HEALTHCLOUD - Participatory service design of user interfaces for senior people’s active aging

The aim of the HealthCloud project has been twofold: to develop knowledge of user needs for interface design specifically for an ageing population, and also to develop a user interface design specially designed for senior persons with sensory decline to promote healthy living through five Core Health Projects. A participatory approach was chosen to investigate the aim of the project and data was collected and analysed in three sequential steps. A reference-group with senior citizens recruited from retirement organizations interactively evolved data for the project during three workshops. The continuous interaction with the reference group resulted in a conceptual user interface design aimed for the digital HealthCloud service. In the design of the conceptual user interface, the identified core factors were a strive for simplicity: to reduce, organize, and make it enjoyable to use. Participants in the reference-group found the developed interface easy to use regardless of previous computer skills and they were also motivated and stimulated by the interface to start using the computer for promoting their health on a daily basis. Participants also wanted to display and recommend this interface to other members of retirement organizations.

KEYWORDS
User experience design, active aging, participatory design, e-health, user interfaces

Contents

INTRODUCTION ........................................................................................................ 4
BACKGROUND ........................................................................................................ 5
USER EXPERIENCE DESIGN [UX] ........................................................................ 8
Participatory User experience design .................................................................. 8
User interface design ............................................................................................ 9
Designing for people in their third age .................................................................. 9

METHOD .................................................................................................................. 12
Research Design ................................................................................................. 12
Participants ........................................................................................................... 12
Project process ..................................................................................................... 12

RESULTS .................................................................................................................. 16
Workshop 1 - Inspiration and exploration .............................................................. 16
Workshop 2 - Exploration and ideation ................................................................ 17
Workshop 3 - Implementation and finalization ..................................................... 18

DISCUSSION ............................................................................................................ 20
Acknowledgement ................................................................................................ 20

RESEARCHERS ...................................................................................................... 21

REFERENCES ......................................................................................................... 24

Abstract

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Intro
Introduction

The focus of this report is the co-design process of “HealthCloud”, an online service for promoting active aging. The service aims to empower and enable persons in the third age to improve wellbeing and a healthy life. The project concerns both senior people’s needs and preferences for interacting with digital systems, and promoting wellbeing in a service that encourages a healthier everyday life. Through participatory design, senior persons get expanded possibilities to influence and participate in the design of a service that can affect their daily activities, an outcome which in turn can prolong their period of healthy living.

The main target group in this project is persons in the third age. The third age is the period after retirement, when person has opportunities to guide their own life according to their resources. During this period persons are usually promoting their own health, to gain capacities aimed at reducing functional losses that may occur in later life. The overall objective of the project is to enable senior persons usage and experience of co-design of an active aging service and a user interface. Through active participation in the design of the HealthCloud service, the outcome will ensure that senior persons influence the design of the user interface, as well as the content that promotes healthy living, which in turn support active ageing, as well as reduced costs for health-care.

The future society should be accessible for all generation, and an active ageing (WHO, 2002) should be a natural part. Health, participation and security are three of UNs cornerstones for an active ageing. The idea is that the fully developed HealthCloud will enable and promote older persons’ actions and interactions to a lifestyle that promotes healthy living. The HealthCloud builds on the idea of participant knowledge exchange, social interaction, inspirational content, and easy access to multiple sources and will hence encourage an active ageing. By this project we want to increase the knowledge how an interface ICT design support an active healthy living explicit among older adults with sensory declines.

The scope of the project has been to further knowledge of interface design usability and user experience among people in the third age, explored in the design of a HealthCloud. The future society should be accessible for all generation, and an active ageing should be a natural part. Health, participation and security are three of UNs cornerstones for an active ageing. The idea of the HealthCloud is to enable and promote senior persons actions and interactions to a lifestyle that promotes healthy living. The HealthCloud builds on the idea of participant knowledge exchange, social interaction, inspirational content, and easy access to multiple sources and will hence encourage an active ageing. By this project we want to increase the knowledge how an interface ICT design support an active healthy living explicit among older adults with sensory declines.

A. To develop knowledge of user needs for interface design specifically for an ageing population

B. To co-design a user interface for senior persons with sensory decline, to promote healthy living.

The overall project objective was to enable senior persons’ usage and experience of interface design through active participation in the design of HealthCloud, more specifically:

The focus of this report is the co-design process of “HealthCloud”, an online service for promoting active aging. The service aims to empower and enable persons in the third age to improve wellbeing and a healthy life. The project concerns both senior people’s needs and preferences for interacting with digital systems, and promoting wellbeing in a service that encourages a healthier everyday life. Through participatory design, senior persons get expanded possibilities to influence and participate in the design of a service that can affect their daily activities, an outcome which in turn can prolong their period of healthy living.
Background

Currently, there is a growing aging population, at the same time of an on-going explosion of digital technology and innovations. Paradoxically, digital services, systems or interfaces are rarely developed based on senior people’s skills, neither their conditions, for example impaired vision, hearing, nor on their cognitive and sensory understanding of different information and feedback. Also, these services, systems and interfaces are rarely based on proactive outside health care objectives for active aging.

The overall objective of enabling ICT in this project is thus to improve a healthy life and wellbeing for senior persons, and empowering them to gain control over their own health. Digital health support has so far mainly focused on fragile older persons and providing health-care at home. Less focus has been directed towards the support outside the health-care, and the sustainability of a healthy life and wellbeing. Active aging is the right of being active despite reduced capacities that are primary strategies for health recommended by WHO (2002) and implemented as a European and national recommendation in Sweden (SNIPH, 2006).

The national goal for health is to create social conditions for good health on equal terms for the entire population which illuminates equality and sustainability in health for all groups (The Ministry of Health and Social Affairs, 2002). The importance of building health from personal integrity and freedom of choice when supporting health as well as the individual’s prerequisites for health has been focused. Prerequisites to reach sustainability in health is to support empowerment and the ability to use ICT (Ministry of Health and Social Affairs, 2007).

The first prioritized area for Health 2020 in Europe is to invest in health from a lifecycle perspective and give people influence over their lives (WHO, 2013) that must be supported by community structures. There are several reasons for focusing on the health of the ageing population (PHAS, 2017). The life expectancy increases in Sweden, especially the very old people aged 85 years and older. Diseases and disabilities is more common among the older population than in the younger population and persons over the age of 75 years has a reduced function of living with disabilities within one or multiple areas in their lives. It is profitable to invest in elderly people’s health.

Sweden has well-functioning welfare systems but the cost for healthcare sector is threatening to increase. A forecast show that the cost of rehabilitation and health care will increase and these costs has to be reduced. An active living is recommended to improve health and prolongs the period without reduced function in life.

A literature review (Karp et al., 1999) show that: social community and support, meaningfulness in life, physical activity, and good eating habits, contributes to a healthy ageing. Research of senior persons in northern Sweden shows that sustainability of living healthy and active lives includes strategies of: maintaining control, influence of others, and the importance of identifying a solid motivator (Wiklund Axelsson, 2015). The current project builds on Björklund (2015) research of senior persons in northern Sweden showing that there are five Core Health Projects that these persons identify as relevant for healthy living:
A. keeping the family together
B. enjoying life at home
C. being close to the nature
D. self-development
E. promoting conditions for healthy ageing

For the first time, the general ICT usage has grown among the oldest age group. According to The Swedes and the Internet report (2017), the majority (56%) of the oldest age group in Sweden use internet today, but still the rate of use is significantly higher among the younger population. Complicated technology and lack of interest is according to this report the main reason for not use the internet among older persons, other reasons are decline in vision and motor skills.

According to the World Health Organization, the opportunity to be active and involved are important aspects that promote health (WHO, 2002). Benefits for using health related ICT at home increase the possibilities to take control, feeling safe and maintaining a healthy lifestyle (Milligan, Roberts & Mort, 2010). To be aware of older person’s feelings and expectations is also an important prerequisite towards ICT usage. Usefulness is in this regard essential in everyday life (Turner, Turner & van de Walle, 2007). Recent research founds that older persons have positively expectations on health-related ICT regarding their quality of life, in case of diseases (Wiklund Axelsson, 2013).

E-health involves a broad group of activities that use electronic means to increase assess to deliver health-related information, resources and services, skills, as well as promotion of positive changes in health behaviours and manage of diseases (WHO, 2017). The Swedish version of eHealth 2025 has been developed to include and support equal health, independence, empowerment, participation, accessibility and to be user-friendly (Government offices of Sweden, 2017; SKL, 2017).

Even though E-health has been developed to the user perspectives it is mainly focused on fragile older persons and providing health-care at home. Less focus has been directed towards the support outside the health-care in a promotion perspective and the sustainability of a healthy life and wellbeing. Active aging is the right of being active despite reduced capacities. Prerequisites to reach sustainability are to support empowerment and the ability to use ICT. In northern countries, older persons have high access to Internet. Computer usage for older persons may be difficult due to sensory losses as reduced hearing, dimming eyesight and loss of memory functioning. Therefore, there is a need of development of designing a user interface that enables an ease of use and an enabling user experience, for persons with sensory losses.

One contribution of this project will be to E-health, and it may also be relevant to develop digitalization of society, smart regions, and smart cities. The developed HealthCloud will be accessible for older persons both in urban and rural areas in Sweden. E-health that is offered today is based on health professionals processing data provided by older persons and professionals offering solutions to the older persons’ health issues. By using the interactions and services available by the HealthCloud, senior persons will be empowered to influence a healthy living. They will be provided with opportunities to interact in a community cloud and develop capacities to engage in activities relevant for healthy livings and active ageing. According to strategy documents of ICT the expectations is that ICT has the potential for improve a healthy life and wellbeing for senior persons, and empowering them to gain control over their own health.

The contribution of this project is within design of enabling ICT, developing knowledge of how people experience utility, quality of appropriateness in use, and significance, how forms assume meaning in the ways they are used. In turn, this promotes design based on user experience, rather than technology development, and hence contributes to knowledge of how to utilize and improve the usability of ICT tools. This will contribute to knowledge of how smart and sustainable cities and regions should be designed, i.e. based on resident’s needs, conditions and preferences.

The ideation of this project is a collaboration between Luleå University of Technology and University of Oulu Finland, and collaborated with other EU countries.
HEALTH CLOUD - Participatory service design of user interfaces for senior people’s active aging

UX
PARTICIPATORY USER EXPERIENCE DESIGN

Design can be seen as ubiquitous, meaning that design plays a significant part in shaping human experiences and lives in numerous ways, in diverse situations and contexts. Co-creation or co-design is a design approach that sometimes is labelled Participatory design (PD). PD can be described as both an approach and an ideology, spanning a rich variety of theories, practices, analyses, and actions, as well as bringing together people from a broad variety of disciplines and practices. Muller et al. (1993) stress the core of PD being that of working directly with users in design. As Suchman (1993) puts it, it constitutes an emphasis on interaction and collaborations between those involved in performing design and those involved in using design. Today, PD in various forms has a broadened scope of everyday life issues, however, the emphasis is on co-creation in actions aimed towards making a positive change in people's everyday lives.

For the last decade, the focus of co-creation highlights user experience. For example, Prahalad and Ramaswamy (2004) describe networked, empowered, and active consumers who are co-creating value with companies. Von Hippel (2005) portray work with users in co-creative activities, aiming towards bettering businesses. Seybold (2006) discuss lead users participating in companies' design processes. Sanders and Stappers (2008) emphasize to involve diverse people in the process, and changing the focus from the product or technology, to broader societal needs in diverse contexts. As Sleeswijk Visser et al. (2005) claim, users are experts on their own experiences, and if the objective is a good user experience they should obviously be involved in the design. The role of the designer hence shifts from being a translator of user needs to a facilitator in co-design processes (Sanders & Stappers, 2008), managing methods and tools for supporting the participants' ability to participate.

User experience (UX) design involves all aspects of how people interact with a product (Alben, 1996):

- how it feels to touch
- how it feels in their hands
- how it makes sense
- what the experience of using it is
- how it fits into their settings

The goal of UX design is to improve user satisfaction through ease of use and pleasure provided by the product or service. Hassenzahl and Tractinsky (2006) state an initial attempt to move away from the traditional task-oriented human-computer interaction (HMI) approach, to that of satisfying human needs. Hence, as Kujala et al.
(2011) states, “enjoyability” is a major factor in UX design. Traditionally usability focuses on improving learnability and bettering first-time interactions with products. However, user’s frustration changes over time, and a first-time experience is not always enough. The strength of UX design is in Kujala et al’s perspective that users are involved in explorations of what constitutes meaningful and memorable experiences, and that designers based on this can go from explorations of current end-products, to co-design of future enjoyable solutions.

USER INTERFACE DESIGN
The most recognised user interface guidelines are compiled by Shneiderman (1987), Shneiderman and Plaisant (2009) and Nielsen and Molich (1990). The guidelines stemming from Shneiderman (1987) and Shneiderman and Plaisant (2009) states principles such as:

- strive for consistency
- cater to universal usability
- offer informative feedback
- design task flows to yield closure
- prevent errors
- permit easy reversal of actions
- make users feel they are in control
- minimize short term memory load

The guidelines of Nielsen and Molich (1990) brings up aspects such as: consistency and standards, visibility of system status, match between system and real world, user control and freedom, error prevention, recognition rather than recall, flexibility and efficiency of use, aesthetic and minimalist design, help users recognize, diagnose and recover from errors, and to provide online documentation and help.

Other guidelines state that for good usability a system should display clarity, visibility, and readability (Jordan, 1998). Generally, these aspects run through most of the visual design guidelines available. Visual elements that don’t add information are considered visual noise, such as ornamentation, and should be avoided (Cooper, 2014). In this view, it is also better to tone down unimportant elements rather than tone up important ones in order to avoid highlighting inflation. The page layout is crucial in both making an interface easy to use, as well as making it visually appealing (McKay, 2013). A good layout has attributes such as emphasis on important elements, clear focus on where to look, a good visual balance, and a clear grouping of related interface elements (McKay, 2013). Visual hierarchy is another aspect in a good layout. According to Tidwell (2006), the user attention should be guided by different weight of information, such as different sizes, different fonts or different colors.

DESIGNING FOR PEOPLE IN THEIR THIRD AGE
The population is continuously increasing and technology is currently pushed forward in a very fast pace. With this comes challenges for certain people, e.g. those who interact with new technology solutions that haven’t been developed based on their specific knowledge and needs. This is a challenge for many people, however, people in their third age risk having decreasing sensorial inputs, e.g. visual, speech and hearing, cognitive, memory and attention, to name a few (Johnson & Finn, 2016). Visual problems tend to appear at the age of 40. This includes difficulties in changing focus between distance and close, and seeing details etc. (ibid.). This also includes sensitivity in terms of color, particularly in the blue – green spectra, and also a decrease in vision field.

According to Maeda (2012), technology has made our lives fuller, but at the same time disturbingly full of complexity and information overload. Achieving simplicity in the digital age in his view should involve a strive for simplicity:

- to reduce – reduction of unnecessary information
- to organize – structure things so they appear fewer
- to save time – make it time efficient to use

The way to achieve this is in this view to sort, to label, to integrate and to prioritize. Finding the right balance among all different alternatives is what constitutes good design.
Knowledge makes things appear simpler (Maeda, 2012), yet it does not seem time efficient to educate all people to become digital literates. Therefore, the user interface should include learnings, being able of making mistakes, getting efficient feedback on your actions, and being able to repeat the actions. The first and foremost question should be to ask how simple you can make it, which in turns race the question of how complex does it have to be? It seems that technology advances that originates from digital literates have somehow forgotten that most people who are intended to use the systems aren’t as skilled as themselves. The computer has an infinite ability to hide functions in order to create the illusion of simplicity, it should however be used based on user insights to not create expanses of complexity. This can be described as utility, experience of quality or appropriateness in use.

Also, relevant in terms of design for use is the concept of affordance. Norman (1988) describes this as the users perceived possibility of actions, how the design communicates actionability: the quality and characteristics of being actionable.

When designing interfaces for people in their third age, there are some general guidelines. Some guidelines regarding visual design (Johnson & Finn, 2016) states that:

- legibility of essential text should be maximized
- colour should be used sensibly
- visual design should generally be simplified
- the need for vertical scrolling should be indicated
- long list of options should be avoided
- a consistent graphical language should be used
- text alternatives should be provided for non-text content
- important content should be made noticeable and easy to scan.

According to these authors, it is important to take into account that senior people tend to take longer to learn new application or devices, take longer to complete tasks, use different search strategies, perform worse on tasks relying on memory, be more distracted, have a harder time dealing with errors, make more erratic or accidental movements with the pointer, make more input errors, and they have more trouble hitting on-screen targets.
Method
Method

In this chapter, the overall project approach and implementation is presented. Firstly, there is a brief description of the project approach and rationale for participatory research activities. Thereafter follows a description of the participants in the current research project. The project process is described, in terms of the three co-design activities.

**RESEARCH DESIGN**

The project was based on a participatory design [PD] with a focus on user experience (Merlijn Kouprie & Sleeswijk Visser, 2009), involving end-users in explorations of user interface design [UID], and hence developing knowledge of conditions and prerequisite of elderly persons usage and experience of ICT, specifically for the Health-Cloud service in this project. One way of accessing user’s experiences is based on Sanders (2000) to:

1. listen to what they have to say
2. watch what they do and how they interact
3. find out what they know, what they feel, and what they dream of

In this view, when you have reached the third level, you have empathy for the user’s and their experiences. The current process was iterative, including participants in the development of a conceptual user interface design based on their specific needs and conditions. The UID of the Health-Cloud was developed in five infer-communicating steps during three workshops with a reference group. The steps were: inspiration, exploration, ideation, implementation and finalization.

**PARTICIPANTS**

Participants of the reference group were invited by contacting retirement organizations [SPF and PRO] in the county of Norrbotten, Sweden. The retirement organization recruited seven participants who all joined the first workshop. The participants age ranged from 71 to 82 years old (mean 75 years), two were women and 5 were men. Four of the participants were living in rural areas and three in urban areas. All of the participants self-rated by a visual analogy scale (VAS) sensory losses in reduced hearing, dimming eyesight, mobility, sensibility and loss of memory functioning. Reduced hearing, dimming eyesight and mobility was the highest rated score among all the participants. There were five participants in the second and third workshop due to prior engagement of two participants.

**PROJECT PROCESS**

The five steps of the methodology were processed during three workshops when the participants interacted to evolving the project results in collaboration with the research group. Before the first workshop each recruited participants received an e-mail with information and aims of this project, scheduled workshops, information of how the results would be further documented and used. They were also informed of their right to withdraw from the project and they all signed a written consent to...
Figure 1. Showing participants in action during workshop 3. Photo: Åsa Wikberg Nilsson
take part in the project. This procedure of informed consent was repeated before each workshop. All participants gave their consent to participate at each workshop.

The first workshop included the first step of Inspiration and the second step of exploration. For Inspiration and Exploration, the research group presented information of the project and it’s aims, the joint project WELD, information on UID, and importance of health literacy and empowerment, illustrated pictures of ICT in the context of health services Wiklund Axelsson (2013), and finally the Core Health Projects found in research by Björklund (2015).

In a second step the participants Explored their needs, conditions and preferences in terms of user interface design. In this step, both digital technologies, e.g. eye-tracking, and analogue techniques and discussions on different interface suggestions were used to explore what enable digital older users and special needs for persons with sensory losses (reduced hearing, dimming eyesight and loss of memory functioning) were focused. The participants also discussed user experience, based on viewing different sites with diverse visual information, text-based information, symbols and icons, colours, feedback, interactions, and personalization. This was shown in terms of two choices on each slide, in which the participants were asked to discuss and compare the different choices. Thereafter the participants were asked to discuss their insights, ideas and visions based on the 5 previously presented Core Health Projects.

The last stage of the workshop was to test three different types of user interfaces (website based, video based, and an interactive online tool) guided by eye-tracking and interviews. Eye-tracking is a method to get insights into human behaviour and product performance by recording information on where people look, in for example, user interfaces (Tobii, n.d). Eye-tracking information can be used to aid usability studies (Mankhartsberger & Zellhofer, 2005), and can provide an objective measure of the participant’s cognitive process. (Tatler, Kirtley, Macdonald, Mitchell & Savage, 2014). However, eye-tracking needs to be combined with other methods in order to provide the whole picture to the researcher, for example regarding the participant’s intentions, motivation, and comprehension (Martin & Hanington, 2012; Bojko, 2013; Goldberg & Wichansky, 2013; Holmqvist et.al, 2011).

The second workshop focused Ideation for the development of a conceptual UID for the HealthCloud. The interaction of this workshop aimed at clarifying if the five Core Health Project were relevant for the participants and also ICT activities that the participants may perform to further explore the Core Health Projects and if the participants frequently used ICT services that were not included in these projects.

The participants were also asked to more in depth discuss and present their usage and anticipated needs for ICT-use in order to support daily life, health and well-being. In this phase, the participants also explore how the core functions of the UID could be structured, in terms of preferences of responses and feedback in different user sensations and perceptions and there was also further testing of the digital technology eye-tracking.

The third workshop focused Implementation and Finalization. Based on the information generated from the first and second workshop the research group interactively developed a prototype for the ICD HealthCloud, based on the five Core Health Projects. This prototype tested the interactivity, both virtual and in real life, to promote healthy living and health literacy by different possibilities and strategies for promoting social interactions and sharing of knowledge in activities included in the core projects.

The participants also used Product Reaction Cards, an user experience design method which consists of having the participants choosing among a large number of words in order to verbalise their experience of, in this case, the different interfaces.

In a final phase the participants further discussed how the prototype could be further refined and detailed for usage to support elderly persons active ageing, health and well-being.
Results
In this chapter, the results of the different co-creative user interactions are presented as well as the final result of the user interface design. The final section includes a discussion of the project results.

WORKSHOP 1 - INSPIRATION AND EXPLORATION

The focus in workshop 1 was to introduce and discuss some general user interface aspects to get information about how this group perceive them. This was done with a focus group discussion as well as individual testing of interface aspects guided by eye-tracking and a following interview.

The participants discussed user interface aspects such as the use of pictures, text, symbols, video, and audio. In general, pictures seemed to stimulate emotional reaction among the participants. However, the interpretation of the meaning in the picture seems to differ widely. For example, a picture of a bicyclist can for one participant symbolise harmony, but for another one workout and training. The participants are more homogenous when it comes to the use of text in websites and similar. They agree that in many occasions the text is too compact and should be interspersed with pictures, and if the text get to compact and overwhelming the motivation to read through the text fades. The participants also agree that symbols do not evoke such emotional reaction as pictures, but symbols are harder to interpret and the same symbol can also mean different things. In general, they would like to see clear and distinct symbols with high contrast. The use of video, especially in websites, is not perceived as positive. The fast pace of such videos makes it hard to perceive the message in the video and makes it hard to concentrate.

The participants agreed on that the presented Core Health Project, based on earlier research, also were relevant to them for maintaining health and well-being throughout life even though the preferences and priorities amongst the projects activities varied. They felt unsure if they in any way used IT to support such health projects. Though later on in the discussion, they described using IT services for communicating with families and friends, using e-mail and social medias, making ticket reservations for traveling and amusements, and contacting health services. Most of them did not feel safe using the internet for bank transaction or buying for food with they preferred to inspect with their own eyes.

The participants in this workshop often referred to their lack of experience in using IT-related tools, however, it seems that they have more skills and experiences than they believe themselves. Many of them uses internet to search for different items that they are interested in. Some of them use Facebook and similar social media. Most of them were familiar with different user interfaces and had quite strong opinions of them. This indicates that those particular participants, although stated that they did not have to have IT skills, had digital literacy to some extent. Those who stated that they didn’t, still used a lot of different digital tools, sometimes with support of children and/or grandchildren on the first occasions.
WORKSHOP 2 - EXPLORATION AND IDEATION

The focus of the second workshop was on the services of a potential future web page should include. The participants were first asked to discuss e-health, and their current use of such services. Some said that it is difficult to use a phone to book e.g. a doctor’s appointment, “many buttons to press”, but once they had done it they thought that it was good to be reminded through text messages and so forth, saves time, they claimed.

They also discussed whether it would be valuable to be able to make own health checks online, for example blood tests and similar tests. The participants were somewhat hesitant to this, and said that it must be very simple tests, and the technology must be very easy to use. They emphasized that it could be a future possibility, not something that you should have to do: “It is still important with the personal meeting”, they claimed.

They were asked whether they currently used internet to check on health tips and such matters. One participant told that he got weights from his son, and he also installed an app that showed how the exercises should be done, and how long to proceed and so forth. It was very informative and easy to use. Still, he didn’t use it.

The participants were also a bit hesitant towards the fast technology development. They compared with bank services, and said that first they withdraw some bank services, and then people started to use internet services instead. They wanted it to be the other way around, first start with internet services, and then gradually remove personal services. Some of these participants found it somewhat difficult to learn new interfaces, for example when a bank has a certain interface and then change, they said that it is difficult to learn something new, whether it deals with learning a new phone or a new web site.

In terms of future possibilities, they discussed sensors that can feel where a person is, how much she/he has moved, if a person has fallen and so forth. They discussed if this would contribute to well-being or not. Some thought that this would be valuable at retirement homes, but the backside is that it feels like monitoring and it must be based on free-will. This should be voluntary based, they claimed. Technology must be user friendly, this would counteract loneliness for some seniors, simplify their everyday life, take care of both body and mind through keeping track of their health with help of technology. Although, they also said that relations to other people is important, and that it is difficult to get to know new people when you are older. To become part of different networks is therefore important, and be able to choose what to participate in.

Also, in this second workshop the Core Health Projects, introduced in the first workshop, was further discussed. The participant felt the projects evoking pos-
itive thoughts and feelings and that the projects were connected with one another to support the participants' health and well-being. They described personal activities belonging to different projects and how some of the activities were supported by IT or had the possibility to be so. The importance of social activities was focused, having old friends and finding new ones could be difficult in advanced age. The qualities of persons were more important than status and connections. Above all it was important to be content in one self and in one's life situation since most older persons had permanent medical conditions.

WORKSHOP 3 - IMPLEMENTATION AND FINALIZATION

On the third and final workshop, the participants were introduced to two different conceptual user interfaces, grounded in the five Core Health Projects discussed by the participants during the prior workshops, as well as the user experiences identified by the participants. The two user interfaces were labelled as A and B, see figure 2-4. The participants initial response to concept A was that it was easy to grasp, simple to use, and comprehensible. They all stated that the interface was understandable, and that the icons for the different sub-pages were clear. One of the participants were upset about the icon for family, because the persons in the icon had sticks, indicating elderly persons. This was somewhat discriminative, in this person's view. The participants discussed discriminative symbols and that they become upset when the category of older people is indicated by people with sticks and curved backs etc.

They were thereafter introduced to the Product Reaction Card method, which is based on marking words that they perceive that the solution represents. The words that the participants marked for concept A was: simple, understandable, useful, available, easy to use, engaging, meaningful, effective, fast, and enabling. This indicates that concept A was a user interface design that they experienced as useful.

The participants' initial experience of solution B was that it was easy to use, but also that it was more interesting to have images instead of icons in a user interface. Their response to B was that it was more personalized to have images, and they also suggested that you should be able to have your own images and change images every now and then. They all considered B to be structured and usable. The Product Reaction Cards were used also for this conceptual solution, and the participants' reaction was that B was: professional, usable, efficient, creative, motivating, fast, simple, intuitive, easy-to-use, friendly, meaningful, available, understandable, wanted, consistent, controllable, and reliable, all indicating that concept B gave a good user experience.

The participants expressed “enjoyability” with both concepts, stating that they never thought that all of their different and diverse needs and preferences could be joint in a single web site. All of their prior expressed needs now seemed to be forgotten, as if they were surprised that we actually had payed attention and listened to what they had stated as important in terms of the service content and the design of the user interface. They said that they were impressed by the interface design, although, its actual content and design were factors they had expressed themselves. Both interfaces were designed to be as simple as possible, but not simple in terms of being “designed for dummy’s”; rather to be consistent, easy-to-use and straight-forward. The simple design was also something they seemed to appreciate. Another aspect was that of the possibility of personalization. The participants expressed a need for exchanging pictures to your own preferences, and also to be able to variate the user interface in terms of sizes of text fonts, images, and content. One participant for example expressed that if we could fit the SPF websites as a link to the HealthCloud page, he would be more than satisfied.

Over all the five Core Health Projects supported the idea for the HealthCloud interface, and served as a clear simple design that evoke positive feelings and had possibilities to promote health and well-being. The participants also suggested that there should be two additional projects added to the interface HealthCloud, one “Personal”. e.g. “Lotta -My self”; and one for “activities that were important to keep track of” e.g. engagements such as PRO meetings.
Figure 2. User interface concept A. UID: Jörgen Normark

Figure 3. User interface concept B. UID: Jörgen Normark

Figure 4. Showing 3 layers of user interface A. UID: Jörgen Normark
The overall objective in the current project was to empower senior person’s ability to take control and affect their own health and well-being with support of a digital service.

The project aim was both to develop knowledge of senior users experiences of interface design, and services promoting healthy and active ageing. The outcome is a digital conceptual user interface that needs further refining and user testing before launch, however, some important aspects have been identified. The importance of co-designing digital services and interfaces with actual users to emphasize their insights, ideas, and visions is one of them. Furthermore, the participants supported the structure and content of the five Core Health Projects. They stated the activities within these projects as relevant for keeping them healthy and active, with the addition of a personal page and an important activity page.

The results of this project may contribute to further development of E-health, and may also contribute to develop digitalization of society, smart regions, and smart cities. The developed HealthCloud will be accessible for senior persons both in urban and rural areas in Sweden. E-health that is offered today is based on health professionals processing data provided by senior persons and professionals offering solutions to the senior persons’ health issues. By using the interactions and services available by the HealthCloud, senior persons will be empowered to influence a healthy living. They will be provided with opportunities to interact in a community cloud and develop capacities to engage in activities relevant for healthy livings and active ageing.

A result of this project, the UID of HealthCloud, contributes to design of enabling ICT, by the increased knowledge of how people experience utility, the quality or appropriateness of a design in use, and affordance, how designs assume meaning in the ways they are used. This was clear both in the participant discussions of the Core Health Projects, and how they could be implemented, and in the discussions and testing of the user interfaces and their content.

Another outcome of this project is the promotion of design based on user experience, rather than technology development, and hence contribute to knowledge of how to utilize and improve the usability of ICT tools. in the long run this contributes to knowledge of how smart and sustainable cities and regions should be designed, i.e. based on resident’s user experiences and active participation.

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