Loneliness Amongst Elderly
A User Experience Design Approach

Jeroen Alblas

Eindhoven University

c.j.alblas@student.tue.nl

Hielke Wils

Eindhoven University

h.wils@student.tue.nl

Simone Forno

Eindhoven University

s.forno@student.tue.nl

Abstract

This paper addresses the phenomenon of loneliness of elderly people. Loneliness is defined as "*Experiencing an unpleasant or unacceptable lack of certain social relationships*". There are several studies available describing the risks and factors being in direct relation with being lonely. To gain empathy with the elderly people living alone, individual interviews were conducted. From those interviews, an affinity diagram has been constructed introducing seven main clusters. These clusters have been the basis for the ideation process in which a design concept has been created. The concept has to lower the threshold to engage with society and to increase (mutual) awareness about loneliness and its changeability. The concept is given by an activity box consisting of activity nodes that correspond to activities an elderly person potentially wants to do. Next to that, the co-constructing stories method has been applied in which both sensitizing and envisioning stories are created. This has then been applied in a second user interview.

Introduction

Loneliness is an increasingly occurring phenomenon in our society due to the growing number and proportion of older people. (Giesbers, Verweij, & de Beer, 2013) This project aims at proposing an intervention to combat loneliness amongst elderly by applying user experience design knowledge and practice. The method described in this paper is an in-depth interview with elderly people living alone as well as secondary persons such as family members. The purpose of the interview is to get a better insight into the daily lives and corresponding experiences of elderly people living alone.

Situation overview

Loneliness Definition

It is said that people feel lonely if the quality or quantity of social relationships, for instance with family and friends, is lower than is considered desirable for people's quality of life and well-being. (Perlman and Peplau, 1981)

The Dutch National Institute for Health and Environment defines loneliness as "Experiencing an unpleasant or unacceptable lack of certain social relationships". (RIVM, 2013) Two types of loneliness can be distinguished; social loneliness and emotional loneliness. Social loneliness means people have lesser contact with others than they would like to have, whilst emotional loneliness means that people miss a certain emotional connection with somebody. (RIVM, 2013) The latter means one does not need to be alone to feel lonely. The first, social loneliness, means one is alone most of the time by definition. In this context the individual can be in the state of being lonely but not all the time alone, being immersed with high degree of social cohesion, integration, solidarity and proximity with a community. Therefore, one of the roots for the elderly loneliness can be traced back in the loss of the so called *Gemeinschaft* (Schirmer & Michailakis, 2015), thus a critical view of the elderly towards modern the society and its anonymity.

More than 30 percent of people in the Netherlands from the age of 18 are lonely. In the Netherlands around 32 percent of the people with an age over 65 are feeling lonely, from which almost 13 percent are feeling extremely lonely (As et al., 2008). At the age of 90 and older even 65 percent of the people says that they are feeling lonely (RIVM, 2013).

Implications of Loneliness

Loneliness is an extensive problem for both the lonely people themselves as for the society they live in, due to the effect loneliness has on their health and the costs and care this implies. A number of risks can be defined; depression and health problems like heart attacks and high blood pressure (Losada et al., 2012) or loneliness feeling similar to physical pain (Cacioppo, 2009).

The research of Sample (2014), where more than 2000 people with an age over 50 where tracked, showed that people who reported to be lonely had a 14 percent higher risk of dying sooner compared to the average person in the study (Sample, 2014).

Behavioural analysis

First of all, socio-demographic characteristics have an influence on the feeling of loneliness such as low education and low income (Pinquart & Sörensen, 2001; Hawkley et al., 2008) and the household composition. (De Jong Gierveld & Van Tilburg, 2010; Demakakos et al., 2006) A deterioration of senses or chronic pain interfering with social contact can also maintain loneliness. (Stevens & Martina, 2006) Moreover, it has been found that people living in high urbanised and deprived neighbourhoods are lonelier. (Scharf & De Jong Gierveld, 2008) In that sense, Weijs-Perée et al. (2015) found that individuals feeling more attached to their residential location are less lonely. Access to quality interactions that are crucial for the necessities of life as well as social and emotional well-being is achieved by being mobile (Spinney et al., 2009) while 62 percent of people with decreased mobility feel lonely (RIVM, 2013).

Van den Berg et al. (2016) studied 344 people living in the province of Noord-Limburg in the Netherlands

There are **risk factors** and **risk behaviours** facilitating **loneliness**. They can be *changeable* or very *hard to change*. Having more positive and predictable relationships is more changeable than for instance having a lower socioeconomic status

Loneliness depends on several aspects such as;
- Mobility aspects
- Personality traits → cynicism, pessimism, distrust, etc.
- Built environment and neighbourhood
- Socio-demographic aspects
  - Education
  - Income
  - Living alone or together

Women living **alone** tend to have a **higher** chance of feeling **lonely**

during the period between January and March 2014. They found that the urban density level of the residential area was not affecting feelings of loneliness or social isolation. Finally, it was found that use of different transport modes significantly reduces loneliness as well as feeling well in the residential environment.

Also some personality traits such as cynicism, pessimism, distrust and being critical of others (Stevens & Martina, 2006), can facilitate loneliness. These traits, combined with lacking social skills, can make it difficult for elderly to meet new people or combat loneliness.

There are some risk factors and risk behaviours that can facilitate loneliness. Some of them are changeable, others are not or very hard to change. Examples of risk factors that are hard to change are the loss of the partner and relatives, being woman and having disabilities. On the contrary, there are risk behaviours that are more changeable such as being unable to visit relatives resulting from decreased mobility. (Losada et al., 2012; RIVM, 2013; Stevens & Martina, 2006)

Design Strategy

The goal is to create a design concept for elderly people that are lonely. To develop a concept, it is necessary to retrieve a thorough understanding of the experiences and daily lives of those individuals. The design strategy will then be based on the outcomes of the in-depth interviews held with a sample group of the target audience.

User Experience Design Approach

We relate to the world trough experiences. An experience is considered as "a story that emerges from the dialogue of a person with his or her world through

action" (Hassenzahl, 2011). User Experience design is a design field that, as Hassenzahl and Tractinsky (2006) argue, attempts to go beyond the task-oriented approach of traditional Human Computer Interaction Design by bringing out aspects such as beauty, fun, pleasure, and personal growth that satisfy general human needs but have little instrumental value.

The intervention development is approached from user experience design knowledge and practice to make the intervention not only useful, but also turn it into an enjoyable experience. If the user looks back at a positive experience after using a product or service, he or she is more likely to use it again. (Garrett, 2006; Jordan, 1998) This is something that is desirable with the targeted audience of lonely elderly, that should be kept from their loneliness experience as much as possible.

Ethical considerations

Any design project involving social and emotional fragile users, calls for ethical considerations. The User Experience Design approach in proposing an intervention that is aimed to promote pro-social change, presents several ethical dilemmas which should be taken into account (Brown & Singhal, 1998).

Communicating about loneliness too strongly might provoke the opposing perspective that loneliness is very common while before it was not even experienced as a personal problem. An ethical dilemma arises: Is it such a good idea to confront people with a higher risk of loneliness that do not actually express a request (or need) for help with this higher risk of getting lonely by making them participate to this intervention? Other research among elderly points out that an active participation to the intervention, combined with strong preferences of the participants, indicates that an

intervention focusing on mild symptoms instead of full disorders is meaningful and fulfils a need among elderly (Van 't Veer-Tazelaar, Cuijpers & Beekman, 2011).

We perceived interviewing lonely people as very difficult, in the first place because it is a very fragile subject, not only for the people in question, but also for their relatives. It is very hard, and maybe ethically wrong, to say Person A is lonely and Person B is not. Furthermore, we did not feel very well with the thought of interviewing who is lonely and then, after an hour when the conversation has finished, just leave that person with the idea that you were the first and last person visiting that individual for maybe two weeks or so. In that sense, it was decided to focus on elderly people living alone while not strictly being lonely.

User Research – Setup

Gaining empathy with elderly people living alone can be achieved by applying research methods such as playing an empathy game and conducting in-depth interviews.

Empathy games (First person perspective outcomes)

In user experience design, getting to know 'the user' is key. Literature research and interviews provide some insight. This is all based on interpreting the user as a third person though. That is why a first person experience, i.e. acting out the user experiences, as a design tool is embraced increasingly to gain empathy for the user. According to Kouprie and Sleeswijk Visser (2009), empathic understanding goes beyond knowledge: when empathising you do not judge, you 'relate to [the user] and understand the situations and why certain experiences are meaningful to these people' (Battarbee & Forlizzi, 2004) Many tools and techniques have been developed in the field of

empathic design to support this empathic understanding. (Fulton Suri, 2003)

An empathy game has been executed and filmed to allow us to relate a little more to the experience of being lonely. Initial literature showed that social loneliness amongst elderly is often due to a loss a people close by, particular personality traits and/or a loss of physical abilities. Because physical limitations can be replicated best, sight problems and a stiff walking gait where a starting point for the protocol that was developed in order to carry out the empathy game. Each of the participants had to be alone in a room with a window for a few hours but was allowed to go to a supermarket and a common room (like the ones you find in elderly homes or libraries) once, at a moment of his liking. The participants were not allowed to make contact with others unless they were specifically addressed by someone else.

Interviews

The interviews were conducted by each team member individual, as well as the according preparations. The approaches for conducting and preparing the interviews are given in Appendix A, for each member respectively. The elaborate personal outcomes and findings on the interviews can be found in Appendix B.

User Research – Results

Empathy games

Being alone in a room without much to do is extremely boring, already after a few minutes. If there was any task to be engaged with, one would feel much less useless and lonely. Not having anything to do, or not even being able to do things, is extremely tiresome; evidenced by one of us falling asleep from time to time.

Figure 1: Affinity diagram created by means comparing of the outcomes from the individual in-depth interviews

The physical disabilities are such a nuisance that it is easy to just give in and stop doing activities (that potentially involve social contacts). Especially the limited sight gives a feeling of being locked away from others, even whilst being close to them. Approaching others is much harder this way. It makes one extremely sad to realize that some people live like this for years on a row. It makes great sense now that physical disabilities are a catalyst for loneliness. The positive thing is though that there is potentially more room for improvement than for instance with particular personality traits and loss of people.

Interviews

The different outcomes of the interviews have been compared by creating an affinity diagram which is shown in Fig. 1 allowing us to group our findings into seven main clusters. These clusters are; feeling of loneliness, mobility, the role of the built environment and neighbourhood, the relation towards the society, the role of the family (members), personal negative aspects and the role of the partner that passed away.

As someone said: "People might enjoy being alone at home for one night, but I can assure that it is not that enjoyable 24 hours per day, 7 days per week." the feeling of loneliness is the first cluster. Persons also explicitly said that they sometimes have the feeling that they are too long at home, alone. While another lady said that she really makes sure she is not sitting at home the entire day. Be it just a walk through the neighbourhood, she really forces herself to not stay at home the entire day. And if the feeling of being lonely appears, someone said, she just calls someone she knows from the church community or family members. As a final remark, we would say that the feeling of loneliness is present, be it rarely. The interviewees try everything to make this feeling disappear.

Mobility refers to the relation between being alone and mobility, as found in the literature. (e.g. Spinney et al., 2009) We found out that people have the idea that if

they are no longer able to basic things they used to do, such as walking, they could end up in a feeling of loneliness. One person explicitly mentioned that her life changed notably compared to ten years ago due to physical impairments limiting the degree of mobility. Moreover, people feel comfortable when all the basic necessities such as a supermarket are very close to their home. While one lady specifically said that she is happy to still have the freedom of driving a car.

Thirdly, the role of the built environment and neighbourhood is important for the elderly people. It turns out that there is a need for an environment in which people understand each other's situation, while getting older also means losing a lot of parts of the environment, also in terms of losing friends and relatives. We also noticed that people that moved to another house during the previous five years find it important to have the possibility to regularly meet with their former neighbours. On the contrary, it was mentioned that it is even more important to have a good relation with the current neighbours by frequently meeting with each other and drinking coffee while talking about common subjects. This comes back in the literature that we found about loneliness. (e.g. Weijs-Perée et al., 2015) The neighbourhood contributes to the social well-being of an individual. Having the feeling of not being surrounded by the right persons or the right environment might form a risk for being lonely, that is why people find it so important.

The next category is with regards to the relation towards the society. Some respondents said that they perceived nowadays' society as a very fast moving world, e.g. by feeling less safe on the road and even when looking at their own family. Everyone has a busy job and smartphones are appearing constantly during conversations. To some extent, the relation between the fast moving society and elderly people is highlighted by the report of WRVS (2012).

A different topic was addressed by a lady saying that she really perceives a difference between women who never had a job and currently living alone and those

who also live alone but did have a job. From her opinion, the persons who did not have a job are lacking a network of former colleagues or people they met while doing their job. This relates to the risks of feeling lonely and socio-demographic background as described by e.g. Pinquart & Sörensen (2001).

The family appears to play an important role as well, so this forms a next category. One of the interviewees said that she really looks forward to the dinner she has together with her granddaughter, every two weeks on Wednesday evening. Also the fact that the contact moments with her family members are spread makes her less feeling alone. On the contrary, we found that having good comprehension from relatives was not sufficient to not have the feeling of being alone. From this, we conclude that even if there is intensive contact with family members, it is possible that the person is not feeling well. Moreover, there is a kind of responsibility related to other family members. The daughter of a women living alone mentioned that she was emotionally conditioned by her mother's state to take decisions for her anxiety and responsibility.

In general, it was mentioned that the connection with the family is one of the most important aspects leading to social well-being. It does not mean that children have to visit them very frequently, but they just want to keep in close contact by e.g. just calling them. One of the respondents recently wanted to drink some water and tumbled down in the middle of the night. She really needed help and luckily her son, whom she was able to call, just lives 5 minutes from her house. A report of WRVS (2012) also discusses this major role of the family, as they are particularly concerned that children are too busy to see their parents. Moreover, a survey of them showed that there are real pressures which families face in trying to juggle work and family commitments. Their findings reveal that the people who are affected the most by infrequent visits are the ones that are over 85 years and those living alone. The report also concludes that living alone, a lack of close

family ties and infrequent contact with children highly contributes to a sense of isolation and loneliness.

Personal negative aspects are related to aspects of the person self that have been worsened and directly influence the social well-being. Someone said that her health situation became worse the most recent years, negatively affecting her social life. It was mentioned that the feeling of mourning led to a personal isolation from everyday activities too. Also the lack of self-esteem lowered the person's autonomy, making the feeling of being alone even worse. Finally, a lack of security and control of the own personality was addressed. These findings correspond to literature with regards to e.g. the relation between health situation and loneliness or being alone. (e.g. Stevens & Martina, 2006; Scharf & De Jong Gierveld, 2008) The aspects worsening the ability of actively being in contact with others, addressed by the participants, correspond to the factors leading to loneliness, as described by the aforementioned papers.

Finally, the role of the partner that passed away turned out to be of high importance. We are talking about older people above 65 years old, meaning that people have been married or living together for several years. For instance, someone misses being together with the partner in the evening or during dinner. During the day, there is a lot of activity on the street or in the environment, but in the evening, being alone can be treated literally as such. One respondent even said that she was not able anymore to do the same activities she was used to do together with her husband since it did not feel right. However, this feeling of miss slightly disappeared by for instance looking at pictures of the husband that passed away.

Moreover, one of the respondents said that the memories to activities that she and her husband experienced together force her to go out and continue her life. This can be related to earlier studies discussing the role of the household composition and the corresponding risk of feeling lonely. (De Jong Gierveld & Van Tilburg, 2010; Demakakos et al., 2006) In this

Figure 2: Visualization of the ideation process

case, elderly people living alone were interviewed, so they are more deceptive for being lonely. However, in the theory, there was not a direct link between the degree of feeling lonely or the experience of being alone and the role of the partner that passed away.

Ideation

The insights from the individual user contacts allowed us to create a set of seven clusters of topics to be addressed, as presented earlier in this paper. The proposed seven clusters formed the basis of our ideation process. This process was made physical by means of writing material and a large piece of paper, as shown in Fig. 2. First of all, we linked as much topics as possible to each other to end up with relationships and eventual conflicts between them. As an example, the role of the neighbourhood is said to be closely related to the mobility aspects and the relation towards society. With regards to the latter one, we concluded that there is a need for emotional connection, being two-fold. First, people want to gain understanding from other people. Second, elderly people want to in touch with similar people who all have to do the same things. An important issue we addressed is the one of mutual awareness, which depends on; social translucence (if you want to share something, you have to make it visible), self-efficacy, and knowledge/awareness about others.

Our main goal is then to lower the threshold to engage with society, to get the elderly people out of their houses and meet other people. Furthermore, we consider the awareness as described above as well as the need for gaining understanding. Having set these boundaries, we thought of several concepts.

Figure 3: Activity box with indication of enabled or disabled activity nodes

One of them was a digital map of the environment in which people can interact with other people to plan activities or meet somewhere. Another idea was creating VR meetings to lower the threshold of meeting with others and to enlarge the knowledge and awareness of other people. However, we can imagine that the technology might frighten the elderly people. Furthermore, we think that there are also other physical and ethical considerations corresponding to this concept. People can potentially get dizzy or even become sick by making use of the VR technology. Moreover, there would be no experience of true human contact. Next to that – and maybe more extremely – we think that they might really lose grip on reality.

Concept

Finally, we were able to come up with our final concept that provided an answer to what we were striving for. It is a service that is built around a box consisting of nodes which are related to activities. People can subscribe for it and prolong it on a monthly basis. These costs might be partly paid by health insurance considering the health risks loneliness brings. (Losada et al., 2012)
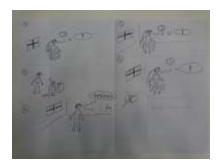
Figure 4: Sensitizing story of co-constructing stories method

Figure 5: Envisioning story of co-constructing stories method

The main idea is that the user can pick a preferred activity from the enabled activity nodes. (Enabled or disabled can be shown through illumination of the nodes as you can see in Figure 3) The selected activity node can then be put into a socket that is placed somewhere in the house. By doing so, an entire service will be activated. Imagine that the person opts for the activity 'going to the zoo'; a taxi driver will be automatically contacted and provided with the information who wants to be where and under what condition. From our opinion, this concept could potentially lower the threshold to engage with society. Furthermore it increases (mutual) awareness about loneliness and its changeability. Now the threshold is made visible to other stakeholders (such as family, the taxi driver, or even governmental instances and service providers). Also, the lower threshold to undertake activities increases self-efficacy through active coping.

Co-constructing stories – method/setup

Co-constructing stories naturally follow the ideation phase as earlier described. These correspond to the visual instruments to allow the participants to be sensitized upon the topic and furthermore investigate whether they empathize with the design concept that is developed.

Co-constructing stories generally consist of two main parts. The first part is defined as *sensitizing*, where the user is immersed in the context the concept was designed for. The aim is to get the target user involved in the situation described so that recognition by the participant is realized. However, this does not imply that the user surely has to agree with the situation that is described. The second, *envisioning* part, is used to engage the participant in the envisioned future situation that involves the design concept. Creating the envisioned story together with the user helps to get the user to engage with a potential future situation.
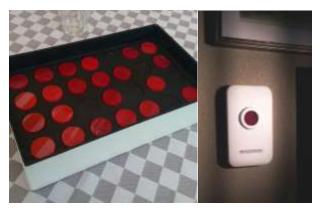

Figure 6: Photos of the physical concept of the activity box including activity nodes (left) and the socket (right)

This is necessary in order to find out if the design concept is in line with the user expectations and needs in this situation.

For the sensitizing story, shown in Fig. 4, an elderly person living alone has been selected as the main character. The individual sits on a comfortable lounge chair in the living room. While sitting there, a lot oftime passes by, and the character gets bored. Therefore the character gets up to make some tea and kill some time, only to find him/herself back in the chair after some time. The character would like to be with others – family for instance – or be in nature. In the mind of the character, though, both would include bothering others. Either family has to be called to come over and break their busy daily activities, or a taxi has to be called, such that the character could be brought to a nice park. Because of this threshold the character then just stays home. The root causes for this isolation or this restraint to *disturb* someone else can be multi-faceted, ranging from physical mobility problems to lack of self-esteem.

In the *envisioning* story, shown in Fig. 5, the situation is the same as before, but when the character either

does not know what to do, or feels a threshold to actually do something, the design concept comes in.

The character can easily find and select an activity node from a box after which this node is put into a socket that activates this activity. In the story, the character would like to play a game with other people. When this activity is selected, a taxi is ordered, to bring the character to the activity. After the game (for instance, Bingo or cards) the character is also brought back home.

A physical prototype of the design concept is made to clarify the concept even more for the participant, shown in Fig. 6. We trust this will help to enhance their envisioning of the concept. The participant does not get to interact with this physical prototype.

Co-constructing stories - Results

Due to the short amount of preparation time and the fact that people's privacy is protected extensively, only one participant was found to conduct the co-constructing story with. This participant was a woman at the age of 84 years old that has been a widow for more than a decade and has two daughters.

The sensitizing story resembled to the participant to a certain extent. She was in a comfortable chair at that time. Her chair even allowed her to have her feet up. It sits so comfortable that sometimes she thinks, she will never want to go out of it again. "Though after some consecutive hours, it will be too much for sure – unless whilst taking a nap perhaps".

She does have a newspaper subscription so she reads that every morning, also she makes a lot of cards. This keeps her occupied through the mornings. Sometimes – about once a month - she does this with a friend. Her daughter then brings this friend, so more often is not really possible.

Sometimes - about once a week or once in two weeks – her children and grandchildren come by. She does not want to bother them too much – "they are all so busy these days".

A five-minute walk away is a grass field that children gather on to play. It is just close enough for her to go there now and then. "Though it seems to be a longer walk every time." There is no supermarket nearby, so every Saturday morning her daughter gets her groceries. If she misses something she sometimes asks her neighbour. Though she does not want to bother her too often.

When her husband was still alive they often went out during the weekends. But that has been so many years ago. She is no longer permitted to drive her car and does not dare to use a bicycle anymore.

The envisioning story was received with great enthusiasm. The participant found the concept very interesting but wondered if it is not too good to be true. She mentioned that this would mean that she could suddenly come at places that would not be possible otherwise. Also the notion of having suggestions for activities really appealed to her.

The participant then realized that one would never know with what other people the activities would be done. This seems a bit scary for her and would also keep her from using the concept on a daily basis. She also wondered if this whole concept would not be too expensive.

At some point the participant realized that just selecting an activity type would mean not exactly knowing where this activity is. This seems scary to her, because she would like to inform her family on her whereabouts if she leaves the house for a longer time – "what if something happens?!"

The participant mentioned that the activity nodes should be big and clear enough to quickly understand what they stand for.

Conclusion

The UX Design method helped to gain empathy with elderly people living alone. Moreover it helped us to get a more genuine insight in how these people potentially get lonely and how they prevent to feel lonely next to

what we knew from literature. This information was gathered by means of individual interviews with elderly people living alone.

The design concept that was developed in the ideation phase and discussed during the co-constructing story is promising. Converting calling and arranging things to a simple physical action, really seems to take away the biggest threshold to find and take part in some activity that involves others. During the co-constructing story some issues on information provision came up. Leading to a sense of insecurity. However, those are easy to solve by adding this information.

The whole (improved) design concept obviously needs additional research. The co-constructing story is only conducted with one participant. For more conclusive results, more lonely elderly need to be able to give their opinion about the concept.

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Appendix A – Interview setups

Hielke

Elaborate conversations with a sample group of three elderly individuals living alone, taking approximately one hour were held.

The sample group to be interviewed consisted of three ladies with an age between 68 and 85 years old, whose husband had passed away. To make the interviews as comfortable as possible for the interviewees, it is decided to organize them within a trusted surrounding. This means that the conversations are planned to take place at their corresponding homes.

To support the interviews to be held, considering the fact that there is no (emotional) relation between the interviewer and interviewee as they are strangers for each other, it is decided to use a visual aid that is less emotionally charged. The main goal is to obtain an insight into the daily experiences of the target users, so an overview of the week will be provided to the interviewees which will serve as a guidance of the conversation. The intention is to, per day, have a discussion of the activities that occurred and the people that were involved during the preceding the day of the interview. Furthermore, the interviewee will be asked which activity she really wanted to happen but did not or the people she wanted to meet. This aid is not said to be strictly followed, rather, it is meant as a guidance for a fluent conversation.

With regards to the conversation itself, several sample questions have been formulated in advance in order to be prepared. These sample questions have then been tested with a couple of the researcher's relatives such that remarks or recommendations for the real interview could be gathered. Although these questions are prepared in advance, the main purpose of the interview is to let the interviewees talk as much as possible, whether this is related to questions or not.

Jeroen

After contacting several elderly homes whether some lonely people could be interviewed, it turned out that they would not that easily reveal these lonely people for privacy reasons, which feels a bit crude. After being allowed to attend an elderly meeting in an elderly home common room it seemed no one was actually lonely. A lot of people were even together (husband and wife) still. Some of them where in fact alone but had plenty of social contact moments, both within and outside the elderly home.

When at some point bluntly asked people indicated that they knew of some people to be lonely, but they were not present. Also they mainly suspect these people to be lonely. They hardly ever spoke with these people though. There suspicion was based merely on the fact that they don't see them leave there room that often and because they almost never visit social gatherings like this. Also they don't see a lot of visitors at their doors. Most of them are really old 90+ and have some physical disabilities that make it harder for them to go out.

It proved to be hard to reach out to lonely people. But that might just be in its definition.

Simone

The personal family environment was selected to be a new and innovative source of context to conduct the interviews and extrapolate data, different from elderly homes or elderly strangers. One of the reason behind this choice was the lack of english speaking knowledge when interviewing elderly native Dutch people. Therefore, being confident on this point, allowed to have a better empathy of the situation that was going on.

The interviews were carried out considering the main stakeholder, a 75 years old lady, widow for 7 years so far, and a secondary actor, her daughter, a lady of 50+ married and with two children. The old lady lives alone 5 days per week in an isolated village in the countryside. She was not affected by some particular impairments, apart from a medium blindness that caused her to constantly wear glasses. Her daughter lives far away from her and during the weekends usually goes to visit her, spending a couple of days.

The interviews were conducted physically meet the person and not by phone, in order to feel their personal expressions to the given questions. The interviewee were asked to describe the experience of their personal lives in the recent 7 years, just after the death of my grandfather, on the basis of whether they experience a personality change, which kind of emotions they remember of that periods and as the last one which kind of values did the mourning bring to change and crash in their personal lives.

The general timeline was divided into two rough periods. The first two years after the decease, and the last five years, in order to record some kind of development or change.

Even if the context was strictly personal, some interesting and unexpected results were observed, as will be discussed later.

Appendix B – Outcomes of individual interview sessions

Hielke

The first person that was interviewed is a 79 year old lady whose husband died one and a half year ago, which is actually quite recent. However, when I rang the bell, I immediately noticed a voice plenty of kindness and self-confidence which gave me a rather good feeling when entering the apartment building. Once I arrived at the right floor, she was already awaiting me and the person appearing in front of me looked like a very enthusiastic lady with a lot of delight in life, as if she had found the right manner of anticipating on the new situation of living on her own without her husband. So we entered the pleasantly furnished apartment which was dominated by several souvenirs from across the world. After five minutes I could already observe that the lady in question had a lot of engagement since she suggested that I should not be the only one taking notes. She really wanted to know my background and the reason why the interview was held and so on, so we were sitting there in her living room next to the enormous window being a physical piece of art due to its beautiful view towards the neighbouring park, writing down information about each other. At that moment, I already had the feeling that the next hour would be a very enjoyable conversation, and it actually was.
Throughout the interview she told a lot of stories about the trips she made with her husband; they saw Japan, the currently devastated Syrian city Aleppo and they lived in Africa for a couple of years. As she told, the great memories to these times being together with her husband form the main reason why she does not stay at home but goes outside. From her past, she knows that nothing special will occur whilst sitting in your living room. "You have to force yourself to make time to go out and make appointments with people or just talk about commodities with people you accidentally meet at the supermarket." This statement is actually the key subject of the remainder of our conversation. Preventing yourself of being alone and not seeing anyone is an activity that requires time and energy, you have to work for it. But once you know how to rearrange your life – of course the gap created by losing her husband will not be filled entirely – you are so happy that you put the enormous effort to go out that first time. And then the answer came to my question why she seemed to have successfully adapted to the new situation; she already had to say goodbye to her husband when he had to move to an elderly home. But from my opinion, she really re-organised her life in the right way, to give an example, she literally had to search for blank spaces in her agenda. As she told, you have to know the secret of picking up your life. She did that by continuing living the life she was used to in the sense of drinking coffee with a group of friends on a weekly basis, an activity they have been doing for more than 25 years. Since she is currently living in an apartment building, she had to be creative to do one of her favourite hobbies, namely working in the garden. So she decided to go to a gardening club that meets on a frequent basis. Furthermore, she really likes playing cards so that is also an activity she is doing every week. One of her sons lives in Thailand, however she does not see the distance as a beacon to not visit him on a regular basis. In general, she told me that the key thing of living alone is to make sure that you are not sitting at home the entire day. One of the conditions of being able to do so is of course the extent of mobility of the person in question. The lady in this case is physically in good condition and still drives a car, though she was thinking about the idea to sell it next year. This will have an impact on her mobility as she has to think of other ways to travel longer distances, but she assured me that she will avoid negative consequences on her social life. At that moment we had already talking for one hour, but I had to go to the next interview. If there was still time left, I think we had been sitting there in her living room for the entire afternoon.

The second interview was held right after the first one such that already some rough comparisons could be made. The lady I was going to interview was already awaiting me and wished me welcome in her house. As for the first interviewee, I started with a brief explanation of the interview and its purpose as well as our intentions of what we want to do with the outcomes. I immediately had the impression that this verbal information was more or less necessary in order to build up trust, later on in the conversation it would become clear why this was the case. The main difference with the previous discussion partner, the lady in question is a couple of years older and, maybe more relevant to mention, she is living alone for several years, after the death of her husband. In some way, it is rather difficult to explain in words, I really had the feeling that the death of her husband already happened some time ago. I would not say that living alone had become a habit, but compared to the other lady it was clear for me that her current situation is still the same as the one of several years back.

During the conversation we exchange different information about each other, at some moment even the telephone rang; it was one of her sons. That was a confirmation for me that what she earlier told me, was effectively the truth, namely that she frequently is in contact with her family. An example of that immediately follows after the phone call when she explains me that her granddaughter visits her every two weeks on Wednesday evening when they have dinner together. It becomes clear for me that this activity is of high value for her when she says that this week's dinner has to be postponed due to the fact that her granddaughter is on holiday. But not only her family is important to her, while she says that she finds it very important to live in an agreeable atmosphere in the sense of having good relationships with her neighbours. She tells me that a group of elderly people living in the same apartment building have agreed to meet each other on a regular basis to drink coffee. Furthermore she is part of a group of approximately five neighbours that takes a walk on Mondays in order to remain active. As she says, those walks are continuously becoming shorter and shorter since they become older and have a lowering physical condition, but she explicitly emphasises the importance to maintain these weekly walks, particularly for the social contact that is related to it. She admits that she is not someone who is sitting the entire day at home waiting for someone that could eventually come but will never appear. From her opinion, it is important to seek social contact as people will this effort of getting in contact with them as a kind of recognition which creates a good relation. However, then I ask her the question to what extent her life has been changed during the previous ten years. "Quite a lot", she responds. She says that she clearly notices that her mobility is getting worse which has a highly negative impact on her social life in the sense of putting restrictions on the ability of traveling longer distances. She does not own a car so she has to rely on public transport to go to places that are not in the close environment of her house. She says that she is happy to have so much warehouses and other kinds of shops at the ground level of her apartment building but she has to admit that she is not able to take the bus or train for a longer period of time anymore. In the past, that offered her the opportunity to visit her children on a more regular basis while they were not obliged to pick her up and bring her back home. In short, she finds that her worsening mobility is more or less restricting her freedom. However, she also says that it is a challenge to adapt to the current situation. That is the reason why she feels strongly about frequently seeing her friends and neighbours. Furthermore, she learned to work with a computer by herself which, in some way, bridges the gap created by the worsening mobility. To give an example, she agreed with her family members that she has to send them an email about how she is doing, every morning before nine o'clock. If this is not done, she assured me, the telephone will be ringing before half past nine, so it can be seen as a kind of social check.

We are reaching the end of our conversation when I get an answer to the feeling I have since the early minutes

of the interview, namely a clearly more inhibited impression than I had with the first interview. Although the interview went very well, there was a notable difference in terms of atmosphere, compared to the first interview. When I am leaving, I thank her for the interview and the trust to let a stranger come to her house doing an interview. At that moment she told me that she became a little bit suspicious with regards to strangers which stems from a housebreaking that occurred when she lived there for just one year. So I had an answer to my question why I felt the distance between us was a bit larger than for the first interview.

The first two interviews were held directly after each other, however, due to certain circumstances, the third interview had to be held the day after the others. An important note to be made is that there is a rather significant difference in age between the third interviewee and the other two persons. The lady in question is 68 years, so we can actually speak about a younger generation than the other two ladies who are 79 and 85 years old, respectively. We take place in her living room and start talking about common things. Soon it became clear that she had been living in Belgium for ten years, so there immediately was a kind of relation between me and the interviewee. Around the year 2000, her husband started to get some health issues for which he had to be treated at the hospital of Leuven (Belgium) and had to attend consultations with the doctor on a regular basis. As a consequence of that, they were obliged to move to Belgium to decrease the distance between their house and the hospital. The house they were living in was surrounded by nature and they had an enormous garden at their disposal. It was her husband's territory, she told me. However, his physical condition was decreasing rapidly and by the year of 2005 they had to recruit a gardener to do all the hard work. He would have be working there for five years until they decided to move back to the region of Eindhoven since the house became too large and the husband's health condition worsened even further. The man, although his physical condition did no longer allow

him to do a lot of work, tried to do as much as possible with the gardener which made that they had become very good friends. But then the moment came to sell the house and to say goodbye to the beautiful garden. While looking for an apartment in Eindhoven, it was a prerequisite to be located closely to all the daily necessities such as a supermarket, while on the same hand the building should be surrounded by a green environment, which brought the couple to the place where the woman is still living. After one and a half year living in the new house, the husband's situation had drastically worsened and he arrived at the hospital where he would stay three weeks and eventually die. She daily visited her husband and when arriving back home, there was the silence and nobody to talk to. However, her husband had been in the hospital so many times that she said to herself "within one week he will be back home and we can live again our old life". But he did not come back and in the very first months that was very difficult to deal with, as she told me.

Now, four and a half years later, she is able to place it in a right war. Of course it is impossible to fill the gap created by the death of the man she was married to for 45 years, but she says that she can now focus on completely other things which make her happy too. The only thing she regrets is that she did not hear anything from the gardener after her husband passed away, though they were each other's best friends during the five years they were working together.

In some way, the death of her husband caused a kind of switch in her life. It made her aware of the fact that she has to continue with her life and that she has to do the things she really like to do. She regularly meets with people from the neighbourhood they were living in the past while she is still active in the carnival association of which she and her husband have been members for more than 30 years. Currently, as she mentions, there are some very important aspects helping her to keep up having an active social life, two of them are her computer and her car. Her computer as well as her tablet is a necessity to be aware of what her

relatives are doing. She frequently uses Facebook to keep in contact with friends and relatives living in Australia since she lived there too when she was young. Then her car allows her for remaining independent in the sense of having the freedom to go wherever she wants, not being restricted by shorter distances. Recently, she had some health issues and she finds it very important to drive to the hospital by herself such that she does not have to rely on family or public transport. Talking about family, she says that she finds it very important to regularly see her two sons and daughter and their children. Last week, two of her grandsons went sleeping at her apartment, which she really likes of course. However, she is also happy when they go back home since, from her opinion, things are going too fast in todays' society if she looks how much things her grandsons want to have and what they receive. However, this does not have a negative effect on the extent to which she loves her grandchildren. She just notices that the current digitalised society is not the most enjoyable one. When we are reaching the end of the conversation, I hear a story I am already more or less familiar with, namely about the weekly walks organised by a couple of people from the neighbourhood and the coffee meetings with people from the apartment building. Hearing this story for the third time, with more or less the same arguments and opinions, I can only conclude that these people find it very important to be surrounded by a neighbourhood that understands them or that is in a comparable situation. They want to have people around them that make a going outside their house joy instead of an effort. Maybe this is then the one of the ultimate ways to avoid loneliness?

Jeroen

Information from the interview		
Gender	Man	Woman
Age	85	79

Information from the interview		
Education	HEAO	MULO
Married	Yes, until partner died 3 years ago	Yes, until partner died 8 years ago
Children	1 son, he sees him rarely	Two daughters. One just got a child. Live far away but both visit regularly
VR Experience	Funny and interesting	Bit of nausea, wonderful environment, fun
Holiday	Went to Toscana many times himself. Together with wife travelled the world for business. After work started to with caravan to southern Europe. Has not really been on holiday since loss of wife three years ago. Has holiday always, plenty to do.	Has never been in Italy. Would have liked to go sometimes. Went to Dutch bungalow parks together with husband until eight years ago. Has been going on group holiday (by recommendation of family) to Portugal three times. But does not really want to go any more. Has a holiday planned in Drenthe in a few months with two children and grandchild

Information from the interview		
Daily activities	Board of local Probus Club (for retired business or professional people) o TAX consultancy o Committee for activities in this elderly home o Eats often with others at elderly home or calls taxi to go to restaurant. o Watch tv (news (never misses 8 o clock NOS news) and talkshows)	o Eating: Breakfast Lunch in common room Diner alone or in common room o Sleeping o Calling daughters o Puzzles o Making 3D cards o Bookclub (once a mont) o Choir (once or twice a week) o Church (twice on Sunday) o Some visits and activities during the week
Have these activities changed a lot the past few years?	No, not really. Though I miss being together with my wife in the evening and during diner. Though the biggest change in activities was off course	Yes, a lot since my husband died. We were always together. Even when ding groceries

Information from the interview		
	when I retired. In the beginning I felt kind of depressed after retiring	
To what extent do you feel a need for more social contact? (none 1 – 10 a lot)	2 (especially family)	7 (sometimes too long alone in home)
To what extent do you have a need for social contacts that are of higher quality?	6 (everyone seems to be in a hurry, having a good conversation seems to be hard)	2
Could you imagine getting lonely?	Yes if I am no longer able to do the things I do now, physically -> walking to taxi, reading.. and mentally..	No, if I feel lonely I just call someone from church or my daughters. Though sometimes it feels bad to still be alone after calling. Luckily we have common gatherings almost every day.

Simone

Phase 1 (first 2 years)			
Person	Grandma	Mother	Me
Q1	It was incredible the way I experience the pass away of my husband: regarding the age (at that time I was 65). I was still developing some potentials, like taking care during the summer holidays of my nephews. From that moment on, suddenly, my life starts to be stagnant and have no meaning anymore. Feelings: emptiness, under-stimulation in engaging tasks. Personality: motivated à stagnant, mournful.	Having a nice family was not a sufficient condition for fulfill the lack of my father, it is mostly an intimate and personal experience, most of the time difficult to cope with and alienate with third parties. Feeling: Isolate Personality: Quite à nervous, intolerant.	I can personally confirm the statements hereby present of my grandma and mother. It was sad to see my grandma so static, on the meantime being excluded from my mother's mood, and willingness to help her with her status of that moment. The presence of mourning had 2 big consequence on her behavior: the first one, I notice she refused to be understood even from her relatives (intimacy), the second one being intolerant and getting hungry most of the times, just for an excuse to release her stress (this needed was recorded).
Q2	Before my husband died I was a self-confident person, and self-reliant. Suddenly, I lack of security and control of my personality. Values crashed: certainty of life, stimulus to laugh.	As a consequence of not being anymore satisfied with my personal family relationship, I crashed into my relatives expectations. Values crashed: personal stability related to family love	-
Q3	(Showing her some picture of her husband, in different occasions).	Seeing my mom apparently living two parallel lives, one struggling	Recording the same feeling as my mom. Emotions: sadness

	Some light came up in my ideas I that moment, and suddenly I remembered most of the scene we were be living together when young. **Emotions:** happiness, *nostalgia.*	with herself alone and the other jumping back in the past, made me feel sad. Emotions: sadness	

Phase 2 (last 5 years)			
Person	Grandma	Mother	Me
Q1	After some while you're just getting used to the feeling of being alone, but the mourning feeling has just passed away. I opened myself again to my relatives and now I needed constant	This was probably the most critical period I had encountered, having my mother always asking for me. We had to take the decision, and let her live some days with us, in the	Me and my sister were reading the situation of my grandma in a very negative way for her. Recording a **lack of self-esteem** was lowering her **autonomy**. She was not used to the new ambient

	attention. Strangely the feeling of **belongingness** to someone away from my personal intimate love, lead to put myself under the need of constant attention. **Feeling**: depression à resignation **Personality**: shy à egocentric	urban environment she was never used to live in. **Feeling**: Anxiety and responsibility **Personality**: nervous à frustrated	but she was happy to be there. **Feeling:** lack of privacy due to the constant presence of grandma (this might be taken into account for a future design).
Q2	Me and my husband were countryside people and farmers, we were used to collaborate together and solve problems together too. Now I am anymore interested even in the small house keeping things. **Values crashed:** pleasure and self-	Things changed after some times, and now my mother needed some stimulation from her only daughter she has. Therefore I was always in charge to get here doing some activities. **Esteem needs:** big	My grandmother developed a strange behaviour, on one hand she needed personal family belongingness, but on the other hand she was just lacking of being in charge with some tasks, in a stagnant way. From our point of view, this was

	stimulation	responsibility, workload	frustrating, also seeing my mom multitasking a lot for her. **Value crashed:** safety and order
Q3	Facing the outside part of the world is very different than your family ambient. In there you know what your limitations are. I loose most of the skills of being an "outsider" **Emotions:** shy	Villagers I was meeting during the weekends spent with my mother, were recording her movements. I was happy to know she was going outside **Emotion:** happiness	-