Effects of Using Care Professionals in the Development of Social Technology for Elderly

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Abstract. In some situations when developing technology for elderly, the intended users are too fragile and cannot participate themselves in the design process. The aim with this study was to investigate the use of care personnel as mediators for the elderly in the design process. The system that was developed was an information and communication technology system for sharing information and for keeping in touch with friends and family. Initially the care personnel misunderstood the need of technology among the elderly. During the project the care personnel changed their view and suggested new ways of using the technology. When the devices where placed in the rooms of the elderly the usage was low, but when the system was used in the dining areas as something to gather around, e.g. to show each other pictures of friends and family, the system became a success.

Keywords: Social technology · Welfare technology · Elderly · Community-based participatory research · Co-participatory design · Community networks · Professional-patient relations

1 Introduction

There is an increasing social isolation among elderly today. Loneliness and social isolation can, however, be addressed in several ways using different interactive electronic services. One of the most important issues in reducing social isolation is the existence of social networks [1]. The possibilities to communicate with friends and relatives through computers and Internet can increase the social network, and social isolation can be reduced [1, 2]. Several studies have shown the importance for older adults to be able to communicate with family members and friends enabled through new communication technology [2, 3]. Although it may seem different, in Sweden the Internet usage pattern does not differ between older and younger daily users; Internet is mostly used for e-mailing, searching news and gathering practical information [3]. Technology also provides opportunities for older adults to gain new knowledge from other generations. The Internet usage among older adults is increasing [3] and the possibility to communicate with children and grandchildren through Internet and e-mail is important for older adults. Among many elderly, Internet has also become an

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important source for getting health information. For elderly using digital health information this is an opportunity to increase the feeling of control over the own health [4]. It empowers people in terms of both being more educated in the area, and of having the possibility to share experiences with others [5].

Also, the quick development in the area of mobile communication in the last decade has provided many new possibilities for communication and for sharing our everyday life with each other. Many new services and applications are targeted towards elderly and have interfaces that are considered easy to use. However, daily usage decreases from generation to generation as a function age. The older a citizen is, the less he/she uses Internet services [3]. The low rate of usage at high ages could become a society problem, where more and more public services are accessed via different communication technology tools.

The digital divide could be addressed in several ways [4] by different and alternative (non-traditional web browsers) information and communication technology (ICT) solutions. Unfortunately, literature reports on numerous failures when trying to deploy novel technology to elderly user groups. Some explanations to this could be that the services are not perceived to be meaningful enough or that they, despite efforts from the developer team, are perceived too cumbersome or difficult to use. A further challenge when developing services for the oldest group is to involve the users in the design process.

In this action research project, elderly care professionals were invited to co-design novel services as they are experienced in age-related impairments. The services were provided through an innovative mobile communication device connected to the TV, which worked as an interactive large screen remotely controlled.

The objective of this work was two-fold. The aim of the project was to investigate how the device and the social interactive applications could be further developed and appropriated among elderly at a nursing home, while at the same time the researchers developed and applied an iterative co-design technique with engagement of older adults and the care personnel that supported in conveying the needs of the elderly.

2 Research Approach

Present action research study adheres to Cooperative design [6, 7] as one of the Human-Computer Interaction (HCI) research theories that regards system development with user participation and that considers designing a social process. From research literature we know that usability aspects should be brought in early in the development process [6, 8]. Previous research also presents several methods to engage users with the aim to create future environments, e.g. future workshops [9]. Other methods to bring future needs analysis into system development are iterative prototyping and scenario-based design, preferably applied together with potential users in a collaborative approach [7, 10].

The degree of user participation may vary. Regardless of activation degree, in cooperative design developers and practitioners/users are seen as actively cooperating partners. Together they aim to reduce uncertainty and risk in the development of novel systems, where a detailed conception of exactly which future needs should be supported, often lacks [6, 9].

In this study the approach was to involve the end users as much as possible, but when this inclusion was not possible also involve the care personnel. However, this is only an option when the information not can be gathered from the elderly themselves. Using older adults' extensive experience when trying to meet their needs can be more successful for promoting a new product or service, rather than relying on interaction patterns based on the computer paradigm [11].

This work aimed to increase the competence of the municipality care personnel while at the same time increase the knowledge of the industry partner of the end-users of their system. By collaboration with the research team, the company also got a chance to improve their methodological skills. In this environment, problem-owners, researchers, elderly users and developers of novel ICT services worked together in a user-centered and participatory design approach [12].

3 Method and Materials

The project (called IPPI, as the device involved), in which this study was conducted, was carried out during 2010 and 2011 and was financed by the Swedish agency for innovation systems, Vinnova. The work was a part of gathering knowledge regarding social technology tools and interacting eHealth services among different older user groups and in different contexts [13]. As a part of the development of a co-design technique, present study investigated the usage of elderly care personnel as mediators of the elderly users' needs. This work was conducted during the implementation and testing phase of the IPPI project together with old adults and care personnel at a nursing home.

3.1 Study Site and Participants

The nursing home (Väsbygården) was situated outside Stockholm, Sweden, in Vallentuna municipality. It consisted of four departments of which all participated in the study, although to various extent. Each division contained approximately 20 apartments and a dining room for meals in common. For each division, an employee responsible for the IPPI project was appointed by the operations manager. The project team at site further consisted of the registered nurse, the janitor, the reception and the nutrition managers as well as the operations manager. In all, there were nine care personnel responsible for different parts of the project execution. Project members from academia (the authors of this paper) were working closely with the development company who contributed with a project leader, a test leader and a developer. Five end-users were involved as test participants in the project. Other elderly tried the services but not as frequent users. The project team met approximately every two weeks during the latter part of the project, from January to June 2011 and there were both internal and external funding to reimburse the nursing home for time loss and to hire substitutes for the care personnel when necessary.

According to our knowledge, it is not common that a municipality project in elderly care is so well equipped with care personnel and resources as this project was. The care personnel took on different roles; recruiting elderly, information to the relatives, display

of food or menus, information about activities for the residents, teaching activities to the rest of the care personnel as well as medication and technology experts. These responsibilities contributed to the creation of new content and new services of the device. The entire setting was prominent and cheerful and all involved care personnel was appointed as "IPPI ambassadors" in relation to the residents or their relatives.

3.2 Study Design

In general, there is a need to develop technology towards the demands of older adults in the future. There is, consequently, a need to develop technology towards elderly already today; however for some people in this target group it could be difficult to imagine possibilities with the new technology. Many of the elderly also suffer from age-related decline, both with respect to physical and cognitive abilities that make it difficult to be involved in the design of new services and new technology.

Inspired by Boyd-Graber et al. [14] and their work regarding using people close to the intended user in the design process, our aim was to investigate to which extent people familiar with elderly persons' presuppositions could contribute regarding needs and usage of technology. In the work conducted by Boyd-Graber et al. [14] staff that worked close to users with aphasia was involved in the design process. This study showed that overall it worked well since supporting staff was very familiar with the user groups' needs and demands. However, some difficulties were found regarding the testing of prototypes since it was impossible to imagine another person's usage context all the way and in all details [14].

One of the goals of the IPPI project was to develop an interactive ICT system for elderly users with possibilities to share information and to keep in touch with friends and family. In this case, the majority of the elderly at the nursing home was too fragile and they could not participate themselves in the project. Hence, in the study we investigated the use of care personnel as mediators for the needs of the elderly. Contradictory to the Boyd Graber et al. [14] study, focus was not on the design process, but particularly on the needs and actual use of social technology. The study was explorative in a sense that the authors wanted to get a first understanding of to which extent care personnel could represent different categories of elderly in terms of attitudes towards and usage of technology.

Workshop Activities. On an every two weeks basis during 6 months, the project team was gathered in 2-4 h workshops with different content. Once a common agreement on vision and goals was reached, other workshops iteratively handled:

- the needs and demands of the elderly,
- the needs and demands of the care personnel,
- the needs and demands of the relatives,
- eHealth and communication services,
- potential improvements of the device and services.

The researchers and the industry partner's project leader planned and lead the workshops together, using different techniques. Personas [15], brainstorming

techniques [16] and semi-structured interviews were used to gather information from the different groups about themselves, but also to gather what they thought about the needs and attitudes of the other groups.

Every meeting had a formal agenda, always containing: (1) What was decided last time? (2) Where are we now? (3) Where to go next? (4) How to get there? In that way, a truly cooperative work was established and the process was transparent to all participants.

Personas were created by the care personnel. This method was previously successfully used by one of the authors in another project [17], by then in a clinical setting by home care personnel. At that time, the home care personnel agreed to mix medical conditions and characteristics of deceased persons they had been involved with and in that way they created completely new personas, but with the possibility to remember those persons and their characteristics and behaviors. In the study presented here, the care personnel worked with a template of characteristics such as age, gender, social situation, preferred hobbies, previous life in terms of work and family situation as well as medical history, current conditions, medication etc. The only restriction was that the care personnel should create three personas describing different categories of elderly living at a Swedish nursing home.

Brainstorming sessions were held with the care personnel. The aim with these sessions was to suggest new relevant services for the device.

Information from the elderly was gathered by the researchers through individual semi-structured interviews, which often were held during a conversation over coffee. Although the company staff had made a good impression on the elderly, we choose not to involve them in the interviews in order to let the users speak freely about the device and its services.

The collected material was analyzed with regard to differences and similarities; what the elderly had described and what the care personnel had thought about the elderly. Although the care personnel knew the residents well, the comparison needed to be performed on a more general level and the researchers turned to the respondents once more to verify that the interpretations and abstraction passages were correct.

3.3 The Device

Research suggests that use of a TV as platform would reduce new users' uncertainty [2, 12]. Based on this previous research, the TV-platform was believed to have a relative advantage over computers and mobile phones in terms of users' self-reported motivations for starting and continuing to use the system. Hence, this project was built around an innovative mobile communication device called "ippi" (Fig. 1) that was connected to the TV, which worked as an interactive large screen remotely controlled.

When the device was connected to an ordinary TV, the TV could receive and send photos, videos, sounds and text messages to and from mobile phones and computers. The technology behind was based on the mobile phone network for communication. There was a SIM-card in the device, requiring the device to be placed within GSM coverage. It was also possible to send e-mails through the device.

Fig. 1. The novel communication device, called "ippi", connected to the TV-set

The device was considered easy to install; it was plugged into the TV and to the power connector. When a message had been received, the device flashed like an answering machine. The message could be opened with one press on the main button of the remote control. The user of the device could answer the message by writing a text or by sending a voice message. The device could be used for communication between friends and relatives, but also for care-giving purposes, e.g. to inform the older adults which nurse was scheduled to come, which social care services or other activities, which medication etc. were scheduled for that day.

The device had been iteratively developed over three years. The studied (and latest) version consisted of three different user modes addressing different user groups, as designed by the development company. User mode 1 consisted of a limited amount of functionality and was aimed to address the basic needs of elderly without technology experience living at nursing homes. User mode 2 was targeted to a more active user group that still lived on their own, but with nursing or home help support. Some of the most advanced functionalities had been closed to make the device easy to use for people without technology experience. The aim with user mode 3 was to provide full possibilities for mobile communication (text messages, e-mail, sending pictures etc.) for a cognitively active senior living on their own, with or without support from the municipality. These target groups were handled in different studies in the project. In the case study described in this paper user mode 1 was initially used.

Five devices were placed in the residents' apartments and five in dining areas, one in each department and one in the reception, to provide the possibility to refine broadcasting services at the nursing home as well as electronic communication between friends, relatives and the residents.

4 Results

Meetings were held with elderly and workshops with care personnel at the nursing home. The different perspectives of the elderly and the care personnel are presented below.

4.1 Services Suggested and Developed for the Device

The intended main usage of the device was social interaction with friends and relatives, but many other suggestions for services that could be useful for elderly and care personnel came up during the project. For example information services as news, sports and TV-guides were suggested. An important condition of these services was that they should be context-dependent so that they would provide information that was not possible to get elsewhere, i.e. in many cases a local anchor was desired. Local information about activities at the nursing home was a service that was suggested and quickly developed and deployed. An administrative web site of the device was used for broadcasting personal invitations to activities and to administer sign ups for these activities. This service turned out to increase participation at the nursing home activities. A slideshow (shown in the reception) with photos from these activities also turned out to be much appreciated by the elderly.

Based on ideas from the elderly and the care personnel quizzes, riddles and a memory game were developed and introduced at the nursing home. These services were mainly used when the elderly were gathered at common meetings and support was given by the care personnel. There were several other suggestions for services to develop, such as making appointments or order food. However, in an evaluation the most desired services turned out to be the ones that supported social activities, therefore the development company decided to firstly focus on these services.

4.2 Developing Personas with the Care Personnel

To get descriptions of different subgroups of users, a task was given to create a number of personas that represented elderly living at a Swedish nursing home. The care personnel were responsible of the development of the personas. The participants started their work with the personas based on the initial characteristics and thought of some of the elderly living at the nursing home and created the persona descriptions from them. The task seemed to be very fun and engaging. The descriptions were developed with very little input from the researchers, whose task was to write down the descriptions of the personas for further use.

Important in the work was to create a balance between describing real characteristics and behavior and at the same time avoiding descriptions that potentially could point out someone particular. Compared to persona creations in the other project previously mentioned [17] using living role models for the personas was a delicate task. When reflecting upon the two choices; if possible, creating personas using memories of deceased residents was considered preferable by the care professionals, with regard to both ethics and time consumption. The development of the persona descriptions however forced the care personnel to reflect on their residents. To think of a person as he or she used to be was a learning experience, as well as to reflect on the entire person in a salutogenic manner, beyond all medical conditions. It also contributed to gaining a new perspective of the residents since the care personnel was forced to think about them as possible users of new technology.

4.3 Attitudes Towards Technology Among the Care Personnel

In the workshops with the care personnel we asked the participants about their own attitudes towards technology, and how they perceived the attitudes towards technology among the elderly. They all answered positively with respect to the care personnel's own attitudes towards technology. They all had own computers and smart phones, and they were positive towards using ICT in the daily work with the residents.

Regarding how the care personnel perceived attitudes and needs for technology among the elderly the results were less encouraging. Compared to the answers given by the elderly themselves, the care personnel underestimated the technology experience and overlooked that many of the elderly once had worked with technology in different environments. Since the care personnel placed large focus on what they thought about previous experience of computers and its importance for using the device, they initially selected test participants for the project based on technology interest and computer experience. This turned out to be unfortunate, since the selected persons already were included in the digital world and did not see any need for further devices providing the same services.

It was clear that the care personnel did not quite understand for which resident the device could be useful. It was not, as the care personnel had expected, the computer savvy elderly that needed the services the most. On the contrary, when the devices were given to elderly that had no previous experience of new technology but were curious to get a communication channel with people outside the nursing home the new technology became a useful tool. This result is in line with previous studies [2] and may show that sometimes care personnel act as gatekeepers preventing without any clear reason that the elderly are exposed to new technology.

Finally, in the discussions with the care personnel it was also clear that many thoughts about the potential need for technology among the elderly were discussed from the care personnel's point of view. The technology was discussed in terms of how it could be useful in their work with the elderly, rather than how it could be useful for the elderly themselves.

4.4 The Perspective of the Elderly Living at the Nursing Home

The number of elderly participants varied during the project due to illness, changed living conditions and misleading expectations. One expectation was that the device was a tool to increase social interaction. New communication tools often merely provide a new channel for social interaction. The sender and the receiver need to be there. In one case, the resident wanted to communicate more with his family, and was consequently disappointed when the device did not increase this communication. However, for many of the elderly participants the technology strengthened the contact with family and friends, especially for those who had relatives living far away.

In meetings with the elderly it was shown that they appreciated to get messages from their grandchildren, especially when sent to a TV in a public area so they could show other people the messages and the pictures. The possibility to share information about children and grandchildren turned out to be one of the most important needs for the

device to fulfill among the elderly. By using the device together with others or with care personnel, there was also the possibility to get support when answering the messages. This way of using the device in public was not at all considered by the developers. From the beginning, the device was supposed to be used by only one person, or by a couple. This novel usage scenario was taken further with different folders created for each user and by informing relatives that their messages were shown in public. This also forced the developers to rethink their idea of user modes, as easy access to individual settings became important.

Another appreciated category of services was "games and quizzes". These services were also used together with others in dining areas or at meetings. Many of the residents desired content that was related to previous times or to history. Personal historical information or information that the person felt he/she had a relationship to was especially appreciated. Other historical content were, at least by some participants, described as not relevant and uninteresting. This reveals another preconception suggesting that most elderly people are interested in history or in things that have happened in the past.

With respect to the device and its interaction ways, some elderly thought it was difficult to use the remote control, especially if one had difficulties with the fine motor skills of the hand. Further, the use of the remote for messaging instead of a keyboard was, by some elderly, perceived as inhibitory since it introduced an unequal situation where the elderly person could not communicate at the same level as the person on the other side (friend, relative etc.). This experience places a focus on the negative aspects of trying to develop easy-to-use devices for elderly. Ways of producing text that are common today was preferable compared to this device designed for "easy clicking".

Further, the user modes had a good intention, but it was questioned and caused irritation. When selecting a user mode for someone, this is done based on stereotypes and without understanding the situation of this person or his motivation to use the device. This can be wrong in both ways, either a too complicated interface is provided or an interface that will be perceived as childish and without possibilities to access all the functionalities that this person regards as needed. The entire concept of user modes needs to be reconsidered. The elderly demand easy access to settings in order to individually build up shortcuts to meaningful functionality instead of pre-designed user modes.

4.5 Evolution During the Project

In the beginning of the project large efforts by the care personnel were placed in getting the devices out to different users. After a while it turned out that the devices were not used as much as expected. The users had got stuck in handling the devices or they lacked the motivation to use them. There were also examples of elderly not having anyone to communicate with through the device.

This initial phase led to the insight among the care personnel that they should aim for participants with rich social network rather than participants with computer experience. The engagement of relatives and grandchildren became a key component, and work with involving the relatives started at the nursing home. Lists of relatives and

contact information were gathered and the elderly got help with creating contact lists on their devices.

However, the key to a successful usage lies within the social interaction; that the user actually receives interesting messages and photos, and with a certain frequency. In an evaluation regarding contact with relatives and friends, it turned out that the contact had increased a bit, but not that much as expected. The participants had too small social networks for using the device for communication only with people outside the nursing home compared to their expectations.

Based on an idea from the care personnel more devices were placed in the dining areas of the nursing home. This turned out to be a success and the general usage increased. The main benefit of the device turned out to be social interaction between the residents, and not as expected, interaction with people outside the nursing home. This resulted in positive effects by both elderly and care personnel, when realizing how technology can be used and appropriated when elderly users were given the opportunity to start using novel technology in their own ways, as stated previously by e.g. Wyatt [18] and Östlund [2].

5 Discussion and Conclusions

The aim with this study was to investigate the use of care personnel as mediators for the elderly in the design process. The complexity of the design process is acknowledged, especially when developing towards end-users with whom it is difficult to relate and whose world of experience is different from that of the researcher/designer [19]. The agile co-design method and the care personnel's growing insights about the user groups' need for social technology finally led to succeeding in involving user groups with different impairments and to keep their interest throughout the design process.

However, several initial misunderstandings with respect to the users' preconditions and needs led to a loss of interest from the users. The first selection of participants done by the care personnel were performed based on computer experience, which turned out to be completely wrong since the persons using computers did not need an additional device. The role of the care personnel in the work with selecting elderly participants could be viewed from several perspectives. It could be argued that they protect the elderly from "being used" in different projects and by companies developing products. On the other hand, when the participation of the elderly is arranged by care personnel, it might be harder to convey the elderly users' needs in order to influence the development of new products and services. There is no legal barrier for approaching the elderly users directly, however to be able to conduct a fruitful project within a nursing home, the "externals" have to work with the "internal" care personnel, and as shown in this study the cooperation with the care personnel was irreplaceable from many other perspectives. Similar to Boyd-Graber's results [14] the mediators, in this case the care personnel had difficulties in understanding usage context. Although the study initially showed that the care professionals had difficulties in understanding which elderly could benefit from using the device and which services could be meaningful for the elderly, during the project the care personnel broadened their view of the elderly person as a

user of technology. When the care personnel could see other social needs, the technology became used in a meaningful way.

The involvement of the care personnel led to new ideas not thought of initially. The device was originally intended as a device for single usage. But a success factor was achieved when the care personnel placed the devices in the dining areas and used it for social activities and for sharing information together. The possibility to show pictures of friends and family supported the need for a contact with the life outside the nursing home, showing that the residents were more than old patients. From this perspective, the device was not viewed as proprietary in the same way as a mobile phone is an individual property. Similar to the conclusions by Barkhuus and Brown [20], the device became something to socialize around and the TV metaphor shines through with its possibilities to gather around something in common.

This work resulted in many lessons learnt. One could argue that several aspects of this could have been done differently, but it was the hands on experiences that led to the actual insights and the successful results at the end regarding where and how to use the device. As a result of the increased usage in the dining areas of the nursing home, the authors conclude that it may be more fruitful to dare to provide the novel technology in different settings to see what happens, rather than trying to figure out impaired elderly citizens' needs through someone else. A current trend is that much work regarding service development is conducted from a broad perspective in test beds with a large number of ongoing projects only in Sweden. In these environments it will be particularly important to take into account results like the ones from this study, showing that it is not enough to ask care personnel about elderly users needs for technology. The users themselves have to be involved regardless of difficulties related to physical and cognitive limitations.

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