Designing for Societal and Commercial Adoption of Smart Textile Applications

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Abstract

With this research-through-design process we aim to provide methods that will increase the chance of societal and commercial adoption of smart textile applications for eldercare and rehabilitation. These methods will show how designers can guide the collaboration between companies from the textile and technology industry, and eldercare service providers. We will illustrate the research goal with examples from the Smart Textile Services CRISP project and will discuss further plans of this PhD research.

1. Introduction

Within the field of wearable computing we focus on smart textiles: the integration of technology, such as computing, sensors and actuators in the textile itself. Technological challenges such as power use, heat dissipation and networking have always been an important issue in the field of wearable computing [1]. As the field of smart textiles is maturing, non-technological challenges related to societal and commercial adoption are becoming increasingly important to focus on [2]. Within the Smart Textile Services project of the Dutch Creative Industry Scientific Program (CRISP) [3] we are investigating how the creative industry can contribute to tackle these societal and commercial adoption challenges.

Societal adoption of new technologies changes the way people behave and experience the world. For example, the adoption of the mobile phone made the way we manage our social relations more flexible [4]. Until now the developments in the field of smart textiles has been relying on explorations, while this now needs to change to a more systematic approach [5]. For smart textiles to be adopted by society it is necessary to develop design methodologies which fuse research and consumer insights [2]. We will focus specifically on developing smart textile applications for the domain of eldercare and rehabilitation. In the field of wearable computing healthcare and eldercare has been a topic of interest. For example for the assistance of nursing staff [6], support for people with

dementia [7] and neonatal monitoring [8]. Wearable computing is beneficial for this domain as it can help the user, the caretaker and other stakeholders in the care process to perform their tasks more efficiently, while also maintaining the intimacy that is needed in this field of application. The second challenge, commercial adoption, is about helping industries to collaborate in such a way that they are able to take new smart textile applications to the market. The paradigm of open innovation [9] learns us that in a complicated field as smart textiles companies need to transfer knowledge between the domains of textile, technology and eldercare services. This collaboration is not natural, because of differences in process, company culture and language. It is the challenge for companies to find enough common ground and shared ownership within the development process [10].

We are exploring societal and commercial adoption challenges by applying a research-through-design approach. This approach can be seen as an iterative transaction between design and research in which knowledge is generated through cycles of designing, building, and experimentally testing experiential prototypes in real life settings [11]. The consequence of this approach is a first person perspective on the design process. Designers perceive themselves as the point of view from which they perceive systems and products: we are a part of our designs [12].

2. Research goal

Since we are aiming to provide insight in how the creative industry can help in tackling the challenges of societal and commercial adoption we are zooming in on the role of the designer. This designer is not a traditional designer whose responsibility it is to style the end product or an industrial designer who is skilled in engineering. Instead, this designer should be considered more as an "interpreter": a person with basic knowledge of the domains of textile, technology and eldercare services. Because of the collaborative nature of smart textiles, such as person can be the link between the domains and society, the person who can help to guide the applications towards societal and

commercial adoption. The goal of my research is to investigate *how designers can guide the multi-stakeholder collaboration process towards societal and commercial adoption of smart textile services for elderly care and rehabilitation*. The contribution of my work for the wearable computing community will not be found in the technological advancements. In fact, this is the part where I have a lot to learn from this community. I hope that my research approach and research questions can offer a different perspective on the process of developing wearable technologies and will provoke discussion about the societal and commercial adoption of applications within this field.

My starting point was in exploring the commercial adoption challenge by bridging and finding common ground between the companies. This was done collaboratively with textile and technology companies, and an eldercare service provider by exchanging expertise and skills in workshops [10]. These activities created the opportunity for the companies to find each other and possibilities for collaboration within the field of eldercare, and more specifically rehabilitation. For the societal adoption challenge my goal was to explore how designers can negotiate between their own design vision, end-user requirements and goals of other stakeholders, and accordingly set the frame for the design process. By providing prototypes of initial ideas the companies were able to articulate what they value about the idea. For example, I developed the audio fabric shown in Figure 1 as an example of how sound and smart textile can be combined to make physical movement exercises fun. An engineering company recognized the pressure sensitive capabilities of the fabric that they can use in curved surfaces. A producer of non-woven fabrics saw new possibilities of their semi-conductive materials, and the eldercare service provider reacted on how and when they wanted to trigger physical movement.
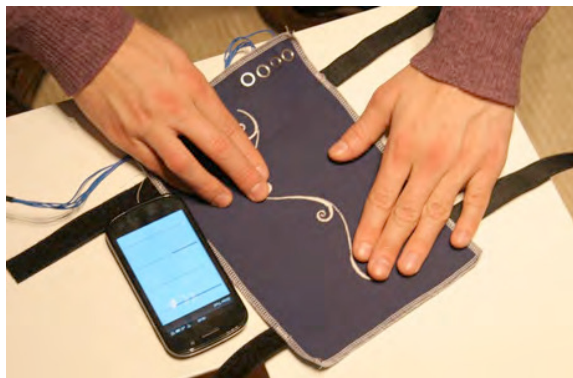

Figure 1 Audio fabric to stimulate rehabilitation exercises with music.

3. Next steps

To explore societal and commercial challenges I am continuing my research-through-design process on three levels: collaboration, context and tools. The group of collaboration partners is composed from an electronics engineering company, a design agency specialized in new business development, a textile company with experience in medical textiles, an eldercare service provider and an creative platform with experience in testing new products in the care domain. With a group of therapists and caregivers we are iterating through research-through-design phases to design, build and test new applications in the societal context. To increase the quantity of prototypes, to further integrate technology into fabrics and to tailor the applications to the end-users we are investing in a computerized knitting machine.

4. References

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