A LivingLab Approach to Involve Elderly in the Design of Smart TV Applications Offering Communication Services

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Abstract. Aging is a new step of life with a lot of changes that could be related with physical, cognitive and social frailties. Rather than addressing autonomy and dependency issues for which a variety of assistive technologies has been designed, our aim is to define how ICTs could alleviate elderly loneliness, in order to cope with their social frailty. We make the hypothesis that TV is a good medium for this purpose and we design Smart TV applications dedicated to foster the social interaction among elderly. We adopt a living lab approach, which assure us of an early engagement of the end-users.

Keywords: Elderly, Online communities, Design, Living lab, Smart TV.

1 Introduction

Nowadays, elderly are encouraged and are willing to stay at home as long as possible, rather than entering institutional care. This issue has been addressed in several research initiatives focusing mainly on the development of a variety of assistive technologies. From our point of view, ageing well cannot be reduced to physical and cognitive frailties and technologies have to tackle the quality of life of the elderly by improving their psychological well-being and self-esteem.

Extensive research has established the strong relationship between social isolation and health. Even, recent studies have showed that the lack of social relationships influences the risk of mortality for aging people [1]. Older adults may be particularly vulnerable to social isolation and diminished social network because of transitions from work, loss of a spouse, and the onset of illnesses that limit social participation. Older adults with poor or weak social networks are 60% more likely to develop cognitive decline due to isolation or high stress levels caused by the death of a spouse [2]. Social isolation and the gradual reduction of the mobility and autonomy lead older people to depression, which could have a fatal impact on their health and longevity.

This paper charts a work in progress in the frame of the European AAL project FoSIBLE¹. This project aims at providing technological support for social interaction among elderly people.

In the following, a description will be given of our research context and issues, the adopted design methodology and the involvement of elderly people in the design process. We explain user sampling and how interviews were done in France (the end-user association which is one of the partners of the FoSIBLE project is French). User requirements are presented in the form of result synthesis and design implications. We conclude by describing the derived services and perspectives to adapt usability testing to suit our selected participants.

2 Online Communities and Social Support among Elderly People

Interacting with other people, participating in groups and social relationships are critical to people's well-being [3] [4]; social relationships support social well-being directly as well as indirectly by increasing self-esteem [3]. Social engagement, which refers to making social and emotional connections with people and the community [5] is increasingly being seen as critical to health and general well-being of elderly [6].

A means of fostering social interactions and enhancing social connectedness is to make use of technologies that enable individuals to access information and to communicate with others. In particular, providing individuals with the opportunity to use the Internet may be one means of reducing social isolation because it offers the opportunity to increase contact with others, to communicate with new social groups and to pursue old or new interests—in essence, to reconnect with the world in a new way. This, in turn may have a positive impact on psychological health [7]. Research results emphasize the potential of modern technology to help reducing the risk of social isolation and compensating disabilities [8][9]. This body of work has shown the potential of these services to enable older adults to keep in touch with their social network and to improve their quality of life.

So, contrary to some critics addressed to the Internet, it does not pull people away from face-to-face contact, making them less sociable, less able to relate to other people. In contrary, virtual communities could help promoting social inclusion among elderly [10]. Online community involvement encourages greater social contact via other means, especially face-to-face and telephone. In fact, the engagement in the online community increases the involvement of the members in the offline community [11]. Moreover, older adults friendships have been found to contribute to psychological well being of older adults in more positive ways than family relationships [12]; elderly participating in age-designated online communities appear to value personal recognition, along with the opportunity to learn from peers, and to interact socially with members of their peer group. By asking their peers in forums and chat groups, they may readily get access to the help they need.

¹ Fostering Social Interactions for a Better Life of the Elderly.

Many online communities involving elderly have been studied. One of the largest virtual communities for elderly is the Australian GreyPath, which offers various available options, such as forum, blogs and chat rooms. In interviews [13], members of GreyPath frequently expressed feeling like they belong to this community of people who share their life experiences and with whom they could discuss things relevant to their age group. The assumption is that perceived friendliness will have a positive effect on the elderly's attitude toward using a social platform.

3 Research Issues

Within the FoSIBLE project, our researches are devoted into creating services for elderly by rethinking the use of well-known existing technologies and to broaden their scope to be more affordable by older people.

The questions that arise are related to the role of technologies to cope with social isolation and are methodological:

1. Could we consider the development of innovative services based on an interactive Smart TV platform as a solution for elderly' social isolation issues? In general, elderly are reluctant to use computers and most of them consider computers as a working tool rather than a communication media [14]. We suppose that TV is a good alternative for the elderly reluctance about using computers. Moreover, knowing that their relatives are watching the same program than them could be a good opportunity to start a discussion whereas it is not always obvious for them to start an interaction, as they may be afraid to disturb.
2. Acknowledging that it is technically possible to develop online applications for social interaction among older people will the feelings of mutual trust and of belonging be sufficient to build virtual community among elderly who are used to face-to-face interactions?

We can find excellent ergonomic guidelines to support the design of interfaces for the elderly and to help developers in building applications for interactive television [15], [16]. The use of these guides provides a real added value in terms of accessibility, however it does not reflect the functional needs of the future users and it is not focused on sharing among different stakeholders. Thus, designers do not have any tool allowing them to focus on the social aspects of interactive television applications, even if there is recent research that attempts to provide answers to this issue, including Geerts and Grooff [17], who introduced heuristics to support the social practices through interactive television services. It is essential for our research to have effective methods to interact with elderly end-users and to collect data on their needs concerning relationships. Then, how could we adapt the established user-centred methods for developing innovative applications for elderly people accessible via TV? More precisely, how these methods could be adjusted to allow us to effectively gather the expected needs of the elderly in terms of social interaction[18]? Having in mind

that a real-life experiential environment allows all stakeholders to concurrently consider both the performance of a service and its adoption by users at the earlier stage of research and development, we have adopted a Living Lab approach.

4 A Living Lab Approach for User Centered Innovation

Direct and autonomous involvement of the future users in the technical design of functionality and in their evaluation is needed to promote a more proactive role by bringing ideas from their experience, practices desires and frustrations. Such participation ensures that a broad range of interests, needs, and values are addressed in the design work. For so doing, we are adopting a living lab approach. It will allow us to put the users' perspective at the forefront of every design decision. The real challenge of adopting a living lab approach consists in involving all the stakeholders in the design process by taking into account the micro-context of their everyday contexts for discovering emerging scenarios, usages and behaviors. A living lab approach is particularly promising due to the opportunity it gives to try out, and obtain user feedback on services at different levels of development, where relatively large numbers of users may be involved in the innovation process.

We have established a small-scale living lab. Services access was given to a relatively small number of users and the feedback loop between users and designers is made as short as possible. Such approach will enable us to learn from older people what functionality and attributes are important to them, what motivates them to use a product or service, and what factors would hinder the usability, as well as to conceptualize how parts of older people's lives could be improved by the use of technology. It is also important to be aware of the context provided by older people's lives, and to discover when technology should be introduced and when its introduction would have a negative effect on the older person's quality of life.

4.1 Involving Elderly in the Design Process

Older people are frequently perceived and portrayed as being resistant to technology. In fact, some of them are willing to accept novel digital technologies into their lives. The issues that arise with acceptance do so because the ways in which older people construct their decision to use or not use these technologies are fundamentally different to the ways younger adults do.

Designing digital technologies for older people is not simply a matter of addressing the immediate consequence of the most obvious functional impairments. In practice, the designers are ill equipped to design technologies for older people [19]. Inappropriate design is a mechanism through which society disables people with impairments by ignoring them.

End-Users Selections Process

For the selection of the potential end-users, we organized a meeting which took place on the conference room of Les Arcades (the end-user organization which participates

in the FoSIBLE project), in Troyes (North- East of France). The participants received an invitation letter from Les Arcades, announcing the purpose of the FoSIBLE project. During this meeting, we presented the project. Two brochures were made for this occasion and given to the participants. One gives a general overview of the project and the other includes a set of usage scenarios of social television, so that participants can get an idea on some potential opportunities for using the system that we intend to design.

The involvement of the end-users is based on voluntary participation. Ten volunteers were recruited, eight women and two men aged between 65 and 90 years. Two Participants were never married and the others are widowers and do have children and grandchildren. Almost of the participants do not suffer from chronic physical disability except one who suffers from arthritis affecting her hands and feet. Four of them are basic computer and Internet users.

The volunteers did not feel isolated and so not really convinced that the project objectives are related to their situation and directly relevant to their interests. But, they stated that they were widely interested in new technologies and defining services which could be helpful for the future. Understanding an older person's interaction with a design depends on the older person showing realistic levels of motivation and this was a consideration in recruiting our volunteers.

Two of the participants quitted the project before the in-house rollout. One because of family issues with their children and the second was afraid not to be able to perform the experience. She argued that she is ok with her TV and does not want a new one.

A Set of Personas

Personas [20] are user archetypes whose goals and behavior patterns are well understood. Personas help to visualize and imagine the typical and realistic usage workflow and environment of the real user. Design for the archetype conduct to satisfy the broader group of people represented by that archetype. We defined a set of personas from the first series of semi-interviews with the participants [21]. Their description includes behavior patterns, goals, skills, attitudes, and environment, with a few fictional personal details to bring the persona to life. Such detailed persona is a key to the suppression of any tendency for the developers to usurp or distort the real end-user lead to the situation where developers make products solely based on their own interpretation of the older person's needs, a solution that can be ineffective and patronizing.

4.2 The Existing and Expected Use of TV

The interviews revealed the picture of the daily activities and current use of existing technologies in the daily life of our participants. The obtained information also provided us with design implications and user requirements.

TV as a Communication Device

Face to face social interactions mostly take place in societies, and especially in Les Arcades. The research confirms that certain relationships appear to reduce subsequent

loneliness: going to church, volunteering, seeing friends or neighbors, and talking with them on the phone. Interviewees expressed needs in relation to the use of their TVs to allow sharing real-life moments: grandchildren making them drawings, sharing comments during watching their favorite programs and also after (water cooler effect) instead of doing it on the phone. For those who have friends at the retirement house, they would appreciate to communicate with them through television (as they say TV is the main occupation in the retirement house). The idea of communicating with other people than family or friends to discuss various topics (television programs, shared interests) seems also good opportunity from their point of view.

Features have also been proposed like recording broadcasts or movies in order to share them afterwards, and searching for information. We also note that participants focus on sharing and communicating about their activities rather than around the TV programs.

Reflecting the situation that many of the elderly had to give up their former hobbies, it would be interesting to offer them media supported possibilities to help in doing this hobby again. This could be constructed as some coaching activities or by virtualizing the hobby, for example online book club. By those activities we could build up social communities which could lead to a better social integration of the elderly.

TV for Collective Activities

In terms of cooperative activities, our interviewees proposed some very interesting features that would be useful in their daily lives and would help them feel better:

- They would appreciate to learn things on television and to share their comments and impressions with others – for instance exchanging recipes during or after a cooking course. They would also like to exchange reading tips and to share advices.
- They would enjoy participating to dedicated and tailored sessions on television (e.g. yoga), and especially virtually attending to sessions at the same moment than their friends from Les Arcades.
- They would enjoy virtually sharing games (crosswords, sudoku, bridge) with their relatives and friends.
- They would like to benefit from on-line poems written by one of their friends.

Another participant also mentioned the importance of common interests. For example, a support group for those suffering from a health issue, or for informal caregivers.

Usability Issues

Participants expressed the need for more accessible and less complicated interfaces than computers. About control interface, participants who do not have disabilities think using a keyboard would be possible but not very practical. They would prefer a digital tablet with digital pen, even if they find that the voice control is also a simpler

interface than the keyboard. The digital control interface could be used for collective games as crosswords, puzzles or sudoku, and to exchange drawings with small children. For the participant suffering from arthritis, the digital tablet with digital pen is also difficult to use.

Given mentioned requirements results, we here summarize the translation of the collected data from the study into functionalities by having in mind present technology possibilities and expressed user needs.

4.3 Prototypes and Derived Functionalities

Applications implementing expressed needs by our users are developed on a smart TV platform. Smart TV² is a set of web-based services running on an application engine installed in digital TV connected to the Internet. A Smart TV application is a special type of widget that is implemented on a browser and runs on the TV screen. Viewing an application is very much like viewing web pages using a web browser on an ordinary PC. Screen resolution, hardware specifications and remote controller make differences between applications and web pages. An application is a web page consisting of HTML, CSS and JavaScript. The smart TV service makes possible to extend the functions of the TV, so that users can obtain useful information and interesting contents on their TV screen.

Combining the possibilities offered by this technology and the collected data from the end-users, we have identified that the following services would be helpful for the elderly:

- Awareness services through the use of a “buddy list”
- Synchronous communication services: being able to chat with some “buddies” when looking at the same TV show.
- An asynchronous communication service taking the form of integrated clubs organized by interests. Thus, new communities of interest could arise which are able to build or expand their knowledge collaboratively.

The users access the platform by widgets. The background is slightly transparent so the image of the TV program can still be visible. On this platform users will be able to use a tablet PC (figure 1) as an additional terminal to navigate on the TV menu, but also to enter text. The tablet can additionally be used to display messages, when the TV is switched off or to be able to read messages in another room (e.g. read a recipe sent by a friend in the kitchen).

When looking at a TV show, the user can decide if one of these three widgets should appear: “Online Friends”, “Chat”, and “Participate in clubs”.

When the user selects “Online Friends” using the tablet or the blue button of the remote control, s/he will be able during the TV program to see a buddy list with all the friends who are watching TV at that time, with the channel information and their

² <http://www.samsungdforum.com>

Fig. 1. Tablet Interface for Entering Text

recent activities on the platform. “Chat” can be opened and closed via the tablet or the red button on the remote control. It allows sending short messages to the online friends for instance to initiate a discussion when watching a TV program. The messages are typed on the tablet.

“Participate in Clubs” is launched using the yellow button of the remote or the tablet. It shows the list of existing clubs (yoga, philo cafe, cooking, poetry, reading ...). After entering a club, one can comment or create a new topic by using the tablet. For example, in the reading club, one can browse existing reviews, comment them or add a new one (figure 2)

Fig. 1. Browsing Reviews in the Reading Club

5 Next Step –Evaluating the Proposed Services

In order to get a deeper understanding on how users perceive the developed services, and according to the living lab approach that we have adopted, we have planned evaluation at home of the elderly, during one year, together with design iterations.

Our participants are enthusiastic and enjoy the opportunity to provide their perspectives and influence. However, incorporating them in the evaluation process involves taking into account their doubts or anxiety about their ability to successfully perform or complete the activities.

Participants are now equipped at home with the FoSIBLE system and we are still working on the evaluation protocol. Information about the capabilities, limitations, and needs of older adults will be collected during this evaluation phase.

6 Conclusion

Monitoring is a solution for older people to be able to live in their environment as long as possible, especially for those suffering from disabilities related to age or diseases. However, we believe that we need to take into consideration social isolation due to loss of relatives and weak social network as a factor contributing to depression and may have negative impacts on the general health status. For that, we would like to allow elderly to interact online using the devices they already have at home.

We are iteratively designing SmartTV applications to support socially oriented activities for older people. They are actually being developed and the InHouse rollout started this month and will last six months. Rollout includes TV, Tablet, and the Integrated Widgets. The analysis and evaluation of the use of this platform being designed in a user-centred approach will help us to answer our research issues.

Acknowledgment. This work was partly funded by the European Community and the National Research Agency (ANR) through the AAL 169 program (FoSIBLE Project No. ANR-09-AALI- 002-04).

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