Identifying requirements and features for communications systems between older people in care settings

Ronan McDonnell
Centre for Health Informatics
Department of Computer Science
Trinity College Dublin, Ireland
mcdonnra@scss.tcd.ie

Jane Grimson
Centre for Health Informatics
Department of Computer Science
Trinity College Dublin, Ireland
jane.grimson@scss.tcd.ie

Abstract

Care settings for older people, such as nursing homes, can have low levels of social interaction, which has been shown in many studies as being crucial to both the mental and physical well-being of older adults. Furthermore, increased social interaction has been shown to have a positive effect on adjustment in institutions for the aged. However, these social connections can be lost due to movement within the care system, with residents regularly relocating for a variety of reasons including cost and medical issues. Eleven health professionals and six residents living in a care home in Ireland were interviewed about their social activities and levels of engagement within the home. Storyboards were then developed and presented to the residents based on these interviews. Findings from the interviews indicate that activity levels among the more cognitively able residents are quite low due to activities catering for the less able residents. Furthermore, a lack of access to information and resources (such as books and newspapers) means that these more able residents reported experiencing long periods of boredom. Technology can potentially allow residents access to such information and resources, enabling them to pursue activities in their personal time which can then also be used as the basis for group discussions. The use of technology could, in addition, allow those residents who had moved out of the home to continue to participate and collaborate in activities with the other residents.

1. Introduction

As people age, their social networks tend to reduce in size, placing them at a higher risk of social isolation, and potentially affecting their health. Major social change in a person's life has been linked to the onset of depression [1], with older people who are resident in care settings par-

ticularly at risk when initially moved from their home or another care setting. Depression in institutionalised adults increases the likelihood of death by 60% in the first year after onset [2].

Social contact is also seen as crucial to psychological well-being. Those with low levels of social integration are more likely to be depressed than those with high levels [3]. Furthermore, remaining in contact with existing friends and family can reduce the emotional stress of major life events in old age, such as moving into care [4].

But these social supports may be lost due to a number of factors including relocation or widowhood. There have been very few social computing applications designed for older users, and these have mainly been designed for older adults still living at home rather than in care [5] . Of these applications designed for care, many have focused on individuals who suffer from cognitive impairment or their caregivers [6]. There exists a significant group who, due to some physical or other impairment, may need to be in care, but who are not cognitively impaired. This is the cohort on which this research is focused. But within this group, maintaining friendships and social connections can also be difficult with residents regularly moving to different institutions. This paper addresses the development of technology for peer-to-peer social interaction within and between different elder care settings, a topic not previously investigated.

1.1 Previous uses of technology to reduce isolation

A small number of studies have examined the development of communications technology specifically for use by older people [5],[7]. Many of these studies were designed to take into account age-related changes in abilities and a lack of experience with technology [8]. However, there has been relatively little exploration of such technologies outside the

home, specifically in care settings, with non-dementia affected adults whose needs may be quite different to those at home. White et al.[9] reported that older people in a mix of retirement and sheltered housing sites, who received 5 months of training and access to computers, showed a trend towards less loneliness and depression. However, there do not seem to have been any studies which have also examined the computing and physical requirements of older users when designing such systems in care settings.

1.2 Technology and Older People

Adults over 65 are the least likely to be connected to the internet in the United Kingdom [10]. A lack of experience with modern computers and age-related impairments also act as barriers to computer use [11]. However, studies have shown that merely being older is not necessarily a barrier towards internet usage, with other factors affecting uptake including perceived usefulness, ease of use and complexity of navigation [12].

When designing for older people, several studies have noted the importance of their involvement from the earliest stage possible [5]. Eisma et al. [13] reported that in-home interviews were found to be the best way to elicit requirements from older people, as well as making sure any technology that would be introduced would be appropriate, as older people are more vulnerable to the negative effects of inappropriate technologies [14]. They also found that if terminology was made more understandable, as well as explaining the value of the opinions and input of the participants, then more successful data gathering would result. It is also very important to ensure that a great deal of effort is made to recruit potential participants as older people are usually less mobile and live quite isolated existences [13] .

2. Methodology

The main study is currently being carried out in a care centre in the Leinster region in Ireland, with one participant currently residing in another care centre in the same region. These centres have a mix of residents, including dementia, nursing home and psychiatric patients.

Eleven staff and stakeholder interviews were conducted: 3 occupational therapists, an activities coordinator in a nursing home, 3 directors of nursing, one current and one former inspector of nursing homes, a consultant gerontologist and a consultant psychiatrist. The staff and stakeholders were interviewed about several topics, which included their own insights regarding resident activities, the different types of residents and effects of social isolation.

Following the staff interviews, several residents were identified for participation in the research project; these were then approached by both the researcher and the director of nursing. These residents were selected based on criteria that had been provided to them, namely that residents would be cognitively able to sign consent forms and participate fully in the trial. Residents who may potentially benefit from such a device or who had a previous interest in technology were also approached, but these residents still had to fulfill the inclusion criteria. This meant that despite there being several residents under the age of 60 who may have been cognitively suitable for the trial, they were not approached as they were not old enough.

Six individual interviews were conducted, in most cases in the participant's personal room, unless they specifically requested otherwise. Interviews typically lasted 30 - 40 minutes, with several topics being discussed. Staff and stakeholder interviews had specifically identified many of these topics as important for care residents (such as meal times and activities). Other topics included their communication patterns, such as frequency of communication with people inside and outside the care centre.

The findings from the interviews were developed into several ideas for system features; these covered quite broad themes and included playing multi-player games, a system for communicating with the resident's council in the care centre, phoning and sending messages to friends and family, and participating in a book club.

Each idea was developed into a storyboard, where each feature was shown to a participant in a picture-based scenario, following which the participant was asked what they thought of the idea, why they did/didn't like it and what could be improved about it. This feedback helped decide which features were to be developed as part of any technology.

In the storyboards, technology was depicted as a black box - while it was present in the storyboards, it was kept quite ambiguous. This was to ensure that the conversation focused on the idea itself, rather than what the technology would look like or how it would function.

3. Findings from Interviews

3.1. Interviewing Care Centre Staff and Residents

Care centre staff can act as gatekeepers to the residents of care facilities; they work with and for the residents on a daily basis, and have already established relationships with them. Furthermore, in a situation where researchers are not from a medical background (such as in this case) staff can recommend and introduce suitable residents. This proved invaluable in this research. Interviewing the staff allowed the research to benefit from the knowledge that they have about the residents, as well as daily life in the care centre. It

was also important to let staff feel that they had an involvement in the research - the centre is a working area for the staff as well as a home for the residents. Interviewing the staff can also provide valuable insights and potentially an alternative viewpoint than the residents themselves, as well as corroborating what the residents may say.

Under each topic, participants were also asked to compare their current activity levels to their activity levels before entering the care home. Every participant interviewed noted a drop in one or more of their activity levels, and while some had maintained their levels of particular activities, there were no cases where activity levels had increased.

3.1.1 Non-attendance of activities

The majority of the residents interviewed did not take part in any of the activities provided by the care centre, with the exception of day trips outside the care centre. There were several reasons given for this, but the main reason was that the activities were set at too low a level and therefore were not of much interest. The staff adapted a hands-off approach, with one stating "if they don't want anything, if they prefer to read newspapers in the room, and prefer to spend time in their room watching TV, that's ok". The staff felt that the main opportunities for socialising were meal times and activities, if residents attended them.

Staff noted that while activities are separated by impairment (e.g. those with dementia have specific activities) there was no further separation than that. One resident noted how games would take too long to play as the other players would regularly fall asleep during the game (in this case, Scrabble), or were not able to play the games to the same level that he could, possibly due to mental decline. This frustrated him greatly and as a result he no longer took part in activities.

Observation of some of the activity sessions took place on several occasions. It was noted that a number of residents were asleep during some of the activities, corroborating what residents had reported previously. It did not seem specific to any game, as ball games, board games and poetry sessions all had similar issues.

3.1.2 Using a common ground to promote discussion

Some residents have become friends due to shared experiences. In one case, a love of boats and "a lot of great stuff" was one of the main things that made two individuals friends, as one had been working at sea most of his life. However, as neither really participated in activities, many of their interactions took place at meal times, backing up the staff opinion that meal times were crucial for social engagement.

One resident spoke about the idea of having more discussions, citing a lack of interaction between many of the

residents beyond simple greetings. He also remarked on a theatre group that was organized by a former staff member, but that it had not continued once that staff member left. It had been attended by many of the residents who did not take part in other activities, suggesting that a facilitated group activity, based on a shared experience, could work for a group. However, while such an activity could be quite well attended, it would not necessarily alleviate the boredom that exists between activities.

It was noted that each resident who did not take part in activities spent a significant period of the day in solitary activities such as reading and listening to music. However, while this was enjoyed by the residents, they also felt that they did not have access to as many resources and information as they would like, with one resident saying that he read "whatever I'm given" (on occasion a staff member drove to the library), and longed for a library where he could access and read more books. He also mentioned that he used to read several newspapers every day, but since he had moved to the nursing home, he could only read one newspaper (that staff brought in every day) and got up early every morning so he could have access to it before everyone else and read it at his leisure.

The key issue for these non-cognitively impaired residents seems to be providing activities that allow for both solitary engagement and group interaction within the care setting, thereby reducing the long periods of boredom between activities (if they are attended) and meal times - as one resident put it, "it's just sitting here bored out of your mind a lot of the time". Another said (on mentioning that she only spoke to one other resident regularly) "I've no one else to talk to". This could potentially be achieved by providing activities that could be undertaken on a personal level, but provide for discussion on a group level or through activities. As residents already experience issues in accessing resources and information for their own activities, technology could have a role in providing this access.

3.1.3 Communicating problems to staff

Residents felt that there was a lack of communication and engagement in the care centre, matching previous studies [15]. Confirming the statements made by some of the staff during their interviews, mixing of residents with some cognitive impairment and those without any cognitive impairment occurred, but was a source of frustration for many of the residents who were in a sound state of mind. There was also a feeling that there was no formal way of communicating problems to staff beyond mentioning it to a staff member when they met them.

3.1.4 Attempts at computer use

Computer usage is limited in the care centre, but several classes have been held in the past. Technology is sometimes used for long distance communication (using Skype, an internet phone service), but residents require assistance to use the computer, as they "get lost in the process", according to the staff. Some residents have laptops but do not use them as they could not understand how to use them. Most do not use computers at all. Staff also stated that a lack of understanding of computers lead to fear of using them (in one example, a resident didn't want to use the computer in case they accidentally accessed pornographic material) - "it was too difficult for them to learn, so we stopped".

4 From Findings to Features

From analysis of the interviews conducted, it was felt that one way of increasing social engagement was through collaborative group activity based on a common experience. Specifically, this group-based activity would need, quoting one of the residents, to promote "more discussions". It was also felt that the technology would need to facilitate, rather than replace, face-to-face engagement.

The findings from the interviews were developed into several pictorial scenarios, or storyboards, and shown to the residents. Each storyboard consisted of 4 - 5 images, with the first describing the individual, and the last image describing the benefit of the technology. The other images described the individual using the technology to achieve this benefit.

Nine storyboards in all were created, covering a broad range of topics: a searchable library for accessing and reading books, a newspaper archive with the ability to share interesting articles, messaging and calling systems to contact friends and family, a comment box for comments/complaints to the staff, an activity reminder system for when activities are taking place, a communications system for a resident's council, playing multiplayer games, and a book club.

The most popular feature was the book club feature. The storyboard for this feature described an individual reading a book on a device, which also informed the individual when the next book club meeting was on, the book they were reading and who was attending. The storyboard then depicted the individual participating in a book club meeting where a number of individuals who also had a device met and discussed the book as a group.

It was decided that the book club would be a main feature of the system. It allowed for a common ground, as the majority of the interviewed residents already read a great deal instead of taking part in any activities. Furthermore, previous studies mentioned participants not liking being committed to turning up to many scheduled events [5] - it was decided to run the book club meeting on a weekly basis, as it gave individuals time to read the book themselves, but provided activity and engagement in between the weekly book club meeting. Furthermore, it facilitated discussions and promoted face-to-face interaction, two of the main requests by participants.

Other features that were popular were the ability to contact friends and family using the device by voice and via email (though it was described as sending messages), a device that allowed users to read and share newspaper articles from a variety of sources, a calendar system that displayed when events were happening in the care centre, and a library link, where an individual could access, search for and read books via a device. It was decided to incorporate these as sub-features of the system, as they would provide further opportunities for social interaction through family and friends, as well as potentially alleviating boredom.

The features that were not popular were those that replaced face-to-face interaction with computer-to-computer interaction, such as playing games with someone else using technology, the comment box and sending messages to members of the resident's council. In these cases, participants remarked that they preferred to interact with people directly if possible, rather than through a computer. One participant remarked that he had a small group that he played card games with on a semi-regular basis and that the interaction during the game was better than the game itself. He felt changing that interaction to a computer screen would have a negative impact on this interaction.

5. Movement of Residents

There are a number of difficulties associated with working with residents of care settings. Due to deterioration in health, residents may no longer be suitable to take part in the research. Other considerations, such as residents moving or leaving the home also affect participant numbers, as well as having an effect on any activities that may be provided as part of this research. During this research, consent was obtained from more than 10 individuals; however, in several cases the residents who signed the consent forms did not actually participate as they had left the care centre or had a deterioration in their health. Recruitment needs to be on going, because residents can become unsuitable soon after they sign the consent forms.

In one particular case, a participant moved to a new nursing home due to cost considerations. However, the participant was still very eager to take part in the research. This was due to him wanting to keep in contact with his old friends, as he stated that he "preferred the women at the last place" (his previous care centre). He also remarked that the features that had been selected for development were the

types of activities and interactions that he would participate in if they were available in the centre .

It was felt that it would be useful to compare the experiences of individuals who were physically present at the book club meetings and those who were not. As mentioned earlier, many of the residents cited the importance of face-to-face contact in their activities, and preferred those storyboard scenarios which involved group interaction. As such, it was decided to augment the study to incorporate him into it.

6. Technical Requirements

Once the features of the system had been chosen, the next stage was to define what hardware and software requirements were needed to develop these features.

The storyboards had given a ranking of sorts to the features that were desirable for the participants, but given that the research would now involve multiple nursing homes, extra features were now needed. Specifically, if a participant wished to participate in the book club from another care setting, he or she would need to be able to take part remotely, as it would not be possible to transport them to the other care setting.

6.1   Hardware and Software Requirements

As well as software design, there was also a major decision for the research in selecting the hardware. Many different devices were considered, such as netbooks and laptops. Several key features were required however: some were included as a result of findings from the interviews, as the residents were asked about their previous computer experience. Others were based on previous literature, such as being touchscreen-based [16]. It needed to be light, as one resident had a laptop but couldn't carry it as it was too heavy. It needed to be robust as many residents were concerned that they would drop it. It also needed a microphone and speaker system of some sort for remote communication.

Netbooks, laptops, and several other devices were considered, but it was decided to use the iPad, developed by Apple Corporation. The iPad is a 10 inch touchscreen device, essentially a bigger version of the iPod Touch/iPhone. It is operated exclusively by using the hand to touch the screen, as the screen is sensitive to electrical impulses that the human hand emits. Furthermore, the software included on the device, called iOS, is designed exclusively for finger based interaction. Using the Application Programming Interface, Cocoa Touch, developers have access to a wide range of tools such as buttons, switches and navigation items designed specifically for use with the finger. Touchscreen-based devices have been used successfully by older people in previous studies [16].

The iPad is technologically positioned between a mobile phone and a laptop, and would be considered a consumable device, rather than a creation device - it is designed to watch movies, read books, listen to music and play games, and while it does support applications such as Pages (Apple's version of Microsoft Word), it is not primarily designed for such use. Apple have also developed a book reading application (called iBooks) which allows users to store and read hundreds of books on their iPad. The internet phone application Skype is also available for the iPad, which allows users to call other Skype users for free. This would allow for remote communication, something necessary for participants not resident in the main care centre.

7. Discussion

From the interviews conducted, there seems to be an opportunity for the use of communications technology within a care setting to increase engagement on an individual, group and organisational level.

At the start of the project, using technology to enhance communication between a resident and their family and friends was thought to be a key feature, and to an extent this is supported by some of the data from the resident and staff interviews. However, while contact with friends and family is considered important, it takes on even more importance because of the boredom that many of the residents report experiencing on a daily basis.

These more able residents want mental stimulation and social interaction, and feel that the current activities, designed to cater for as wide an audience as possible, do not provide that for them. Their physical and medical impairments may mean that they are restricted, and this is what has caused a reduction in their social interaction and engagement, rather than a mental impairment.

As well as feeling that the activities do not suit them, a lack of resources and access to information means that they are unable to provide their own activities, apart from watching television, or listening to music. This means that even if they did attend activities, they would still have long periods of boredom. The weekend, when activities are typically not held, are particularly boring, according to residents.

It is not simply a question of providing more engaging activities for the residents. The findings from the interviews seem to suggest that it is important to provide access to information and resources that can be accessed in personal time which can provide for discussions in a group setting. Technology can have a role in providing access to the information that they previously were unable to because of impairment. This in turn could have an impact on levels of social engagement and boredom.

8. Ongoing Work

The software is currently in an iterative development process with the participants, using techniques such as the think-aloud protocol. Once this is completed, the technology will then be trialled with the participants for a number of weeks, during which each participant will receive an iPad with the application installed. Each week a new book will be chosen, and every weekend there will be a book club where participants can meet to discuss the book. Furthermore, they will also be able to use the other features such as reading online newspapers and finding out what activities are scheduled in the care centre on a daily basis.

Throughout the trial, the impact on social engagement will be measured using validated scales (e.g. Lubben Social Network Scale), as well as looking at issues such as the usability and frequency of use of the technology.

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