

# Reminiscence Map

## *Insights to Design for People with Dementia from a Tangible Prototype*

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**Abstract:** With higher life expectancy and an increasing number of older people, the number of people suffering from dementia continues to grow. Dementia impacts all areas of daily life and, in particular, communication with other people and maintenance of personhood. Technology is a promising means to address these challenges, yet approaches to design with and for people with dementia remain sparse. In our work we aim specifically to design interactive systems that can be used by people with dementia, e.g., as part of reminiscence therapy or generally to remember the past and communicate with others. In this paper, we present our research and design approach and exemplify one design case: the interactive Reminiscence Map, which was developed together with a person with early stage dementia. We show how this design served us as a lens into life of the care home residents and caregivers and provide design insights.

## 1 INTRODUCTION

Demographic changes and longer life expectancy lead to a growing number of people with dementia. In 2014, about 36 million people worldwide had Alzheimer's or a related form of dementia, the highest percentage living in Western Europe (Alzheimers.net, 2014). Over the course of the disease, dementia severely impacts memory, speech and language, thinking, orientation and social behaviour. As a result people with dementia have difficulties in all areas of daily life, often become frustrated and experience lower life quality. In extreme cases such frustrations can even lead to challenging behaviours such as unrest, aggression or apathy (Ferri et al., 2004). Unfortunately, there are no medical treatments available at this point to cure the disease. Instead psychosocial interventions play an important role in order to increase the wellbeing of people with dementia. Psychosocial interventions include among others reminiscence, reality orientation or memory training, which have proven to positively and sustainably influence challenging behaviours of people with dementia (Gallagher-Thompson et al., 2012).

Technology has recently started to play an important role in the area of care, mostly in the form

of assistive systems for the home care context (AAL). Systems for people with dementia often put users in a passive role, e.g., when GPS is used to track lost people (Miskelly, 2005). However, “[l]iving with dementia presents a range of challenges ripe for creative applications of technology” (Astell, 2009).

We believe, that the currently prevailing technology-led developments miss some important values and needs of people with dementia. Design approaches involving the target group resulting in technical artefacts for people with dementia have a higher potential to address these people's needs. Especially in the area of designing for reminiscence, maintaining personhood and communication new media technologies can be utilized in supportive ways.

In the so-called ‘NutzerWelten’ (English: UserWorlds, [www.nutzerwelten.de](http://www.nutzerwelten.de)) project our interdisciplinary team investigates ways in which multimedia technologies can be utilized to support and enhance the experience of reminiscence and communication for people with dementia. Until now, we conducted exploratory field research in different settings (e.g. a care home, day care and support groups) and developed a number of interactive multimedia artefacts to be deployed in

these settings for observation and discussion with people with dementia and caregivers. We intend to identify design possibilities for multimedia technologies that integrate smoothly into people's daily lives.

In this paper we focus, in particular, on one design case that emerged from our field research in a local care home. We describe the development of a tangible interface called Reminiscence Map – a physical map allowing the user to select a timespan and remember places and stories from that time. The map was co-developed with a person with early-stage dementia as a personalized artefact and discussed in an interview with the person and a focus group with the caregivers in the institution.

Our intention was not to evaluate this particular design for the purpose of generalization, but to use the interactive artefact (like other prototypes created in the project) as a lens into the lived world of people with dementia. Similar to Wallace et al., our Reminiscence Map “[a]s a tool of enquiry it revealed valuable spaces for design in dementia that have wider implications for interaction design” (Wallace et al., 2012). In particular, the analysis of the case surfaced themes for technology design (e.g., leaving a legacy) that had not originally been considered.

## 2 RELATED WORK

### 2.1 Psychosocial Interventions for People with Dementia

Researchers investigating dementia, especially those following a person-centred perspective (Kitwood and Bredin, 1992), believe that “the symptoms [e.g. depression and fears] and behaviours [e.g. unrest, aggression, wandering] of demented individuals are not solely a manifestation of the underlying disease process, but also reflect the social and environmental context, as well as the demented individual's perceptions and reactions. Psychosocial interventions can address these factors.” (Kasl-Godley and Gatz, 2000). Psychosocial interventions are even more important in light of the limited success of pharmaceutical interventions for dementia. Kasl-Godley and Gatz (2000) reviewed the six main psychosocial interventions for people with dementia: psychodynamic approaches, reminiscence and life review therapy, support groups, reality orientation, memory training and cognitive/behavioural approaches. Each intervention targets particular factors and addresses different goals. For instance, while psychodynamic

approaches are helpful for gaining insight in the intra-psychic experiences of the individual, reminiscence and life review help with creating interpersonal connections. Behavioural approaches as well as memory training, on the other hand, are less concerned with the subjective experiences, but target specific cognitive deficits. Generally, it is recommended to involve others in these interventions in order to “increase social contact, interpersonal communication and psychological health” (Godley and Gatz, 2000).

#### 2.1.1 The Role of Reminiscence

As dementia progresses individuals experience memory loss, disorientation and in later stages a loss of their sense of self. As such, it becomes increasingly difficult for them to engage in meaningful activities, although this is of high importance for their quality of life (Wood et al., 2009). „It is argued that reminiscence may be particularly important for demented individuals' psychological health given that the progressive deteriorating nature of the disease erodes the ability to achieve present successes and makes individuals increasingly dependent on past accomplishments for a sense of competency“ (Godley and Gatz, 2000). Since remote memory is usually spared for large parts of the dementia process, people are often able to recall events from the past. Even while processing memories may be compromised due to the brain damage, reminiscence can still provide structure in developing relationships or engaging with others (Woods et al., 1992).

### 2.2 Multimedia and Dementia

Especially when it comes to providing a window into the past, and thereby triggering memories, technologies have a supportive role. Multimedia including music, digital photographs and video can be used for reminiscence. Moreover, advanced technologies such as touch displays or tangible interfaces provide new opportunities to make media contents more easily accessible.

In the CIRCA project (Gowans et al., 2004) researchers created a multimedia application using video, photo and music to support one-to-one reminiscence sessions. The interface was intended to be used by caregivers initiating conversations with people with dementia. The authors reported positive results from user testing and even people with dementia being able to use the touch screen. More recent work of the same research team (Alm et al.,

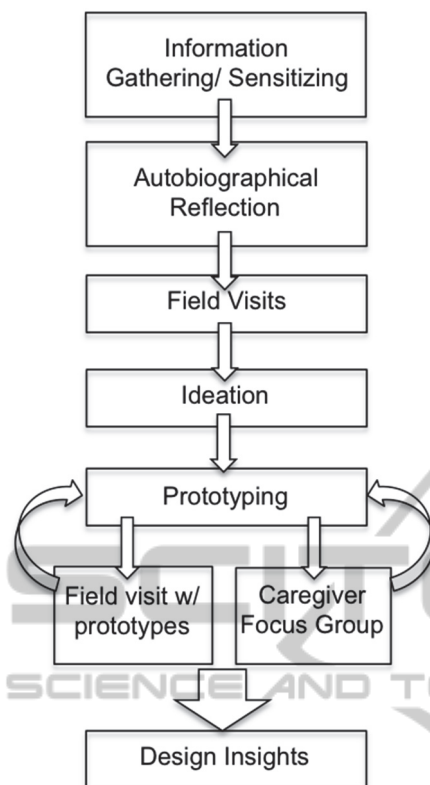


Figure 1: Research & Design Process.

2009) focused on multimedia for leisure. For instance, computer-generated 3D environments provided means for people with dementia to enjoy environments they once liked, but cannot visit anymore, e.g. a garden or a pub. Siriaraya and Ang (2014) utilized immersive 3D technology, in particular Unity3D and the Kinect, to create environments for reminiscence and meaningful activities (like gardening). However, people with progressed dementia had problems with the interaction.

Davis and colleagues (2014) examined, in particular, which type of video content elicited conversation in people with dementia. The authors found in an observation that generic video triggered more diverse comments and a broader spectrum of conversation topics. Two works (Waller et al., 2008; Wallace et al, 2012) investigated the television as a medium to provide media from the past or personalized media to people with dementia. This research showed that contents targeted to the individuals were catalysts for reminiscence and communication with relatives or caregivers.

Many of the works above prove that multimedia has indeed desired effects of supporting reminiscence and communication. However, the

majority of systems were either not meant to be used by people with dementia or posed difficulties in interaction for them – an aspect we focus on.

### 3 PROJECT CONTEXT

In the NutzerWelten project, researchers and designers from four disciplines (Media Technologies, Design, Electrical Engineering and Social Sciences) collaborate on solutions for people with dementia. Our research focuses on empowering people with dementia, on the one hand, through active integration in the design processes of new care technologies, and, on the other, by designing solutions adapted to their needs, values and abilities.

While from the perspective of informal caregivers providing safety is one of the most important functionalities of technology (Topo 2009), experiences from studies with people with dementia emphasized other values. For instance, communication with their surrounding, having a meaningful activity and establishing a connection with biographic aspects were identified to be of highest relevance for a good quality of life (Astell et al. 2009, Wood et al. 2009, Orpwood et al. 2007). Therefore, we focus on the design of technical aids to improve communication of people with dementia and people in their surrounding, preferably through the use of biographic aspects.

#### 3.1 Research and Design Approach

Designing for and with people with dementia is a sensitive endeavour and requires an empathic design approach (Lindsay et al., 2012). Emphasizing and creating trust is a first crucial step. This is why we had a 3-months period in the beginning of the research process (Fig.1) in which we gathered information about dementia through literature research, expert presentations and documentary films about dementia to sensitize the design team. Before visiting the field to get a first hand perspective we engaged in an activity where all design team members reflected about their own ways to reminisce, which objects trigger memories and in what ways. The first field visits were organized in close collaboration with the dementia service network in our city. We established contacts to several welfare organizations and were transferred to the key personnel in care homes (with stationary and day care) and in support groups for people with dementia. Several team members did (participant) observations and conducted either semi-structured

with caregivers or relatives or narrative interviews (Rosenthal and Loch, 2002) with people with dementia in order to elicit insights into their lived world.

In particular, these first visits were done during the course of one month and included: one visit of a day care centre with observation and an interview with a care manager, three visits to a care home including observations and interviews with five residents, several visits to three different support groups including participant observations (i.e. our team members took part in the groups' program), two interviews with relatives of people with dementia in their homes, one visit to a gerontopsychiatric unit of a care home with observations as well as one interview with a caregiver and one with a resident, and, last, one interview of a person suffering from Lewy-body dementia. Observations focused mainly on the (everyday) activities people engaged in, and on the interactions between people. The interviews with caregivers focused mainly on the practical aspects of care, the communication and ways to support people in reminiscence. Interviews with relatives were similar, but focused also on the emotional aspects of dealing with the disease of their loved ones, from diagnosis and throughout the course of dementia. Interviews with people with dementia in the care homes focused on biographical aspects and life experiences.

The collected data in form of video, photos, field notes and interview transcripts were discussed with the team and used in the ideation phase, where two brainstorming sessions were held involving around 6-7 groups of ca. three people each time (mixed groups composed of students and researchers with backgrounds in design, HCI, computer sciences and media technologies). The result was a large number of ideas ranging from interactive furniture (mirrors, carpets), technology-enhanced everyday objects (stuffed animals, books) to completely newly designed artefacts. While some ideas focused more on functional aspects such as day planning, we selected a final set of ideas based on their expected potential to foster reminiscence and communication, their expected ease of use for people with dementia, their practicality to deploy in different environments and their potential to stimulate different senses.

All selected ideas contained multimedia content (video, audio, light and sound), either as original content from the past, recorded stories about the past, or recorded content from today that reminded of events or places of personal significance. Six prototypes were built in the next phase that have been tested with people with dementia in the field.



Figure 2: Concept Design Sketch.

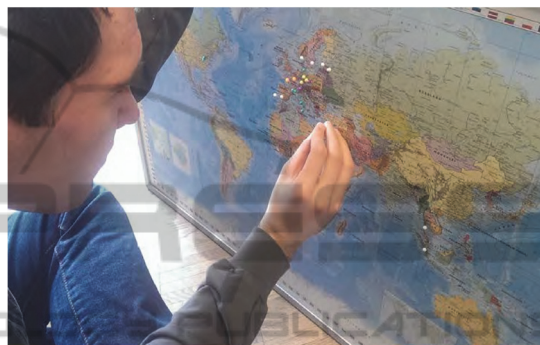


Figure 3: Marking important places during the interview.

We also conducted a focus group with two caregivers and two care managers in the care home, where we presented all prototypes and discussed ideas for further development. Each prototype was assigned to a different caregiver in the home, who helped with the further development and provided test settings with residents.

In the following, we will discuss one of the designs in detail to show how this interactive object gave us insights into the needs of a person with dementia and possible uses of interactive technologies in the care home. These perspectives are valuable for interaction design in this domain.

## 4 DESIGN CASE: INTERACTIVE REMINISCENCE MAP

### 4.1 Design Concept

In one of the interviews in the first field research phase, a person suffering from mild dementia (called Mrs Smith in this paper) expressed the wish to own a world map to mark all places that she had visited to use it as a memory aid for later.

A map is a well-known visual representation of geography. While physical maps provided guidance to people in the past, people use digital maps today.

In addition, a map is a good interface as „combining location information with visual images [or in our case recorded stories] might allow people to better situate past activities in context“ (Kalnikaite et al., 2010). In the brainstorming session the idea was developed to create an interactive map for Mrs Smith to not only support memories of places, but also have a way to link Mrs Smith’s stories to the right places and time (Fig. 2). While this could easily be built as, e.g., a tablet app, we decided to use a physical map, in order to create an intuitive user interface that does not require another digital device. A common representation for time is a time bar. To set a certain time span of a person’s life, we therefore, used a horizontal time slider with a big handle. To indicate visited cities in the chosen time span we used LEDs.

The stories told by Mrs Smith in a first interview were audio-recorded and could be played back for the chosen time span by pressing a physical button with a speaker icon. During the interview analysis we found that some important temporal information was missing to place all narratives onto the timeline. Therefore, a second interview was conducted to focus on the stories and missing dates and to reconstruct all events in Mrs Smiths’ life. Some difficulties occurred in this process due to memory deficits, but with the help of a world map and small needles (Fig. 3) most narratives could be placed in time.

## 4.2 Prototype Implementation

The prototype was developed as a tangible interface. The basis is a printed map of 60 times 40cm that was glued onto a corkboard (Fig. 4, top). The size was chosen as a balance between providing a good resolution and portability. The lightweight material allowed the map to be easily held with one hand.

The heart of the technical backend (Fig. 4 bottom) is an Arduino Uno microcontroller equipped with an audio-shield. All places were marked on the map using coloured 3mm LEDs to be controlled through the time slider, which was build from 6 mm cardboard (Fig. 5), a material used in advanced prototyping. We used two parallel rods on the backside of the slider, one made from copper and a plastic one wrapped with resistance wire (10  $\Omega$ ). The current of 5V sent through the wire drops depending on the position of the handle, which makes the electricity flow back through the copper rod that is connected to the analogue input of the Arduino. When a new position is retrieved, the respective LEDs are controlled via the PWM output of the

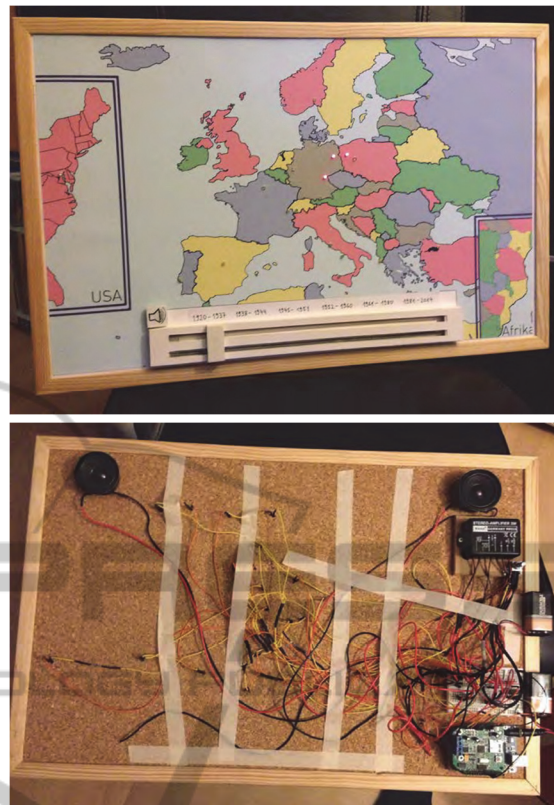


Figure 4: Prototype (top: backside, bottom: front side).

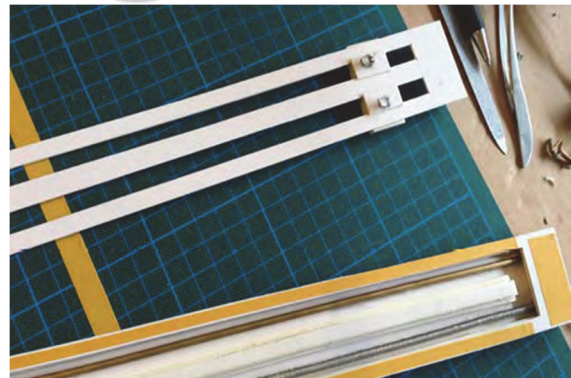


Figure 5: Cardboard Modelling of the time slider.

Arduino (using a shift register to control several LEDs in parallel). The speaker button is implemented as a simple push button with a cardboard interface. For each time span an audio file is saved on the micro SD card inside the audio-shield. When the speaker button is pushed, the position of the time slider is used to access the particular audio file. We used two miniature speakers (1 Watt) hidden on the backside of the map for audio output.

### 4.3 Mrs Smith's Life

At the time of the interview Mrs Smith was 94 years old. She was born in 1920 in Landsberg an der Warthe, Germany, which belongs to Poland today (and is called Gorzów Wielkopolski). At the age of six she moved to Berlin where she had a carefree childhood. Early on she found her calling in taking care of children and already worked for a year in a Kindergarten when she was 13. Later on, she became a paediatric nurse and worked for the Red Cross during World War II. After the war, she felt the desire to see the world. Working as a nanny for rich people this could be satisfied. Her first appointment as a nanny for a jeweller's children brought her to Italy and Switzerland, the second to the US and Denmark, and a third to Germany and France. In her stories today she refers to the children she took care of as "her children". During her retirement she continued traveling including trips to Russia, Scandinavia, Spain, Singapore and Africa. Today Mrs Smith lives in the care home where she is mainly tied to her bed due to limited mobility. She suffers from mild dementia, which was hard to recognize for us at first, but became apparent due to the difficulties when placing her stories in time.

### 4.4 Feedback from Field Visits

#### 4.4.1 Mrs. Smith's Feedback

We visited Mrs Smith a third time after the prototypical interactive map was built. We did not intend to do a controlled user test, but to elicit her feedback in an unstructured interview. The following vignette (based on the first author's field notes) presents what happened.

*We enter Mrs. Smith's room together with a caregiver. We greet Mrs. Smith and she immediately recognizes my colleague. I introduce myself and take a seat. Mrs. Smith asks curiously if there was already something to see. My colleague brought her a map as a gift to keep, where he marked all her visited cities. Mrs. Smith is surprised to find all the places on it. "Even Breslau is on it!" Then she says proudly, "but I was also in Africa." It seems that she hadn't immediately seen that Africa was also on the map. My colleague points it out to her and Mrs Smith starts telling a story about her stay in Africa. When her story is told my colleague demonstrates the interactive prototype and shows how it works by setting the slider on 1920. An LED lights up. "That's when I was born!" Mrs. Smith exclaims. After the demonstration Mrs. Smith teases the caregiver in the*

*room "That's great! Do you also have a map like this?" He says jokingly that there would not be any lamps lighting up on a map for him, because he has not seen much of the world. "What are you going to do with the map? Will it be in an exhibition?" Mrs. Smith asks. My colleague is surprised and says that our intention was to improve the map and maybe give it to her, but Mrs. likes her idea of making the map and her stories publicly available. "It could be interesting to other people to hear my stories," she says. Later in the conversation Mrs. Smith suggests that we could also give the map to her GP, who seems to be dear to her, after she passed away. "Then he can remember my stories." she says – her eyes filling with tears.*

*The conversation stops, it is quiet. Mrs. Smith looks at the marked places on the map and suddenly begins a new story about when she was crossing the border between the GDR and West Germany and was held captive at the border. A bit later, we hear another story about Mrs. Smith crossing the Atlantic Ocean by boat, to which we listen reverently.*

*When my colleague invites her to try out the map herself she takes it in her hand (Fig. 6). With shaky fingers she moves the slider and places it on a timespan. She presses the speaker button to start the audio, but the sound is a little low, so that she has to move the map closer. When we ask her whether it is strange to hear her own voice telling the stories, she says that she doesn't care. The caregiver suggests that we take a photo together. When he lifts her bed, she starts fiddling with her t-shirt to get ready for the picture.*

*Throughout our visit Mrs. Smith looks at the map several times and starts telling different stories about the places marked on the map. In another conversation break, I take the initiative to learn something about Mrs. Smith. I see on the map that she has also visited Scandinavia, where I once lived. I ask her about a place there, and she tells us an exciting story about a bus trip through Scandinavia.*

*In many of her stories she mentions 'her children', but when I ask her about how many children she had, she says surprised "None! I took care of children of rich people." She reflects for a while and continues, "Others had families and I travelled around a lot. That's life. I made the best of mine." In this moment she looks content.*

*After 30 minutes had passed since we arrived, she seems tired and we politely say our goodbyes and tell her that we will improve the map further and show her the results again, if we may. She smiles and says "Of course, if I can be of help. You are always welcome."*



Figure 6: Mrs Smith trying out the map.

We will return to different aspects from this field visit in the discussion section.

#### 4.4.2 Feedback from Caregivers

Besides discussing the interactive objects with people with dementia we also conducted a focus group with four caregiver/managers in the care home. In a two-hour session we first explained the goals of our research and then showcased all interactive prototypes, among these the Interactive Reminiscence Map. Each object led to discussions about its multimedia contents, the user interface and possible uses in different contexts in the care home. The complete results will be published elsewhere. Instead we focus here on the feedback that we received for the Reminiscence Map. Two aspects about the map were highlighted in the discussion: (1) its potential as a communication trigger via places and (2) its appearance (virtual/physical).

Although the map was originally designed as a person-tailored object for Mrs Smith, her comment about sharing her story with others, led to a reflection that the map could be developed further in a way that it holds several residents' life stories. With extended functionality it could then highlight places where several people have once been. *“That sounds good, because it is often like that. ... I often visit places and then I usually find a conversation partner, one person was also in Austria, the other knows Mallorca, the other Southern Germany. It is great [to communicate] via the cities.”* (female caregiver). Another aspect is that people may have visited the same places, but at different times, which would allow for conversations about how places changed over time. *“I think this is great, because it connects people. There is this outsider status that people with dementia still have – that would be released a bit, because there are places where everyone has once been. Places, everyone has*

*memories about. Even if some lose their memories slowly, there are still points that connect people. I think this is a great image.”* (female care manager).

Adding functionality to the map, such as finding overlap between users or showing additional media content (e.g. photos from the times people visited places) would be easier if the map was developed as a digital system using a screen. While the caregivers were not entirely against this idea, it was mentioned that the old physical maps (that were used in geography classes in school) would also be useful, as residents would still remember them. At least such old maps could serve as an inspiration, one caregiver said, even if the interface was digital. Another option could be a mixed reality solution projecting media content on a physical map.

## 5 DISCUSSION

In the following we present the themes that emerged from the field research, and, in particular, the feedback we received from Mrs Smith and the caregivers on the Reminiscence Map.

### Trigger of Memories

In the session with Mrs Smith we noticed that even the non-interactive world map with the marked places triggered a conversation. At least at this early stage in dementia it was easy for her to recognize the places on the map as places that were important in her life and she immediately started telling stories about them. The interactive map added the time dimension to this. When the time slider was set to a certain time period, Mrs Smith saw the places light up and referred to the time in the narratives. Given our experiences from the first two interviews with Mrs Smith, in which it was sometimes hard to match the stories to the correct timespans, the map supports remembering places and time. Similarly, Kalnikaite and colleagues (2010) emphasized the value of locational information for aiding memories, and, in particular, for supporting inferences being made about past experiences.

### Communication Points for Others

Equally important to the memory support for the person with dementia, we experienced ourselves the benefit of the interactive map in conversations with someone we know little about. One of the researchers who had not met Mrs Smith beforehand, could easily see on the map where Mrs Smith was born and which places she had visited at which times in her life. Especially in the case of places that the researcher had also lived in, it was easy to begin a conversation with Mrs Smith. It was also confirmed

in the focus group that caregivers would use, for instance, recent holiday trips to start a conversation with residents, e.g., asking if they had been there.

#### **Integration of Multimedia and Physical Objects**

Existing multimedia systems already facilitate the sharing of stories and life events. They are, among others, available as online platforms, apps or other software. However, these are often not accessible to seniors, who are less technology savvy. Especially people with dementia have limited capacity to learn new interactions with digital user interfaces. Physical objects, however, provide at least three advantages: (1) interactions are based on familiar and basic actions (such as grabbing, moving or lifting objects), (2) they provide haptic stimulation, and (3) they often allow for shared interaction in a social setting. In our prototype we used the strength of both tangible interaction and multimedia content to provide a rich interface to cue reminiscence and allow for active use by people with dementia. In the user session with Mrs Smith, we could not observe any hesitation to use the interface. Instead Mrs Smith was curious about the map. We also did not have to provide lengthy explanations of how to operate the map. In addition, the caregivers highlighted in the discussion about a digital extension of the system, that the tangible aspect of the prototype is important for the target group. They suggested that the map could even have a more antique look and feel to it to trigger memories about maps used by the people in the past.

#### **Equal Level Communication**

Places provide a good means to trigger conversations with people with dementia, not simply because many people have visited the same places in their lives, but also because places are deeply intertwined with one's life story, which (1) allows residents to share their knowledge and (2) supports their life review. Keeping in mind that "[d]espite experiencing degeneration of short-term memory function, people with dementia (including individuals who are severely impaired) can very often retain a facility for long term memory that will function strongly given appropriate stimulation" (Gowans et al., 2004), communication about their past should be possible for people with dementia until the later dementia stage.

As the care manager said in the focus group, an interactive map showing several people's places and stories, allows for a communication on an equal level between residents and caregivers. While people with dementia may have difficulties in taking part in conversations about everyday happenings or recent events, talking about important stories in their lives

and discussing how places changed over time allows them to feel empowered. It puts emphasis on the vast experiences and knowledge that people of high age have. The interactive artefact would support the identification of interesting conversation topics between people, who, e.g., visited the same city or country at the same time or different times.

#### **Leaving a Legacy**

Closely linked to sharing one's life story with others in current conversations, is the aspect of leaving a legacy. For us, as designers of technology to support everyday life for people with dementia, Mrs Smith's reaction in the try-out session was rather surprising. While we expected the Reminiscence Map to be a tool for reminiscence for Mrs Smith herself, it became clear in the conversation that Mrs Smith was more concerned with preserving her life story for others after she cannot tell it herself anymore. Several times in the conversation she talked about placing the map in an exhibition for others to see or bequeathing it to someone she knows. She explicitly pointed out that it would be interesting for others to hear the stories, because she had travelled the world so much. While it remains unclear to us whether traveling the world was her own choice or simply a result of her life circumstances, her reflections on her life seemed to make her content and leaving her stories as a legacy beyond her own life span seemed important to her. Maybe it is especially important because she has few people left and no family of her own to continue telling her stories.

Important for the design of interactive artefacts, is to revise our assumptions of what is important for our target group and seeing the possibilities interactive technology can play in addressing their needs. While we assumed that communication in everyday life is an important need that technology should support, in this case, providing a means for casting one's experiences into an artefact that can be made accessible to others beyond one's life, surfaced as an important need, not in the first interviews, but in the session with the interactive prototype. Thus, the technology becomes a tool for a very different type of communication.

## **6 NEXT STEPS**

Based on the feedback we received for the Reminiscence Map, a wish to scale up the system arose. On the one hand, from the perspectives of caregivers, it could facilitate the moderation of group activities. On the other hand, from comments



of Mrs Smith, we realised that it could provide older people a way to tell their stories and make it available to a larger audience (e.g. in a web platform, as an installation in a museum etc.).

Therefore, a more sophisticated multimedia system that can store several people's stories and can be used in a care home or in dementia support groups to foster the communication between several residents/ participants and caregivers was envisioned. Especially social workers in dementia networks were interested in a support system that could be used by a group moderator or therapist to start up a communication between several people with dementia. In support groups it is already common that the group leader provides material such as postcards, photos or picture books on different topics that could be interesting for the participants. In biography work with single patients therapists or social workers explicitly work together with the patients on their past. Making use of digital technology to store information about (several) people, to provide a range of either personalized or generally relevant multimedia instantly and to have the functionality for identifying commonalities in the places experienced by users, was seen as an added value in these settings.

Based on this feedback we decided to implement an online platform that can provide this functionality. A simple prototype was designed that comprises of a database storing user profiles and their stories linked to time and place. Each user's, or so-called narrator's, places are marked on a map with a different colour. By adjusting a time slider one can see which users were at which place during the selected time. By selecting a place, one can see all stories of all users linked to the place. It is also possible to select single narrators and retrieve only their stories.

We have not tested the prototype yet, but would like to highlight two challenges we foresee, (1) the effort of feeding the system with the stories of several users, and (2) making sure that people with dementia remain in a position that empowers them to take initiative in the communication. The first challenge can be addressed by providing an easy-to-use interface for social workers, therapists or relatives to upload or connect media to the system and record stories linked to time and place. Providing this input could be done in the sessions with people with dementia, and thus become part of the communication itself. While support groups work with small groups of people, it has to be seen in how far it is, however, feasible to do this in a care home with many residents. The second challenge is clearly

difficult to address with a purely digital system. As discussed above, it is just the tangible aspect of the slider and the map itself that allowed people with dementia to initiate the interaction. Therefore, we will work on a solution of combining an online platform with tangible input devices.

We would like to note again, that the intention of our work is not to develop each initial prototype into a fully-fledged product that scales up to the market. However, extending the map to a multi-user system arose from the needs of our study participants in their daily work/lives. In addition, the discussed challenges are not unique to the Reminiscence Map, but to other types of multimedia systems providing personalized collections for reminiscence and functionality to foster communication between group members.

## 7 CONCLUSIONS

The work presented here provides a snapshot of our larger research endeavour to design interactive multimedia artefacts for people with dementia to support their reminiscence and communication with others. In this paper we put the focus on one of the designed artefacts to show how this prototype could give us insights into the experiential world of a person with dementia and at the same time could be used in a focus group with caregivers as a probe triggering new ideas for designs in the care context.

Besides this specific design case we are also field-testing several other designs (e.g. an interactive book, a virtual window to familiar places and a TV program for reminiscence). Based on the results of all evaluations, we intend to provide general guidelines for the design of interactive multimedia artefacts that support people with dementia in reminiscence and communication in different care settings. We should take into account that communication is manifold, and can also refer to communication beyond one's own life. In any case, the current case taught us to look carefully into the communication needs of people with dementia to check our own design assumptions.

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## REFERENCES

- Alm, N., Astell, A., Gowans, G., Dye, R., Ellis, M., Vaughan, P., Riley, P., 2009. Engaging multimedia leisure for people with dementia. *Gerontechnology* 8(4), 236-246.
- Alzheimers.Net, [www.alzheimers.net/resources/alzheimers-statistics/](http://www.alzheimers.net/resources/alzheimers-statistics/), accessed December 2014.
- Astell, A.J., Alm, N., Gowans, G., Ellis, M., Dye, R., Vaughan, P., 2009. Involving older people with dementia and their carers in designing computer-based support systems: Some methodological considerations. *Universal Access in the Information Society* 8(1):49-59.
- Davis, B. H., Shenk, D., 2014. Beyond Reminiscence Using Generic Video to Elicit Conversational Language. *American journal of Alzheimer's disease and other dementias* 30(1):61-8.
- Ferri, C., Ames, D., Prince, M. 2004. The 10/66 Dementia Research Group: Behavioural and psychological symptoms of dementia in developing countries. *International Psychogeriatrics* 16:441-459.
- Gallagher-Thompson, D., Tzuang, Y.M., Au, A., Brodaty, H., Charlesworth, G., Gupta, R., Lee, S.E., Losada, A., Shyu, Y-I, 2012. International Perspectives on Nonpharmacological Best Practices for Dementia Family Caregivers: A Review. *Clinical Gerontologist* 35:316-355.
- Gowans, G., Campbell, J., Alm, N., Dye, R., Astell, A., Ellis, M., 2004. Designing a multimedia conversation aid for reminiscence therapy in dementia care environments. In *CHI'04 Extended Abstracts on Human Factors in Computing Systems* (pp. 825-836). ACM.
- Kalnikaite, V., Sellen, A., Whittaker, S., Kirk, D., 2010. Now let me see where I was: understanding how lifelogs mediate memory. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 2045-2054). ACM.
- Kasl-Godley, J., Gatz, M., 2000. Psychosocial interventions for individuals with dementia: an integration of theory, therapy, and a clinical understanding of dementia. *Clinical Psychology Review* 20:6, 755-782.
- Kitwood, T., Bredin, K., 1992. Towards a theory of dementia care: personhood and well-being. *Ageing and society* 12(03): 269-287.
- Lindsay, S., Brittain, K., Jackson, D., Ladha, C., Ladha, K., Olivier, P., 2012. Empathy, participatory design and people with dementia. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 521-530). ACM.
- Miskelly, F., 2005. Electronic tracking of patients with dementia and wandering using mobile phone technology. *Age and Ageing* 34(5): 497-499.
- Orpwood, R.D., Bjerneby, S., Hagen, I., Maki, O., Faulkner, R., Topo, P., 2004. User involvement in dementia product development. *Dementia* 3(3):263-279.
- Rosenthal, G., Loch, U. 2002. Das Narrative Interview, Social Science Open Access Repository, [http://www.ssoar.info/ssoar/bitstream/handle/document/5767/ssoar-2002-rosenthal\\_et\\_al-das\\_narrative\\_interview.pdf](http://www.ssoar.info/ssoar/bitstream/handle/document/5767/ssoar-2002-rosenthal_et_al-das_narrative_interview.pdf), accessed July, 2014.
- Siriaraya, P., Ang, C. S., 2014. Recreating living experiences from past memories through virtual worlds for people with dementia. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems* (pp. 3977-3986). ACM.
- Topo, P. 2009. Technology studies to meet the needs of people with dementia and their caregivers a literature review. *Journal of Applied Gerontology* 28(1): 5-37.
- Wallace, J., Thieme, A., Wood, G., Schofield, G., Olivier, P., 2012. Enabling self, intimacy and a sense of home in dementia: an enquiry into design in a hospital setting. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 2629-2638). ACM.
- Waller, P. A., Östlund, B., Jönsson, B., 2008. The extended television: Using tangible computing to meet the needs of older persons at a nursing home. *Gerontechnology* 7(1): 36-47.
- Wood, W., Womack, J., Hooper, B., 2009. Dying of boredom: An exploratory case study of time use, apparent affect, and routine activity situations on two Alzheimer's special care units. *American Journal of Occupational Therapy*, 63(3): 337-350.
- Woods, B., Portnoy, S., Head, D. Jones, G., 1992. Reminiscence and life review with persons with dementia: Which way forward? In *G.M.M. Jones & B.M.L. Miesen (Eds), Care-giving in dementia: Research and applications*, 137-161.