Why do elderly not use social media?

An investigation of the elderly's attitudes to HCI

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Abstract

How do social media and internet usage look like in the eyes of ageing people, specifically those at the age of 80 years or above that live independently? What technologies are most interesting to them and why? What do they struggle with that could lead them to avoid specific technologies or to prefer one technology more than others? The reason of the study was to get an insight of elderlies attitudes, regarding technologies in general and social media specifically, to know what hinders those seniors to be excluded of the recent technologies and to not be plugged into cyberspace. The specific questions that the research wanted to answer were *"What are the actual barriers for internet use among the elderly?"* and *"Also, what could be done to address these barriers?"*. The study was taking place in one retirement house in Skellefteå with 4 women at the desired age group and was carried out using semi-structured interviews mixed with focus groups as the method for data gathering. This research will be assisting an EU funded project aimed to start in the summer of 2017 named PLACE-EE and is planned to be a platform for ageing community engagement. The results showed that more technical and human support were required in a local environment. The elderly simply did not have the drive to personally engage themselves actively in technology to use the internet or social media among other things. One of the suggestions made to solve this would be to integrate the technology into their daily routines where they are socially active, like the community centers that they valued quite a lot.

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1. Background

To ensure that elderly people get proper care has become an increasingly big concern that society has to deal with. All over Europe the population has shifted to becoming older and older and Sweden is no exception. The average life expectancy in Sweden has increased nearly continuously since the 1860s, with a current life expectancy being 79,5 years and 83,4 for men and women respectively according to Folkhälsomyndigheten (2013). Not only that, the size of the senior (65 years and up) demographic is expected to increase by 30% between 2010 and 2050, which would make 25% of the Swedish population over the age of 65. The reason for this increase is thanks to the decreased deadliness of diseases like cardiovascular disease from medical treatment, which will in turn put extra pressure on elderly care by a significant margin.

With the increased life expectancy being on the rise, so is the amount of Swedes who become a century old, according to an original Swedish study published in Läkartidningen nr 52 (Marmstål, Rosén, & Rosenqvist, 2009). From the year 1970 to 2007 the amount of elderly celebrating their 100th year had increased tenfold, with there being 225 men, and 1233 women reaching this age at the time of this study. With the also increasing population levels of the country of Sweden, the older demographic is going to continue growing, which will put additional pressure on the Swedish healthcare.

Other sources have confirmed this trend as well, but not all of them see it as something negative. Globaliseringrådet (Lindh, 2008) highlighted that an ageing population could be something positive in that it highlighted a significant increase in human welfare because of the possibility to live a longer life with good health. However, even this article addresses the negative aspects brought up by other people, but argues that some of this has to do with negativity selling well as news. It also argues that the decisions made today will determine how big of an impact the ageing population will have on the Swedish welfare.

Still, regardless of there being some disagreements on this shift in demographic populations, the economic pressures that come with it cannot be denied. A prognosis done back in issue nr 1 of Välfärdsbulletinen (Heggemann, 1999) brought up that by the year of 2006, the amount of 80 year old seniors would increase the costs for the municipalities by 6 billion SEK across all of Sweden. With this trend continuing in this fashion the costs will keep increasing further in the future.

Regardless of these economic pressures, it should also be brought up that there is a growing market for seniors because of the demographic increase. Ageing people 65 years and up have become an important aspect in computer and new media technology usage. They are now one of the fastest growing groups of new Web users since the Web is becoming more of a mass medium (Shamugam, 2015). According to studies (Shamugam, 2015) by Cobb (1979), Cohen & Syme (1985), Ernst & Cacioppo (1999) on the issues of social support and health outcome, social support from various types and sources lead to positive health outcome. The mentioned studies prove the need to find new ways of including elderly back to the society, which will reflect them positively to get healthier and happier close to their relatives, friends, people whom they love and people who love them.

Another example of elderly and technology is the AGNES project, which is one of recent European projects that's been applied in many countries (Peter-Ballesteros et al., 2013) as one of the solutions to develop a home-based system. This in turn provides a way to connect elderly, who are mostly separated geographically from caring family members, with their social network via internet and improve the quality of life of elderly people living independently in

their own homes. The resulting systems in AGNES uses ambient displays, tangible interfaces and wearable devices as a bridge to bring people together. Furthermore it was found that people who used AGNES system had positive impact comparing with elderly people who were living without technologies.

Retirement, death of friends and family, and people moving away are the main reasons that ageing people get isolated and therefore lose contact or communication with their social network members (Havens, Hall, Sylvestre, & Jivan, 2004).

The budget concerns of taking care of the older population have led to there being a need to make elderly retain their own independence for as long as possible, while care is given to the seniors with the most need of it. One approach to tackle this issue has been through the use of technology, since it has become more ingrained into the everyday lives of people, and even functions as a way to communicate with each other. However, the older population is generally slower at adapting to the changing times that new tech brings than younger demographics, so there is a desire to work on improving in this area.

Taking the advantage of social media network to get isolated seniors back into society and help them to socialize as they used to, with no doubt this issue is very crucial to be solved nowadays, at present social media networkings connect many young people together and the range of ageing people over 80 are totally excluded, which makes it not fair. Therefore in this study we will investigate the reasons why these people are feeling left out in the age of the internet and social media.

1.1 Purpose & research questions

The purpose of the research was, to figure out why elderly people do not use technology as well as social media, to communicate with others despite there being no financial barriers for them to do so, nor having the technological limitations to access the internet through hardware like smartphones and computers. By collaborating with the municipality of Skelleftå, this research will be assisting them in a EU funded project aimed to start in the summer of 2017 (Hansson, 2017).

To clarify the use of the word “elderly”, it would be people at or above the age of 80, more specifically those who live independently, because they have the highest possibility of adapting to technology involving the internet and social media, while younger seniors have already started to adapt to it more. Wikipedia defined the term in their article about Social media (2017) as such: *“Social media are computer-mediated technologies that facilitate the creation and sharing of information, ideas, career interests and other forms of expression via virtual communities and networks. The variety of stand-alone and built-in social media services currently available introduces challenges of definition”*. Our research used the term in a broad sense to get a grasp of the attitudes of the the target demographic, especially since they themselves were less than likely to differentiate between different social medias.

While it had not been a full requirement to have used internet technology before, it is still something that would be beneficial. The reasoning for this choice of demographic is that seniors below that age have it generally easier at adapting to technology while being able to maintain their independence, while people who are older have a harder time in doing so. It is therefore imperative that HCI research looks at how this specific demographic sees social media, but also what they potentially struggle with.

The research questions that are the basis for this study are: *“What are the actual barriers for internet use among the elderly? Also, what could be done to address these barriers?”*.

2. Related research

As mentioned previously, the statistics for health issues among elderly, both physical, and psychological, are a big point of concern among researchers. Couture (2012) stated that as a society, we are feeling more lonely than we have ever been, and perhaps nobody feels the sting of loneliness more than elderly. The data showed that 18 percent of seniors live alone in the US, while 43 percent feel lonely on a regular basis, according to a study conducted by researchers from the university of California, San Francisco (UCSF). The article also added that lonely seniors are more likely to decline and die faster. Loneliness is contagious. and it was more interesting to know that older adults who feel lonely are tending to behave in specific ways that might cause other people to not want to be around them.

To tackle the issues of health issues among the elderly, other researches have been made to figure out, and address their needs. One of the solutions to take the advantage of robots to help elderly, as described in the paper *Towards Personal Service Robots for the Elderly* (Goetz-Thrun et al., 2000), where they developed their first robot prototype. Using natural language, the robot could provide information related to activities of daily living obtained from the Web. It also enabled remote caregivers to establish a "tele-presence" in people's homes, by relaying back video, and audio stream through the Next Generation Internet. The paper describes this early prototype.

Attempts at getting seniors involved in the design process for technology has bore fruit in terms of the participants' willingness in engaging with the subject. In the article *Seniors in charge of ICT innovation* (Waterworth, Waterworth, Peter, & Ballesteros 2012), researchers were observing the change in attitudes among elderly after taking an active role in the design process. The results proved to be positive in that the users started gaining the mentality of an expert and became more confident in their abilities, which would improve their social lives as a whole, whether it was online or offline. The article also brought up that the need of lifelong health-care of elderly and particularly ill people, who are suffering from things like dementia and cognitive impairment, is one of the biggest challenges nowadays that most of european societies have to confront, which is confirmed by other research as well.

In addition, MDPI, in co-operation with Centre for Robotics and Neural Systems, Plymouth University, and faculty of health (Dahl & Boulos, 2013), offered us a very curious and precious article, which included an overview of the most current and potential uses and applications of robotics in healthcare and social care. Whether commercially ready and available on the market, or still at the various stages of research and prototyping. We can realize from the mentioned studies that the precious services and facilitations that robotics are able to provide, would be a great support for elderly people to have better care options at the end of each single senior life.

It is pretty common when kids or youths having spare time or feel bored, gaming is the first thing that comes to their mind. However, what about including elderly people to the gaming tract? Eldergames was an EU-funded project aimed at evolving games using advanced visualisation and interaction interfaces to improve cognitive, functional, and social skills of elderlies. This project aimed to merge two significant areas (health and social engagement) to which technology for elderly people was applied, in the mentioned project, playing a mixed-reality platform that would grant elderlies the ability to improve their cognitive skills and individual well-being, and give them the chance to communicate with people who live at a distance with no need to share the same language (Gamberini-Andres et al., 2006).

For what reasons are ageing people excluded from using social media? Lehtinen, Näsänen, and Sarvas (2009) are a group of researchers from Helsinki University of Technology TKK, who

revealed many barriers that preclude old people from being one of the active users in social media networking sites. Barriers like understanding the internet as a dangerous place, social networking sites being places of socially unacceptable behavior, and regarding the required skills to use computers as being too much, they found the assumptions associated with computers as one of the factors hindering seniors. Seniors also found it awkward to use this technology and they did not trust their own computer skills enough. In addition, they explained that if we understood what elements older people are valuing in their friendships while interacting in SNSs, we would be able to develop SNSs that fitted their conceptions, and make the services more attractive in this stage of life.

When it came to the differences between various age groups of seniors using social media, one article stated that *"from 2000-2009, there was a 70% increase in internet use by people aged 50-64, and a 38% increase by those 65+. (Lenhart et al., 2010). The year 2010 showed an 88% increase in social media use by people aged 50-64, and a 26% increase by those 65+ (Madden, 2010)."* (Finn, 2016).

In his study *The Impact of Computer Technology on the Elderly*, Van De Watering (2005) addressed many different positive impacts on elderly people by using personal computers, considering age-related changes, such as declining the loneliness by using e-mail, and a slower decrease of cognitive abilities by playing specific computer games. The paper also showed the future possibilities in this area.

To shed more light on current social media network usage patterns by the elderly and to understand their perceptions and attitudes towards the web and social networks, Ariyachandra, Crable, and Brodzinski (2009) from Xavier University revealed that old people were not familiar with using social networking sites in general, and particularly Facebook. However, they would be interested in grasping every opportunity about this application. In addition, the researchers identified common themes, and challenges that people should encounter when using the web and online social networking sites. The study also provided some good insight into how to develop a plan of action to help increase the use of online social networking communities for elderlies.

Taking the advantage of cutting-edge technologies to offer elderlies the chance to live independently, would in no doubt be a significant challenge for the upcoming years. The mentioned issue was investigated by Vastenburg, Visser, Vermaas, and Keyson (2008) in a study which presented technology-based solutions to support elderlies in their everyday routines, build up social networks, and provide a remote monitoring of the state of the users. The research presented as well a design vision of assisted living solutions that elderlies are interested to use. Based on earlier work, five concrete design goals had been identified that were used in particular to assist living services for elderly users.

Thus far, the research surrounding elderly use of the internet has been mostly about health issues, the effects that technology has on said population, and whether potential design solutions for elderly have proven successful or not. While researches have been made to study elderly people's perceptions of technology and how to design for this demographic, this study will be instead focusing on the various barriers that elderly people, specifically people at or above 80 years old, set for themselves in relation to technology in the form of the internet and social media. The analysis of the gathered data will then be analysed to come up with suggestions on what could be done to address these particular barriers.

3. Method for data gathering and analysis

We read through several methods about how to gather our data and finally we determined to build our study based on semi-structured interviews. This method of data gathering is a qualitative study, since the interviews are open, and new ideas could be brought up during the interview as a result of what the interviewee says. The interviewer in a semi-structured interview generally has a framework of themes to be explored (Semi-structured interview, 2017). Since it is very frequent not to use fully structured questions and do the interviews by following the exact wording when asking these questions, we instead simply prepared a checklist with suitable prompts such as *"Is there anything specific that bother you as a user?"*. This free-form approach is more demanding for the interviewer, but the data obtained does generally repay the effort (Sharp, Preece, & Rogers, 2015).

It is pretty common to use Semi-structured interviews when you want to collect data regarding opinions, experiences and thoughts of a group of people that need to be assessed or evaluated afterwards, except if you are willing to collect numerical information, like the number of kids in the school who are good at math, or the number of poor people in a specific area then you should switch to another method for gathering your data, such as quantitative survey (Bullen, 2014).

A semi-structured interview is a qualitative method of inquiry that fuse together a fixed set of open questions (questions that pop up instantaneously), giving the chance for the interviewer to explore particular themes or responses further. Semi-structured interviews are often informal and unstructured, which conducted by observing the participants responds and adapt the questions accordingly (Pritchard & Sweeney, 2010).

As argued by Bernard (1988) (Robert Wood Johnson Foundation, 2008), semi-structured interviewing is best used when you don't have more than one chance to interview someone, and when you will be sending several interviewers out into the field to collect data. It's also beneficial since we can gain a clear set of instructions for interviewers which bring reliable and comparable qualitative data, and give freedom to the informants to explicit their point of view. Researchers tending to use semi-structured interviews for the reason that questions can be prepared in advance, this facilitate the preparation for the interviews and appear competent during the interviews. In addition, semi-structured interviews also give the opportunity for the informants to loosen up and start expressing their point of view on their own terms.

We also decided to do a focus group (FG) as one of the qualitative research methods. Since it is quite common to merge another method with focus group for data gathering, we decided to then use a semi-structured interview approach simultaneously with the focus group.

Semi-Structured interviews are placed somewhere in the midst of fully structure survey and unstructured conversation (see figure 1) (Bullen, 2014).

Figure 1. Semi-structured interviews in relation to other forms of survey methods.

A qualitative study was the most suitable approach to fulfill the research questions, considering the need of learning more about each individual senior, who has experienced life in different ways. Not to mention to get a good insight into their opinions and dive deeper into their underlying problems, the qualitative study helps to develop concepts, or hypotheses, for potential quantitative research (Wise, 2011).

As we know that the origin of focus group was in sociology, the common use of focus group is mostly in marketing, as well as other areas which are getting more interested to use it, such as health, education and decision-making. Depending on the purpose of the research, the output that we were aiming to gain from using such a method would be particularly effective for getting a deep insight of elderly's feelings, thoughts, and how they react regarding a specific topic (Freitas, Oliveira, Jenkins, & Poppy, 1998).

In general, it is advisable to use FG to generate ideas and hypotheses based on the participants opinion to assess different research situations, in addition to evolve drafts of interviews and questionnaires and also to provide interpretations of the participants' result from initial studies. They would also to generate additional information for a study on a wide scale like in the focus group (Freitas, Oliveira, Jenkins, & Poppy, 1998).

Using the mentioned method was so beneficial that each question sparked an interesting discussion among the participants, which popped up unexpectedly, and the participants gave generous output to support our study.

We should also mention that using focus groups as a research method is not advisable in many cases. For example when the subject matter is constraining the participants. Fortunately the subject *"internet, social media, and elderly"* had a positive tune among air when talking to the participants, therefore we were probably in tune with what were the needs of these seniors, so we could realise when seniors showed a big interest to be part of such supportive study, that cared about a tough period of their life. It is also not advisable to use FG, when the researcher does not have control of the critical aspects of the study, and finally it is not advisable when there are necessary statistical projections (Freitas, Oliveira, Jenkins, & Poppy, 1998).

Finally, the method of choice for the analysis was an inductive approach, which was explained by Thomas (2006) as a method of condensing data in the form of raw text from into a summary. This in turn helped developing a frame for the underlying structure of processes or experiences that became clear from the gathered data. By using the transcribed material from the interviews, we then pinpointed patterns, and themes among the participants to figure out aspects where they had conflicting or aligning opinions in relation to elderly, social media, internet, and technology. Also, the related research was brought up, in relation to to these patterns and themes, to see where this research was standing next to other bodies of academic work.

3.1 Access to elderly people

Negotiations were made with the municipality of Skellefteå to get access to elderly within their municipality who fitted the desired demographic for this particular study. We also took personal contact with elderly homes throughout Umeå to be able to conduct this study, but none of the calls bore any fruit. After weeks of preparation and waiting we managed to get some people that the municipality had managed to get them to agree on an interview, as well as being audio recorded. However, since neither of the women had experienced using social media before, and did not really use computers to access the internet, some changes had to be made to find another angle to the research questions, as well as adapt the interview questions by skipping some and focusing on other areas that we prepared questions for.

There were some significant issues with getting in contact with the target demographic. Because of the strict regulations surrounding these elderly homes, we were not allowed to directly talk to the seniors who lived there, but had to do phone calls with the people in charge of their well being, which further complicated the issue. Even the municipality of Skellefteå had serious problems getting people to participate, so at the end of the study we needed to start looking for people among friends and family that were willing to share their personal experiences. This ended up with one participant being a close family member. However, the data gathered from the interview still produced some interesting results in the end, so it worked out regardless.

Other than that, the interviews themselves went very smoothly. The focus group got interrupted a couple of times by other people walking in and out of the hall we were sitting in, which did not cause a lot of distractions overall, the only exception happened when we have been interrupted by a phone call from one female participant in the middle of the interview. As for the preparations before the interviews as well as after the they ended, we began with explaining the purpose of the study as well as their answers being done anonymously to make them feel more secure about revealing more about themselves in relation to the subject matter. Then once the recording sessions were done we thanked them for their collaboration and saved the files on our private hard drives for only us to.

3.2 Interviews with the elderly

The four interviews were conducted together at a retirement house during an one hour long session right before noon. The house had several seniors who were capable of living independently and also had a hall where everyone in the building could be in a socialise, which was where we conducted the interviews. With the assistance of the municipality of Skellefteå, a meeting was decided, where we then travelled to the city by bus, using recording equipment borrowed from the MIT-building at Umeå University. The original meeting was only supposed to be individual interviews with three people, but because of the circumstances, a focus group was made to answer the questions, with us the researchers acting as moderators to ensure that the discussions were kept on topic, and to make sure every person was given the chance to answer each question. Another woman was also willing to participate because her friends were going to, which made it more convenient. The original idea was to conduct a pilot interview to check how the questions would work out in practice, but the focus group changed our plans. However, luckily the questions we had already prepared worked well, so there was no need to change anything drastically by adding new questions, but rather subtract some of them, since the people being interviewed would not be able to answer them with their lack of experience in using internet technology. Bear in mind that all the participants were Swedish, so the interviews were conducted in the Swedish language as well (the results are however presented in English).

As mentioned previously, a semi-structured approach was done for the group interview, so the questions were well prepared in advance to ensure that the data gathering would go smoothly. The time for each interview was planned to be about 30 minutes in length, but naturally the focus group session took longer, and lasted about 54 minutes because of four people being interviewed. The data gathering of combining two methods, semi-structured interviews and focus groups, were done because of the circumstances surrounding the location and the people signing up for an interview. This created a situation where we as researchers needed to adapt. Since all four of the women lived in the same building and preferred not to wait for each of the interviews to be completed individually, there was an opportunity to save

time by letting them get interviewed together. This also opened up the possibilities of each person working off of each other when discussing the topics, which would give some interesting insights that could have otherwise been missed in a regular interview.

As for the target demographic, the aim was to address the barriers of the elderly above the age of 80, especially for the people who were able to live independently, since they had the highest possibility of adapting to technology involving the internet and social media. While it was not a must to have experienced these types of technology before, it was still something that would be desirable considering the subject matter.

3.3 Source criticism

Our sources for the method were picked out based on official course literature used by the institution of Informatics at Umeå University. They would therefore be reliable to source, since they are a part of regular academic studies.

The choice of articles for the related research were made based on the relevancy of their contents in relation to this study. Publicized work were of the highest priority, where they could be reliably checked as being legitimate research. The approach of finding these sources was to Google search based on keywords relating to the subject matter of elderly, social media, technology, etc. Others were recommended by the municipality of Skellefteå, whom are well versed on the subject, and were publicised as well. Some of the sources were also found through academic databases that existed online.

As for the articles that was excluded from the study, they were not picked based on them having no direct link to the original source, making it harder to trace where they got the information. While it was possible to track down one article despite having no direct source, if the work was not publicized by an academical place of learning or the like, it was reasonable to simply exclude them.

3.4 Demographic

The target age group for the participants was elderlies at around the age of 80 or older. This was the ideal age to base our research data on and the four women participating were at or above the desired age. They had however very little experience with using some form of social media and using the internet, but their answers were fairly insightful nonetheless. Still, regardless of these criteria, no one was denied participation because of their personal background or sex, and we tried to get as broad of a spectrum of people as possible. As for why there was a lack of men in this study, this could be explained with the help of a previously mentioned article from Folkhälsomyndigheten (2013), bringing up the average life expectancy of men being just below the age of 80 (79,5 years). Therefore women will naturally be overrepresented in this particular age demographic, simply because their life expectancies are on average higher than 80 (83,4).

Down below is table 1 highlighting some basic information about each participant based on the interviews. The participants were coded with the letters “W” which stood for “woman” to respect each participant’s privacy. The numbers were used to help differentiate each individual as well and will be used to refer to them when discussing the results.

Name	Age	Gender	City of origination	Gathering data method
W1	79	Woman	Skellefteå	Focus group
W2	83	Woman	Skellefteå	Focus group
W3	83	Woman	Skellefteå	Focus group
W4	90	Woman	Skellefteå	Focus group

Table 1. Information briefly describing each participant based on age, sex, city that they lived in, and method used for gathering data.

3.5 Ethics

To ensure that the interviews were conducted in an ethical manner, four ethical research principles were taken into account, which had been laid out by Vetenskapsrådet (2002), located in Stockholm. These four principles were the information requirement, the consent requirement, the confidentiality requirement, and the usefulness requirement.

No person was forced into participating in this study and was able to withdraw at any point from the interviews if needed. They also consented to being audio recorded based on our request, since it was required for conducting the study, which also fulfilled the consent requirement. If they decided to withdraw from the interviews, no attempts were made to force them to keep being involved in the study as well, and the location for conducting the interviews were approved by all parties involved.

The data gathered from the interviews was done anonymously, where the identities of the participants were only known to us, the researchers. The recorded files were as well not publicly available to ensure that the participants would feel comfortable speaking freely during the interviews, so the study was within acceptable borders regarding the confidentiality requirement. The questions themselves were a bit sensitive in nature because they touched upon feelings regarding the feelings of isolation, relations with other people, and so forth. However, they were not forced to give an answer to these questions, and the questions were laid out so that they would not be too sensitive, in turn ensuring that the confidentiality requirement was met here as well.

As for the information requirement, all the participants were informed about the purpose of the study to ensure transparency about how the information gathered from their answers would be handled. Finally, the usefulness requirement was addressed as well by explaining that the study was done for academic purposes, and not for commercial means.

3.6 Bias

It is important to bear in mind that researching the elderly is a new area for ourselves. Therefore we had not a lot of preconceptions about the subject matter, or the demographic, which we read up on extensively during the course of the study.

4. Results and analysis

We initiated a focus group interview with four senior women who lived in a retirement house in Skellefteå. The interview was recorded and transcribed by us. We made the interview completely anonymous so only us the researchers had the permission to access the recording files, so we could transcribe and summarise the results, in order to answer our research questions. See table 2 for all the prepared questions brought to the interview (some of these were not asked because the participants were not able to answer them).

What is your age?
Do you use computers or other types of technology to access the internet?
Explain why, both yes and no.
Do you use social media, like for example. Facebook, Skype, etc.?
If you use social media, which one do you prefer for social interaction? In which case why?
Do you feel like you are missing anything from using social media?
Can you explain more of what you mean?
How comfortable are you when using the websites you visit?
Is there something specific that annoys you as a user?
What types of content (e.g. pictures, video, and text messages) would you want to share with others on social media?
Would you like to use digital technology that is well suited for elderly people? If yes, would you prefer if it used existing websites like for example Facebook, or would like it to be something completely new that is fully separate from those platforms
Does it happen that you feel alone? (What do you feel about this feeling of loneliness?)
Who do you still have contact with? You do not need to mention any names.
Do you have any ideas of how you could get better contact with your family, friends, and acquaintances to make you feel less socially isolated?
What would one need to make the usage of digital technology good for you?
Have you had any physical or psychological hindrances that affect your social life? In which case what?
Would you like to use digital technology to get to meet new people?

Table 2. The prepared questions made for performing the interviews (translated from Swedish).

Our first question asked to the four women was about if they used technology to access the internet.

All the participants answered no. W2 mentioned that she had used computers at work, but was no longer allowed to use them anymore because of having visual defects making it hard to see.

When asked the particular reasons why each did not interact with technology for internet access, W1 had this to say: *"The reason is that I have not started and did not seem to have the need to use it. Now I understand that I should have followed along a bit but I think that the computerization has gone way too fast for us elderly, for example a store if you have bought a thing they say, 'we only take cards', then you can't shop, it happened to me yesterday."*.

W3 remarked then that W1 had a bank card. W1 then replied by stating that she herself was too grumpy to and that the changing times are too fast for people around their age, one example being that banks no longer accept paper money. All the participants agreed with the sentiment. W4 mention that she had signed up to a computer course, but because she needed to move to a one room apartment, she decided not to. W4 saw nothing of worth with using touch pads, as she put it.

Then W3 continued by stating: *"I have thought from the start that I shall not be computerized but it has gone way too fast. But now when you get older, you feel long afterwards, I feel so angry at TV and everywhere when they just say 'go to the web, go to the app!' every five minutes. I regret (it) because I have not started when I was younger, but now I cannot afford to buy (a) TV and own a TV, I think that affording those changing like here, and I don't even comprehend the mobile. I think it costs too much."*.

W1 added that lacking a salary to pay for these services. Afterwards W3 went on by explaining that once you get as old they were, there is now a need to buy new glasses and teeth among other things despite having a low pension. While there were seniors lucky enough to have sons and daughters who assisted them in learning the unfamiliar technology, but for others like herself who don't have children, and have to rely on computer courses, having to sit at home to actively use these tools when being completely alone was a huge turn-off. W3 finally concluded by saying that it would cost too much, like having a TV.

A specific question was asked to W2 to clarify about her bad eyesight and if that was the only reason she can't use computers anymore despite having some experience with them.

She replied that it was primarily because of bad eyesight and nothing else. The first computers she began using were simply not made for "normal people" as she put it, simply because they lacked very little protection.

A follow up question was about what W2's occupation was. She told that she was an economist and had worked in Luleå.

"Could it be that you have watched way too much on the computer?" asked W3 to W2 as a reaction to her bad eyesight. However, W2 stated that many get bad eyesight at an old age, but she didn't know what caused it. At least she was thankful that she was able to see with one of her eyes. Before going to the next question, W3 reiterated the same point she made earlier about it being too expensive, and that elderly were missing out because of the increased need of using internet technology.

Next question was about what exactly hindered them from using applications or going to the internet to access information, offers, and the like.

W3 then asked in return if you needed a computer to use these, which we replied with yes. She answered by saying that if you don't have a computer then you were not able to do anything at all.

A follow-up question was asked if they were capable of borrowing devices to access the internet by someone else.

She went on by stating that she does not simply understand computers and that you needed to know how to use them. She then brought up an example by talking about her mobile phone and called herself too stupid to grasp all the functions of it. When she stopped working it was

also the time when computers started appearing at her work place, so she never felt like she had the time to properly learn.

Another question related to computers were asked if they had at some point ever tried using one before.

W3 stated no as mentioned previously. W4, on the other hand, started telling a story about she used a smartphone two years ago and how the screen went black when she was alone in a cabin, with no idea on how to fix it. After that experience she went back to using older types of mobile phones without touchscreens to avoid this situation. *"(I) get grumpy, because if something happened with the phone then you can't even understand what it is for until you go to the city and get help from Telia. I will not have something I can't understand."*.

W3 ended with saying that if she was 10 years younger it may have worked easier, which W1 voiced in agreement. She mentioned as well as that she was able to learn how to use a phone and it went well at first, but eventually all that knowledge was forgotten, which she felt was a bad thing.

When W1 was asked the same question, she repeated the same sentiment from earlier in the conversation about the development of technology just going way too fast, bringing up the bank example again. W4, W3, and to a lesser extent W2 went on by discussing the issue of banks and the change from physical to digital money some more, but had to be cut short by us researchers since the conversation needed to be kept on topic with other questions.

A more personal question was asked what they felt regarding being alone and if they personally felt alone.

W3 said: *"I feel lonely sometimes, even though I have a spouse who lives elsewhere (laughing). But I don't have any children, no relatives, nothing, grandchildren…"*.

W4 went on by mentioning that it had a correlation with an individual's personal health and that as long as you have good enough health to live normally, it should mostly be fine. If you get stuck in bed it would have a negative effect on a person's psyche, which W3 agreed with. W4 mentioned that despite being 90 years old and living alone, she did not feel like she had a boring life. W3 then asked her if she had many visitors as a way to feel less lonely, which W4 said no. Then W3 added that she used books to cope with her own boredom and loneliness as well as being out from time to time and also spending time in this building, phrasing the activities like this: *"Exercising, drinking coffee, and talking shit!"*. Some laughs were shared among the whole group.

W1 had this to say about the subject: *"I have worked at a service house on Anderstorp, for many years in Skellefteå, and I thought, it was the best place in the world! Everyone knew each other and everyone was happy, we ate together, and they stood in line just to wait for something to eat. And then they went to the therapy, and then there there was somebody who brewed coffee and sometimes there came people who sang and had a performance and… And the geezers, they were allowed to bring their armchairs, used to sit there and cuddle with us. So we really thrived, to just be together. To be shut in a room like they talk about you know, they were going to remove all, community centers, but they are going to have a room (instead). It is a dread (of mine)."*.

W3 agreed and mentioned that they had a lot of rooms for elderly to do these activities, they had no reason to complain. However, W1 emphasized that there were a lot of despair going through people who had no more place to go to do those activities anymore. Both W1 and W3 agreed that this environment destroyed elderly people.

How W1 felt in this specific case and if she felt alone was the next question asked.

She replied by saying yes and mentioned that she recently lost someone, which felt terrible for her. However, the friends she had in the house, like the other people participating in the focus group, helped easing the pain. W3 mentioned that everyone living in the building, including themselves, had experienced this pain. W1 continued by adding that being able to die while still having friends to talk to till the end helped a lot.

W2 on the other hand had a different view from the rest, stating: *"No I really don't feel lonely, yeah. I don't know the reasoning for it, why I don't, sure it is… It is fun to have someone who keeps in touch and that, but I don't feel particularly dependent on, on… Oh I don't know if it's because of there being so many siblings at home and you never got, got peace and quiet (laughing). I (think I) blame that, I don't know. But, and since I was the oldest, I had to take care of most things. But as said I was… Surely it is unpleasant if you would be alone constantly, if you put it like that. Sure it is fun to have contact and here I think I have it really well (others in the group expressed their agreements), because even if you don't live and sit together, but we do have a lot… Activities."*.We wanted to shed some light on the amount of motivation they had to improve their technical skills. The next question then was if they learned that they could use an application that gave them the opportunity to meet new people, would they want to start learning it?

The answer was surprising, because in spite of not owning any device (tablet - smartphone-computer) W1 said that whenever she visited her daughter who lived close by in the town, the daughter used something called Facebook. W1 then mentioned that it was quite pleasant and that she used to take a look at her daughter's Facebook on the smartphone where she saw other people on there who she was personally familiar with. W3 answered that they had heard about Facebook when we asked if they had heard about that social media platform. Then W3 added that if she got more money to afford buying a tablet, and if she had more energy to use it, she would definitely own one tablet, and use Facebook. W3 continued by starting to question us and show more interest about the tablet by asking how much money it costed, referring to the tablet. She started to explain what she needed before using and buying such a device by saying: *"You need to go on a course to learn, otherwise I just observe like this really I don't know anything, but it would be fun to learn if it stuck in your head."*.

We took the chance to ask them if they all were interested in using this technology, which everybody said yes, with the exception of W2 who had got a vision deficit, as brought up previously in the conversation. Then she added that the doctors had told her that because she was old and had this vision deficit, she could only read as usual and watch TV for only a while, but not for over an extended period of time.

Since they preferred to watch TV rather than using other technologies, we were then interested in hearing their opinion about mixing internet technology together with TV. We asked them if they had the opportunity to use those applications on TV (a big TV) to better see what was going on on the screen, would they be more interested to use it and test it?
W2: *"I don't think (that)…"*. She thought that we should keep going with the smartphones and tablets.

The next question touched upon the subject of personal relations. The participants were asked who they kept themselves in contact with on regular basis in the present day.

W1 mentioned that she had two sons who both had families. She still had good contact with them, in spite of not being dependent on having a lot of contacts. W1 then changed the topic to talk about her job in the past and how much she had fun in her previous job. W3 added by saying to W1 that it was now that it was meant for W3 to have fun. W1 responded that it was

fun for sure, but nobody could believe how much she had fun during her time being an active worker, and getting to be with her old colleges back in the day.
We wanted to elaborate more about her job asking W1 what it was that she did. She didn't mention anything about her position, but she said that she was working in a retirement house in Skellefteå, and she was still describing how fun it was when she was working there.

When asked who W3 was still in contact with at the present, she said laughing that she often met with her spouse who she lived separately with at the time whenever she wanted. In addition, she usually went to the church quite a lot in order to meet up with some people who used to be there. As for family members, she was a bit foggy by saying in the beginning that she didn't have a son or relatives, then she said that she missed her son and grandson. We could then realise what she meant, since when we asked if she still has contact with her family, she said that she lost contact with them since they had been separated for a long time. She continued by saying that they did meet that often and that they called each other rarely.

Then we wanted to know in what way they contacted each other by phone. W3 said that they (her son's family) wanted her to use Skype, but she had not done so. Then we asked again if she tried to test Skype because they asked her to use it, she said no because she needed to own something like a computer (pointing to the laptop in front of us…). W1 added by asking if they could also use Skype with smartphones. We responded yes as long you had internet access and the app was installed on the device.

We tried to direct the focus group more into the amount of social media usage in their lives by questioning them, if they had been asked by their relatives to start to use social media such as Facebook or Skype.

W2 said *"No we have never talked about (it)."* while the rest had no comments.

Elderlies probably have a lot of things that hinder them to live a normal life, so we went on by asking if they had any physical, or psychological hinders that affected their social lives.

In this question most of the elderly agreed that they got physical hinders, like having difficulties using the walker, and others were glad to be able to walk and stand at such an old age. They mentioned as well how the gym in the retirement house has been so helpful in this regard. Then things started to get more interesting when an elderly began to reveal the fact, that most of them had got more or less psychological problems. Suddenly everybody started to get encouraged to expose their dark side of their psychological life such as W1: *"Maybe if you were inside all throughout the day, then you don't know, maybe you stop taking your own end with fright."*. W4 added that she thought it would matter when the person became bedridden and could not manage everything him/herself. Then it no longer made a difference if she was dead or alive, perhaps one would prefer to disappear, she believed. W4 also added that she had never felt alone and whenever she felt alone she got bored and watched TV. In addition many of the participants again brought that they were so thankful that they were still able to manage many things themselves.

We expected to gain some ideas from the seniors on how to get a better connection with their families and acquaintances, to feel less socially isolated. They responded that they had no specific ideas. However, according to W1, being close to the family and spending more time with them was like a dream that would never come true. Other priorities, responsibilities, and lack of time were what hindered them to be in contact with each other like they were previously in life. W1 added that she wished to do more things with them, but she knew that they were busy with other priorities like jobs, and family and that they needed the time to relax. Then other women started to say seriously or jokingly that they were satisfied and had more than enough to do in the retirement house and they had got no time for anything else, or

they would lose their energy when they become old. They also added that they had the energy to only watch TV.

We were curious to ask if they were pretty satisfied with the amount of connections they had recently. The common answer for this question was that it was good as it was and there was no need to be in contact with more people. They were also thankful that they were not bedridden like when W3 mentioned that when people got bedridden they started to get worst kinds of feelings. She also added that they (the participants) could handle everything themselves.

Since one of the participants already mentioned that she had the energy to watch TV, we wanted W3 to elaborate on her answer more. Then we realised that TV was the biggest interest for all of them and that they used to plug it in with headsets so they could listen and watch in a better way. Regarding the woman W2 who had visual defect, we asked her if she had any problem watching TV in spite of her vision problems. She said it was going well and she could hear well when the headsets were plugged into the TV.

We wanted to know what seniors thought applications should look like to be more user friendly, or how the recent technologies should be designed for them. They responded that it should be affordable and that they needed guiding support by getting help from someone. To be able to use them and having pension would be supportive as well. They also mentioned that they had got some computer courses. However, it was only useful for people who owned a computer or a tablet. Regarding privacy W1 said: *"No camera in the bedroom"*. They stressed the idea of having more natural interactions between humans and computers, since they didn't want robots. W1: *"I want that a human should come in, a living human",* since all of them already mentioned that they don't have their own computer. W2 confirmed that she did not have a computer at the time.

One of the participants said that she needed a computer course to start using one. Then we thought it would be useful to ask if they would need a computer course only for one time, or to be in contact with a computer guy whenever they needed help. W3 responded that she would need an individual computer guy (laughing) to come and help her whenever she needed help. Then W3 added that when the person are sitting in a group that many people should be included. It often happened that the person would wait for a long time to get help. When we asked if they would be able to use computers independently after having intensive computer courses for some time, W3 declared that she did nott know since she had never experienced it before.

5. Discussion

Seniors in the focus group were used to masking their feelings of loneliness in the present and instead were looking back at their lives in fond manner, where they were surrounded by many people. They would love to do more things with the people who they were in contact with like family members for example, but they understood that they were busy with their own families, and jobs.

People over eighty were embarrassed and felt useless especially while watching TV, as a result of the many ads that usually popped up in the middle of TV programs, that asked them to surf their websites for more details about the product, or to apply for services that were solely available via web. This reminded elderlies of the fact that they were not capable anymore and they ended up missing a lot of interesting things nu not being able to buy or be a part of those services like other younger people.

As a result of the lack of technical experience, seniors were afraid of using modern technologies like mobile phones, and preferred the old models which were more simple as well as being more used to them. Like according to W4 who described her trip to a cottage when her modern mobile screen turned completely black and she couldn't contact anyone, which put her in a problematic situation. She then became determined not to use such modern technologies anymore and came back to using her simple phone.

Having bad memory is a big challenge for elderly according to W3 who had been taught the way to write an SMS message. She added that after one week she couldn't memorise the way to write an SMS. So she didn't SMS anymore.

They heard from their families and friends about some social media platforms, one them being Facebook, and what types of services that Facebook provides like texting each other and discussing about some topics. In addition they were pretty enthusiastic and curious to learn and start using Facebook whenever they get the chance to meet up with people who have Facebook and who are offering them the necessary help to make them able to use it.

One of the interesting findings that we captured from the study is that, among other all other devices, TV was the most preferable device to use in comparison of other technologies. The reason could be that it requires less commands, less interaction from the users, plus according to Wikipedia *"after the second world war the television sets became commonplace in homes, businesses and institutions"* (Television, 2017). This clarifies that having a good mental model by getting used to a technology such as TV for a long period of time since this technology is available in early ages, could make it more interesting, and easier to use than other technologies which are released when they get old. The issue of memorizing what they have learned and avoid to dismiss those technical information from their mind after a while is a big challenge to support elderlies.

At an early age they never thought that they would be in an urgent need to know much about technologies, expecting a graduate slow development in digitalization that would not make a significant effect in the near future, that could lead to changes in their lifestyles over the coming decades. When they began the ending stage of their lives, seniors realised that the exponential pace of technological advancement unfortunately was out of their expectations. In addition, they got the feeling that they would never be able to grasp all the new technologies, since their brain function had decreased in comparison to the past.

Seniors used to live close to their families and friends, but year by year many of their close ones were spread around to live in other cities or abroad, due to having better job opportunities, studying, or to follow their partners. This led to elderlies being more isolated and meeting up less or only occasionally with acquaintances and friends. One example was

W3, one of the participants who lost the connection with her son and grandson when they moved to another city. They were calling her occasionally in the beginning, but after some time they were not interested to be in contact with her anymore, and were only rarely calling each other.

In spite of the feeling of happiness because they were still able to manage many things themselves and be independent, elderlies were still very much worried of being bedridden. It might be due to the lack of contacts they have, which could lead them to suffer alone for the rest of years in their life until they pass away.

The following will be discussing how the related research is connected to these results.

First, regarding taking the advantage of robots to help seniors, as brought up by Goetz, Hirsch, Margaritis, Montemerlo, Pineau, Roy, Schulte, and Thrun (2000), and also mentioned by Dahl and Boulos (2013). However, according to the findings we gained from the study, seniors completely disagreed about getting help from a robot. They said they did not want to have robots and interact with them, but instead needed to interact with actual humans.

Regarding the impacts of computer technology on the elderly described by Van De Watering (2005), there is a parallel to be drawn to our results. Despite of the fact that those computer technologies would probably be very helpful, supportive to entertain, socialize, simplify their lives, and to provide a bunch of governmental e-services that are available solely via web, we would question how capable seniors over 80 are when grasping new technical knowledge. Considering the obstacles of having low technical skills, the ability of memorizing and learning the basic stuff, and go further to learn more advanced and complicated technologies. The results revealed that, regardless of having the motivation to improve the technical knowledge of the elderlies. They complained many times about their ability to grasp new technical knowledge. Or to understand how a specific technology works. Or the ability to memorise what they learned after a period of time.

Lehtinen, Näsänen, and Sarvas (2009) described in their paper that *"understanding the internet as a dangerous place, and social networking sites as places of socially unacceptable behavior, hinders the use of these technologies".* When going through the findings we realised that the seniors over 80 did not mention any hinders that could be a reason of socially unacceptable behaviors, or become a dangerous place. This data therefore neither confirmed or disproved this research.

Couture (2012) mentioned the increase in loneliness for people in general and elderlies in particular during the recent years. In our investigation in spite of being glad and social where they were working and surrounded by a lot of colleagues before getting retired, it was clearly conveyed that most of the seniors had the feeling of loneliness in their life in the present. They even mentioned the negative effects of being isolated in a room as well as being bedridden, which further confirmed Couture's findings.

Waterworth, Waterworth, Peter, and Ballesteros (2012) discussed how taking an active role as a senior in the design process was a positive aspect of making said group. While our own research did not confirm or deny the findings of this article, there was still an attempt to see if the participants could come up with their own solutions. Their lack of knowledge however did confirm that elderly were very uncertain and lacked confidence in their own abilities to adapt to the technology. The participants did not suffer from dementia or severe cognitive impairment, so that aspect was not as relevant to these results.

In the study that focused on elderlies over 80, all the participants had heard about Facebook and Skype, but nobody used any of them. One of the participants used to surf the web whenever she visited her daughter, or whenever she was around someone who was familiar with it. Then we could confirm the idea of Ariyachandra, Crable, and Brodzinski (2009), when they mentioned in their study that elderlies were not familiar to use social networking sites or Facebook in particular.

The EU-project Eldergames (Gamberini-Andres et al., 2006) brought up how elderly could improve their cognitive skills and individual well-being by playing on a mixed-reality platform with other people over a long distance. However, while our study did not deny any of the findings, it was fairly clear that the age group at and over 80 years would be struggling to see the usefulness in technology, whether it's about social media, games, or socializing over the internet as a whole.

The same issue apply in regards to the works of Vastenburg, Visser, Vermaas, and Keyson (2008). It is not about whether or if technologies have a positive effect or not, nor that they can prove to be valuable tools for elderly to keep their independence, but rather that the elderly need to be willing to learn these techniques, which they still showed to have a bit of interest in when being informed about what technology actually does.

6. Conclusions

6.1 Summary of findings

This is the opportunity to go back to the two research questions and answer them: *"What are the actual barriers for internet use among the elderly? Also, what could be done to address these barriers?"*.

When it came to the first research question, going through the findings that we got from the study, we realized that most of the barriers were related to the insufficient amount of technical and human support that were being provided by the municipality or the retirement home. Another barrier we could observe was that they didn't want to make an effort, simply because they could survive without using technologies. They also thought that they did not have the ability to learn them from the scratch, since they did not grasp any technical knowledge when they were younger. In the present it was more difficult to learn it at such an old age, when they lacked the technical skills, and began facing ageing impairments such as cognition, memory, eyesight, etc.

The feeling of loneliness was also easily conveyed in the study, which was another barrier that could not only affect internet usage, but their ability to function independently.

According to the data we gathered from the participants, it was quite obvious to see the lack of contacts they currently had in their lives after becoming seniors. Considering their physical and psychological hindrances, they needed help to overcome this stage of their lives where they encounter difficulties using recent technologies despite the fact of having a big desire to improve their technical knowledge.

Elderlies need to understand that they need to have the drive to start learning and using technologies that will be very helpful and supportive to entertain, educate, socialize, and to be involved in any sort of digitalization in the governmental services, as well as not feeling excluded anymore, as they themselves stated.

The final research question will be addressed in 6.3.

6.2 Limits and obstacles

It should be highlighted that the suggestions laid out in this paper are simply that, suggestions. While they are based on ideas that could be extracted from the data and analysis from interviewing these elderly around 80 and up, they have not been put into practice when designing for the elderly as of yet to address the barriers they have in relation to technology, the internet, and social media. Therefore it is not completely clear if these ideas will be what elderly people want once put into practice, which leaves open a potential area of study where they can be tried, and tested. This study is simply meant to be informative and put designers and researchers into the mindset of this demographic.

As mentioned earlier in this study, there were several issues with getting in contact with the target demographic, which increased the difficulty in getting the number of participants desired by ourselves, which was around 5-9 people. While it could still be argued that this sample still represents elderly at or above 80 years old that live independently, a larger sample would have still have been desirable. A more extensive study with more time and resources to get in contact with independently living elderly over 80 would assist in ironing out the flaws that presented themselves from a more limited sample.

Another limitation of this study was the complete lack of male participants. While statistically this made sense because of the average life spans of each gender, it does still leave

out one gender from the equation. Another area for further studying would be to get a male senior perspective within the desired age range.

6.3 Further work

There was the issue of the participants lacking in experience regarding the usage of internet technology and social media. We are still not completely certain that the lack of interest to use social media is limited only among seniors over 80 or if it was a pure coincidence with the participants we picked. Therefore it could be interesting to see what reasons that different age groups, both old and young, have for not being engaged in social media to see if reasons differ depending on age. This would better relate to Finn's study (2016) that discussed about the usage of social media and how younger seniors (50-64 years) adapted to them to a higher degree than older generations of seniors (65+ years).

As for ideas of solutions to address the second research question, a long term approach would be needed to build up knowledge among younger seniors. The earlier that you start to teach elderly about the tools to use things like the internet and social media, the better they will be able to adapt to a life above 80 years old. To start teaching people when they are already at that age will further complicate the transition to using technology to access things like social media and other internet features. However, if the option is not present, then active assistance would more than likely be needed to make it a part of their everyday activities.

Looking back on the past where they were working and surrounded by a lot of colleagues at work, gave an indication on what could be done to improve their current lives. By being surrounded by people who use technology, it would probably assist in triggering their curiosity to discover it. It would then also be necessary to keep these activities as local as possible so that the seniors are able to maintain their social circles that they value quite a lot. To emphasize the human interaction when using technology and integrate it into their current everyday social lives, like in a community center, would be a good start when investing into infrastructure that allows elderly to overcome the barriers they have surrounding internet use.

In terms of HCI, another suggestion would be to start investing in technologies or applications that require less or very little interaction from elderlies at or above 80 years old. This would help simplify the use of those technologies for elderlies and motivate them more to use them. In addition, to add more natural traits of interactions to the technologies, like speech interaction, could potentially make it more interesting for elderlies.

Finally, another area of study would be to see the long term effects of an investment in internet infrastructure, as well as of teachers that can be present locally to teach at places like community centers. That would in turn help find potential flaws in the system to evaluate the investment made.

References

Ariyachandra, T., Crable, E. A., & Brodzinski, J. D. (2009). Seniors' perceptions of the web and social networking. *Issues of Information Systems, 10*(2), 324-332.

Bullen, P. B. (2014). How to do great semi-structured interviews. Retrieved May 25, 2017, from http://www.tools4dev.org/resources/how-to-do-great-semi-structured-interviews/

Couture, L. (2012). Loneliness linked to serious health problems and death among elderly. *Activities, Adaptation & Aging, 36*(3), 266-268. doi:10.1080/01924788.2012.708846

Dahl, T., & Boulos, M. (2013). Robots in health and social care: A complementary technology to home care and telehealthcare? *Robotics, 3*(1), 1-21. doi:10.3390/robotics3010001

Finn, K. (2016). Social media use by older adults. Retrieved from http://wiserusability.com/wpfs/wp-content/uploads/2015/07/Social-Media-Use-by-Older-Adults.pdf

Folkhälsomyndigheten (2013). Åldrande befolkning. Retrieved May 25, 2017, from https://www.folkhalsomyndigheten.se/seniorguiden/halsosamt-aldrande/aldrande-befolkning/

Freitas, H., Oliveira, M., Jenkins, M., & Poppy, O. (1998). The focus group, a qualitative research method: Reviewing the theory, and providing guidelines to its planning. 22. Retrieved from http://gianti.ea.ufrgs.br/files/artigos/1998/1998_079_ISRC.pdf

Gamberini, L., Martino, F., Seraglia, B., Spagnolli, A., Fabregat, M., Ibanez, F., . . . Andres, J. M. (2006). The eldergames project. *PsycEXTRA Dataset*. doi:10.1037/e539162010-002

Goetz, J., Hirsch, T., Magaritis, D., Montemerlo, M., Pineau, J., Roy, N., Schulte, J., & Thrun, S. (2000). Towards personal service robots for the elderly. *Computer Science and Robotics Carnegie Mellon University*.

Hansson, M. (2017, May 10). Vill förbättra äldres livskvalitet med IT - Umeå universitet. Retrieved May 25, 2017, from http://www.informatik.umu.se/om-institutionen/nyheter/nyhetsvisning//vill-forbattra-aldres-livskvalitet-med-it.cid282460

Havens, B., Hall, M., Sylvestre, G., & Jivan, T. (2004). Social isolation and loneliness: difference between older rural and urban Manitobans. *Canadian Journal on Aging, 23*(2), 129-140.

HCI *Group Annual Conference on People and Computers: Celebrating People and Technology* (pp. 45-54). British Computer Society.

Heggemann, H. (1999). Andelen äldre fortsätter att öka. *Välfärdsbulletinen: fakta och analys om välfärden och dess fördelning*, (1), 29.

Lehtinen, V., Näsänen, J., & Sarvas, R. (2009, September). A little silly and empty-headed: older adults' understandings of social networking sites. In *Proceedings of the 23rd British HCI Group Annual Conference on People and Computers: Celebrating People and Technology* (pp. 45-54). British Computer Society.

Lindh, T. (2008). Sverige i en åldrande värld - framtidsperspektiv på den demografiska utvecklingen. *Underlagsrapport,* (13). Retrieved from http://www.regeringen.se/rapporter/2008/06/underlagsrapport-13/

Marmstål, Å., Rosén, M., & Rosenqvist, M. (2009, December 21). Svenska 100-åringar blir snabbt allt fler. Retrieved May 26, 2017, from http://www.lakartidningen.se/Functions/OldArticleView.aspx?articleId=13438

Peter, C., Kreiner, A., Schröter, M., Kim, H., Bieber, G., Öhberg, F., . . . Ballesteros, S. (2013). AGNES: Connecting people in a multimodal way. *Journal on Multimodal User Interfaces, 7*(3), 229-245. doi:10.1007/s12193-013-0118-z

Pritchard, M., & Sweeney, D. (2010). Semi-structured (qualitative) interview checklist. Retrieved May 25, 2017, from http://evaluationtoolbox.net.au/index.php?option=com_content&view=article&id=31&Itemid=137

Robert Wood Johnson Foundation. (2008). Semi-structured Interviews. Retrieved May 26, 2017, from http://www.qualres.org/HomeSemi-3629.html

Semi-structured interview. (2017, April 02). Retrieved May 25, 2017, from https://en.wikipedia.org/wiki/Semi-structured_interview

Shamugam, L. (2015). Aging Society, Loneliness And Social Support: Is Social Media Making Them Less Lonely?.

Sharp, H., Preece, J., & Rogers, Y. (2015). *Interaction design: beyond human-computer interaction, 4th ed*. Chichester: Wiley.

Social media. (2017, May 29). Retrieved June 01, 2017, from https://en.wikipedia.org/wiki/Social_media

Television. (2017, May 24). Retrieved May 26, 2017, from https://en.wikipedia.org/wiki/Television

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation, 27*(2), 237-246. doi:10.1177/1098214005283748

Van De Watering, M. (2005). The impact of computer technology on the elderly. *Retrieved June*, *29*(2008), 12.

Vastenburg, M. H., Visser, T., Vermaas, M., & Keyson, D. V. (2008). Designing Acceptable Assisted Living Services for Elderly Users. *Lecture Notes in Computer Science Ambient Intelligence,* 1-12. doi:10.1007/978-3-540-89617-3_1

Vetenskapsrådet (2002). *Forskningsetiska principer inom humanistisk-samhällsvetenskaplig forskning*. Stockholm: Vetenskapsrådet.

Waterworth, E. L., Waterworth, J. A., Peter, C., & Ballesteros, S. (2012). Seniors in charge of ICT innovation. *Proceedings of the 5th International Conference on Pervasive Technologies Related to Assistive Environments - PETRA 12*. doi:10.1145/2413097.2413150

Wise, S. E. (2011, September 16). What is the difference between qualitative research vs. quantitative research? Retrieved May 26, 2017, from https://www.snapsurveys.com/blog/what-is-the-difference-between-qualitative-research-and-quantitative-research/