Service Development (NSD) approach. For this it necessary to change from vertical value- chains to an horizontal value-network and the integration of existing knowledge from partners in the separate domains of textile (soft materials), technology and service providers. The study presented is part of the framework of [27]. The first author will present his PhD research-through-design project that is part of the STS CRISP project. In the project the design researcher takes a leading role in the development process of Smart Textile Services for the context of eldercare and rehabilitation. Knowledge is generated by reflecting on iterative cycles of designing, building prototypes, communication with stakeholders and testing in real life settings. The design researcher has a background in the design of intelligent products, services and systems. The group of partner companies consists from an eldercare service provider, electronics engineering company, design agency with a focus on multimedia and communication and textile knowledge and production facility. This collaboration emerged after two workshops through which similar interests were made explicit (the focus on smart textiles and eldercare), common goals became clear (developing and bringing to the market these services) and the necessary complementary set of competencies (service experience, textile production, electronics engineering and multimedia design) were identified [27].

In this section we will describe four key moments that occurred during the PSS development process, and are related to the transition from NPD to NSD approach. We choose to focus on these key moments because these were moments the design researcher (who had only experience in NPD) moved beyond his comfort zone, facing challenges related to the design for services for which he was not educated. Figure 3 shows a visual overview of all the contact moments with the partners that occurred until this point. The four key moments are indicated with black circles, white circles indicate other moments. In the first key moment we describe the creation of a touchpoint together with a knitting expert: a fabric that can measure stretch. The second key moment deals with the creation of the infrastructure between touchpoints, here a discussion with an embedded systems engineer to find out we could connect smart textiles to the bigger system. The third key moment describes a moment where the value network was further created, a decision making process with therapists. Finally, the fourth key moment will show an example of the creation of the business model and some of the compromises that are needed in this process. First, we will explain how the moment relates to the design for services. Secondly we will discuss a specific example situation in this moment, and discuss why the moment felt uncomfortable for the design researcher.

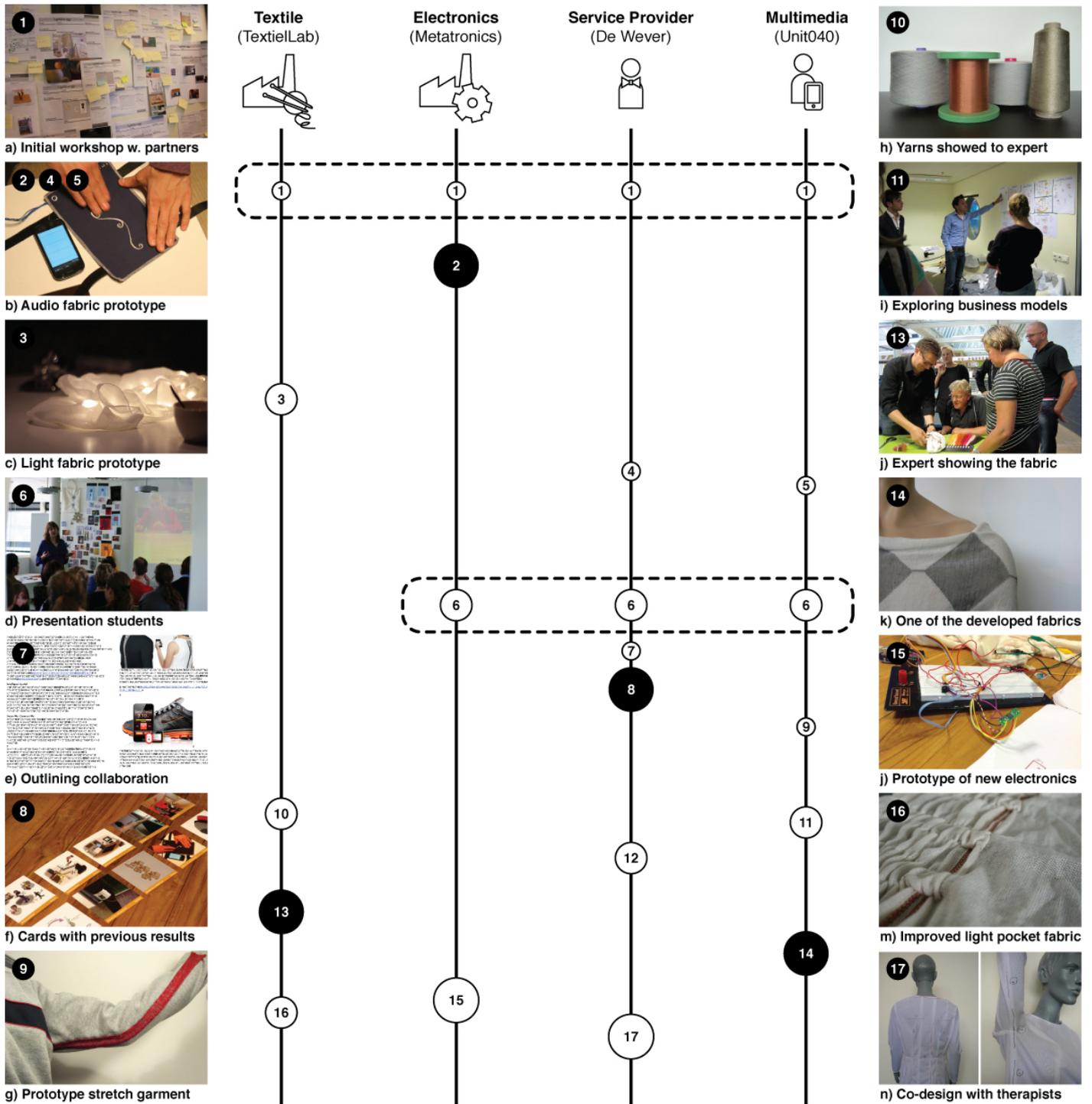


Figure.3 Vertical timeline of the contact moments during the design process, the four key moments are indicated by the black circles, the numbers next to the pictures refer to the moments on the timeline.

### 3.1 Creating the touchpoints (key moment 13 on the timeline in Figure 3)

In the service we were designing there were multiple touchpoints with which end-users (or other actors) came into contact with the service. One of the touchpoints of the service was a garment that could measure physical movements during rehabilitation exercises. This data could be used in the service to provide feedback to therapists and the people in rehabilitation. This moment describes an example that is related to the development of this touchpoint.

Together with a knitting expert from TextielLab we developed and produced smart textiles with integrated conductive fibres that could measure stretch. During this development process we found out that the type of knit that was necessary to realize these smart textiles (intarsia knitting) is a highly specialized technique to produce on industrial scale. The challenge for the design researcher was to engage the knitting expert to also think about transforming the requirements of the service, to a concrete smart textiles implementation. By providing demonstrations, for example by connecting a light to the material samples we created, we were able to show how the fabric would react when people interact with it, and let the knitting expert experience a small part of the intended service. At one point the knitting expert became so excited he took the knitted fabric with the connected electronics, and proudly showed all his co-workers the result (shown in Figure 3.13). This specific knowledge would have been hard to find out before actually developing the touchpoint, but has a large impact on the service since it influences all the other parts of the service.

### **3.2 Creating the technical infrastructure (key moment 2 on the timeline in Figure 3)**

The separate touchpoints were not separated entities in our service, but connected to a larger system (for example the therapists needed to be able to analyse the movement data in the patient treatment dossier). To realize this interconnected system an infrastructure was necessary that enabled every touchpoint to become part of the larger service. The “audio fabric” consisted from a textile touch sensor connected to a smartphone, with an application that composed music based on the input (shown in Figure 3.2). All the connections between the textile touch sensor and the smartphone were necessary to connect this touchpoint to the service. This moment described a meeting where the prototype was showed to a partner company with electronics expertise.

During a meeting with the embedded systems engineer from Metatronics the "audio fabric" prototype was demonstrated. This prototype was build as demonstrator to show the combination of textile and technology. For the design researcher this felt uncomfortable, because the audio fabric prototype was unfinished. This had as goal to be able to open the prototype during the meeting, to show the engineer how the touch sensitive fabric was constructed, and how it was connected to the electronics for the wireless transmission. The engineer recognized the pressure sensitive capabilities of the fabric as a technique that they could apply in other curved surfaces. Bringing it to the meeting helped in understanding each other's perspectives better. The prototype could be touched and opened, making it possible for the engineer to understand the relation of the different parts of the system. The engineer became aware of challenges in creating the infrastructure: connecting textile parts to electronics. The design researcher became aware of current challenges in the electronics discipline, for example creating a curved sensor surface.

### **3.3 Creating the value network (key moment 8 on the timeline in Figure 3)**

To be able to realize the touchpoints and the technical infrastructure it is necessary that multiple people and companies work together. Not in a vertical value chain, but as a network that works in a horizontal open structure. Partners in this value network need to negotiate to find out how activities match everybody's interests, to make sure everybody is staying involved in the process. In this moment we look at a specific example where the design researcher was invited to the context of the eldercare service provider in the value network to learn more about the context where the service was going to be located and how it matched the interests of the service provider.

During this moment the therapists showed their daily activities, their facilities and talked about the experiences of them and their clients. The design researcher prepared cards that showed results from previous projects to

trigger a discussion about product/service proposals (the cards are shown in Figure 3.8). In the discussion we talked about the pros and cons of existing services, which helped to find out which services we wanted to continue working on. By asking them to explain and show their context, and by letting them decide on what was relevant to be showed, their expertise was valued in the design process. The choice was made to start the process based on previous results from the organization, to ensure that these were not forgotten and also taken into consideration. This helped to speed-up the process, but also meant that the design researcher had to be open enough to accept directions that already existed, giving away control of the process to the other stakeholders. The design researcher experienced that giving this control to stakeholders will help the stakeholders to feel involved and take responsibility in the process, it is almost as the stakeholders are becoming part of the design team.

### **3.4 Creating the business model (key moment 14 on the timeline in Figure 3)**

After the stakeholders in the value network know what to expect from each other, it is necessary to coordinate the value flow that is generated by the service. A business model can help to plan this value flow, and think about the opportunities in for example new markets. People from TextielLab were involved from the start of the project, as advising party on how to position Smart Textile Services in the market. With every iteration of technology and textile, they were involved in thinking about business possibilities. With this moment we will give an example of how the business partner is trying to help making the product service system relevant for a larger market.

During preceding meetings the new-business developer and designer from Van den Acker Textielfabriek were involved in thinking about how the develop Smart Textile Services could be brought to the context of eldercare and rehabilitation. However, from a business context this was not fully supported by them because of the smaller and more difficult market. After demonstrating the possibilities of the developed smart textiles (the touchpoint described in moment 3.1), we changed our direction to a garment with integrated sensors that could be used for both the sports and the eldercare market. For the design researcher the focus on eldercare and rehabilitation was very important. Mainly because of the collaboration with the service provider, but also because it was a very natural part of the design process to focus on a specific end-user. In this process it became clear that sometimes the business interests are conflicting with the end-user requirements.

## **4. Implications for designers supporting organizations to transition from products to services**

Based on the results of the interviews with self-trained service designers we introduced four challenges when designing for services: using a designerly mindset, collaborating with different stakeholders, empathy with stakeholders and implementing designed services. Then, we described four moments that a design researcher experienced when working in the different phases dealing with the transition from product based business models to service based models. To conclude, we will further discuss the four challenges of self-trained services designers with the four different phases of the design researcher. Based on this discussion we will try to deepen our understanding of the four challenges for service designers, more specifically for designers who are facing projects in which companies are trying to transition from products to services.

### **4.1 Creating the touchpoints: designerly mindset**

From the interviews with the self-trained service designer it became clear that before starting to develop the touchpoints, the most important part of a service design project was to identify what the design brief actually was. The interviewed service designers used their skills for strategy (for example by creating visualizations) and not

only to design for services solely on a content level. The interviewed service designers felt it was part of their responsibility to use their designerly mindset, as to their opinion it creates added value, to support organizations in addressing the urgency for defining focus and creating a vision. In contrast, the design researcher in the Smart Textile Services project designed the touchpoints simultaneously with the design of the service. It became clear that the design researcher did not have all the knowledge himself to fully understand the implications of the possible knitting techniques on the service (the need for the specific intarsia knit to create the specific stretch sensors for example). To overcome this challenge, the design researcher used a designerly mindset to engage with the knitting expert. He did this by creating demonstrators that showed the goal of the new smart textiles, and the impact on the service delivery. It provoked the knitting expert to apply new techniques to develop these smart textiles and consider production methods that would not have been viable for just selling the fabric without the included service. In conclusion, a designerly mindset can help organizations to create their strategy and vision. On the other hand a designerly mindset stays important when focussing on the individual touchpoints, since these can influence the service on a strategy level as well.

#### **4.2 Creating the infrastructure: collaboration**

The interviewed service designers mentioned that service design has a larger impact on the organization than product design (having to deal with business models, customer touchpoints and back-end of services). The design of the infrastructure between these different elements required the interviewed service designers to design for multiple perspectives and with different types of stakeholders. This meant for example being able to use numbers to support choices, and to be open minded to analytical reasoning. The design researcher found out that especially in traditional industries, such as the textile industry, companies see themselves as one part of the larger vertical product chain. Some partners might not even realize that they are important stakeholders to create the infrastructure for the delivery of new services. The design researcher in the Smart Textile Services project created demonstrators to convince the stakeholders about their contribution in the service. For example the “audio fabric” prototype helped the designer and the embedded software engineer in understanding better what could be their added value to develop the infrastructure for the service. We are seeing that designers have a new responsibility when creating the infrastructure in these phases: an entrepreneurial role to show the opportunities to these partners in collaborating. In both approaches the designers searched new ways to motivate the stakeholders to collaborate, for example using numbers to support choices and prototypes that convey the technical opportunities.

#### **4.3 Creating the value network: empathy with stakeholders**

The interviewed service designers dealt with a great variety of stakeholders and needed integrative thinking across different departments to engage customer service, management, marketing, and others throughout the entire process. Skills that a product designer is familiar with, such as visualizing and prototyping, were of great value to create shared ownership. Further, the interviewed service designers facilitated workshops to connect internal and external stakeholders. Facilitating discussion and keeping partners up-to-date enabled all stakeholders to have a stake in the design for services. In the Smart Textile Services project the design researcher collaborated with internal stakeholders (therapists and caretakers). They showed their own context by deciding themselves on what was important enough to show the design researcher. Because of this step they were involved as mutual partners in the decision making process. This goes further than just creating empathy with stakeholders, the stakeholders became part of the design team.

#### 4.4 Creating the business plan: implementation

The self-trained service designers started with small steps in the process, and gradually scaled the impact of the design services on the company up. Through building trust and engagement in small victories and small projects it is easier to implement change and results within the organization. The interviewed service designers had to provoke and challenge organizations to face new challenges and opportunities together, as they often impact the entire organization on a long-term period. In the Smart Textiles Services project it became clear that sometimes business interests are conflicting with the interests of other stakeholders. Compromises had to be made between partners, for example when the new business developers preferred to focus on sports rather than eldercare services. By being open about resources that can be shared (in this case the new smart textiles) and by being transparent about the goals the parties are trying to achieve (for the company the sports direction, for the design researcher the eldercare direction) it can be possible to create compromises with parties can be satisfied with, and that hopefully lead to implementation. We see from these two examples that it can be important to scale the impact of the service project up step-by-step. However, sometimes it is necessary to confront different stakeholders directly, as otherwise the project might focus on aspects which are less likely to lead to implementation.

#### 5. Acknowledgements

This work is being carried out as part of the project “Smart Textile Services” sponsored by the Dutch Ministry of Economic Affairs under the CRISP program. We like to thank all the interviewed companies and the STS CRISP partners and students for their contribution in this research projects

#### 6. References

- [1] R. Brand and S. Rocch (2011) “Rethinking value in a changing landscape.” Koninklijke Philips Electronics N.V, Amsterdam, The Netherlands, p. 30.
- [2] N. Morelli (2009) “Service as value co-production: reframing the service design process,” *Journal of Manufacturing Technology Management*, vol. 20, no. 5, pp. 568–590.
- [3] S. L. Vargo, P. P. Maglio, and M. A. Akaka (2008) “On value and value co-creation: A service systems and service logic perspective,” *European Management Journal*, vol. 26, no. 3, pp. 145–152.
- [4] K. T. Ulrich and S. D. Eppinger (1995) *Product Design and Development*, vol. 384, no. 4th Edition, Irwin McGraw-Hill. McGraw-Hill, p. 384.
- [5] E. E. Scheuing and E. M. Johnson (1989) “A Proposed Model for New Service Development,” *Journal of Services Marketing*, vol. 3, no. 2, pp. 25–34.
- [6] L. Kimbell (2011) “Designing for Service as One Way of Designing Services,” *The Design Journal*, vol. 5, no. 2, pp. 41–52.
- [7] K. S. Pawar, A. Beltagui, and J. C. K. H. Riedel (2009) “The PSO triangle: designing product, service and organisation to create value,” *International Journal of Operations & Production Management*, vol. 29, no. 5, pp. 468–493.
- [8] P. Coughlan and I. Prokopoff (2006) “Managing Change, By Design,” *Rotman Magazine*, pp. 20–23.
- [9] T. Lockwood and T. Walton (2008) *Building Design Strategy: Using Design to Achieve Key Business Objectives*. Allworth Press, p. 272.

- [10] T. Brown (2009) *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. HarperBusiness, p. 272.
- [11] R. L. Martin (2009) *The Design of Business: Why Design Thinking is the Next Competitive Advantage*. Harvard Business School Press, p. 256.
- [12] R. Verganti (2009) *Design Driven Innovation: Changing the Rules of Competition by Radically Innovating What Things Mean*. Harvard Business Press, p. 288.
- [13] F. Segelström and S. Holmlid (2009) “Visualizations as tools for research: Service designers on visualizations,” in *Engaging artifacts, Nordic Design Research Conference*, pp. 1–9.
- [14] O. Tomico Plasencia, Y. Lu, S.E. Baha, P. Lehto, T. Hirvikoski, (2010) “Designers Initiating Open Innovation with Multi-Stakeholder Through co-Reflection Sessions,” in *Diversity and Unity IASDR 2011 The 4th World Conference on Design Research*.
- [15] Q. Han (2010) “Practices and Principles in Service Design: Stakeholder, Knowledge and Community of Service,” University of Dundee.
- [16] M. Evans (2011) “Empathizing with the Future: Creating Next-Next Generation Products and Services,” *The Design Journal*, vol. 14, no. 2, p. 21.
- [17] M. Lammi (2011) “Service Design challenges Designers’ Competence,” in *Cumulus Working Papers Genk. Publication Series G*, pp. 42–46.
- [18] C.S.H. De Lille, E. Roscam Abbing, and M.S. Kleinsmann (2012) “A Designerly approach to enable organizations to deliver Product-Service Systems,” in *Proceedings of Design Management Institute Conference “Leading Innovation through Design” DMI 2012*, pp. 465–478.
- [19] M. Press and R. Cooper (2003) *The Design Experience: The Role of Design and Designers in the Twenty-First Century*. UK, Aldershot, Ashgate: Gower Pub Co, p. 210.
- [20] R. J. Boland and F. Collopy (2004) “Toward a design vocabulary for management,” in *Managing as Designing*, R. J. Boland and F. Collopy, Eds. Stanford, CA: Stanford University Press, pp. 3–18.
- [21] T. Mattelmäki and F. Sleeswijk Visser (2011) “Lost in Co-X: Interpretations of Co-design and Co-creation,” in *Proceedings of the 4th World Conference on Design Research, IASDR 2011*, p. 12.
- [22] J. Utterback, B. Vedin, E. Alvarez, S. Ekman, S. Sanderson, B. Tether, and R. Verganti (2006) *Design-Inspired Innovation*. Singapore: World Scientific Publications.
- [23] D. A. Schön (1984) *The Reflective Practitioner: How Professionals Think In Action*. New York, NY, USA: Basic Books, p. 384.
- [24] B. Buxton (2007) *Sketching User Experiences: Getting the Design Right and the Right Design*. Sa: Morgan Kaufmann, p. 448.
- [25] T. Kelley and J. Littman (2001) *The Art of Innovation: Lessons in Creativity from IDEO, America’s Leading Design Firm*. Crown Business, p. 320.
- [26] R. Seymour (2010) “The Violence of the New” Eastman Innovation Labs.
- [27] M. ten Bhomer, O. Tomico Plasencia, M.S. Kleinsmann, K. Kuusk, & S.A.G. Wensveen, (2012) “Designing Smart Textile Services through value networks, team mental models and shared ownership,” in *Proceedings of ServDes ’12*.