Supporting Social Interaction in Care Environments: Exploring Stakeholder Perspectives on the Potential of Interactive Technology

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Abstract

This paper explores care stakeholders' perspectives on how interactive technology can help form socially active environments in residential care settings. Based on participatory workshops, involving representatives from multiple stakeholder groups, we identify a set of considerations relevant for design of *social inclusion technology* for care settings. The design considerations relate to the following topics: *Users*, *Places*, *Themes*, *Value* and *Role*. We also present three mock-ups emanating from the workshops, representing the participants' visions as to how technology can contribute to social interaction by accommodating considerations related to the above topics. The results from our study highlight the importance of social inclusion technology being firmly anchored in the local and collaboratively produced care environment. In particular our findings illustrate how *the local* – i.e., the wider social context in which the care residents live, and in which activities and things gain social meaning and value – can offer a rich design space and valuable source of inspiration for social inclusion technology. Potential negative implications of social inclusion technology are also briefly discussed.

The main contribution of this paper is an increased understanding of the intimate relationship between designs for social inclusion and the wider social context in which care residents live.

Keywords: social interaction, residential care, interactive technology, participatory design

Supporting Social Interaction in Care Environments: Co-Exploring the Potential of Interactive

Technology

Social interaction is essential for the health and well-being of everyone, ranging from

childhood to old age (Charles & Carstensen, 2010; Greaves, 2006). Some demographic groups,

such as senior citizens, are especially at risk of social inactivity and isolation due to, for example,

functional decline, illness, or loss of spouse, relatives or friends (British Columbia Ministry of

Health, 2004; Nicholson, 2012). Place of residence is also associated with social inactivity

among elderly. Especially, the transition to a residential care home can have a large impact on a

person's life situation and sense of belonging (Lindley & Wallace, 2015). Studies indicate that

the experience of living in residential care home environments can potentially increase the

perception of social isolation and loneliness (Association of Advocates for Care Reform, 1997;

Fessman & Lester, 2000; Slettebø, 2008; Tuckett, 2007).

Interactive technology is becoming increasingly interwoven with the people's social

lives, offering alternative arenas for socialization, and new ways of social interaction (e.g.,

(Kachouie, Sedighadeli, Khosla, & Chu, 2014)). However, for many elderly people currently

living in residential care homes, interactive technology often plays little or no role in daily social

life (Müller, Neufeldt, Randall, & Wulf, 2012). Given the problem of social inactivity among

care home residents, and the socializing potential offered by interactive technology, a relevant

research question is: *How can interactive technology contribute in the forming of supportive,*

inclusive and socially active care environments from the perspectives of key stakeholders?

Understanding how interactive technology shapes our social worlds and interactions has

been a central topic within Human-Computer Interaction (HCI) ever since the research field's

"turn to the social" in the 1990s. Yet, the research question above has not been extensively

studied in HCI research. To contribute to the body of knowledge on the topic, we explore in this paper how people affiliated with residential care centers—either living in, working in, or otherwise playing a part in shaping the social life of a care environment—look on the idea of using interactive technology to help promote and facilitate social interaction for care residents. In remainder of this paper, we use the term *social inclusion technology* to refer to interactive solutions designed to support groups at particular risk of becoming socially marginalized.

Our investigation has followed a qualitative, participatory, and explorative approach. Through a set of workshops conducted in three residential care centers, and in which multiple care stakeholders have taken part, we have collected data on practices and perceived challenges related to social interaction within each center. Through low-fidelity prototyping activities, we have co-explored ideas as to how large interactive displays potentially can help remedy such challenges by supporting collocated social interaction. Our focus on *collocated* social interaction is rooted in social presence theories (Argyle & Dean, 1965; Wiener & Mehrabian, 1968), in which awareness of others taking part in an interaction is considered central for interpersonal involvement. As such, we wanted to build on the emotive qualities of "same time, same place" interaction, such as ambiguity, negotiation, visual communication. Exploring ways to support collocated social interaction in residential care centers also make sense from a practical perspective, as residents tend to live in relative short distance from each other.

The main contribution of this paper is an increased understanding of the intimate relationship between designs for social inclusion and the wider social context in which care residents live. This wider social context, we argue, helps define the design space for social inclusion technology and can offer a rich source of inspiration for design.

The structure of the paper reflects its explorative nature. We continue in the next section by describing background and related work, drawing specific attention to person-centered care philosophy and selected HCI studies on the use of interactive technology to support social interaction for people with special care needs. Next, we account for preliminary research activities before our participatory and workshop-based study methodology is presented. We then present the main results from the study in the form of key design considerations and how they emerged through collaborative prototyping activities in the workshops. Following the description of the main results, we discuss their key implications for design of social inclusion technology for residential care homes. Finally, some reflections about the applied methodology and limitations of the study are provided, before we end the paper with some concluding remarks.

Background and Related Work

Person-Centered Care

This study takes inspiration from the British social psychologist Thomas Kitwood and his philosophy of *person-centered* (or resident-focused) care (Kitwood, 1997), which emerged during the 1980s. Person-centered care was initially developed as a care philosophy specifically for people with dementia, and led to a paradigm shift in the culture of dementia care. Kitwood argued that the culture that dominated dementia care practice at the time, to a large extent was task and disease-oriented, focusing mainly on provision of basic physical needs and on managing disease symptoms. This culture, Kitwood claimed, diminished human psychological needs such as comfort, identity, attachment, occupation and inclusion, accelerating the deterioration in the care receiver's health. The goal of patient-centered care was to put the individual care resident and his or her psychosocial well-being at center of care (Epp, 2003). Person-centered care has

later been recognized as a standard for professional care not just for people with dementia, but for all groups with special care needs (Martin, Sgrillo, & Horton, 2011, pp. 45-46).

In recent years, Kitwood's care philosophy has also inspired design disciplines. This inspiration is evident, for example, in architecture and in how contemporary physical care environments are formed (e.g., (Torrington, 2006)), but also in the way we think about interactive technology for people with special care needs, their role in design processes, and the value they can bring to design (e.g., (Lindsay et al., 2012; Wallace, Thieme, Wood, Schofield, & Olivier, 2012)).

Technology-Supported Social Interaction for People with Special Care Needs

Design of technology intended to support elderly and other groups that may have special care needs has long been a significant area of research within HCI. Most of this research, however, has focused on how computer technology can help users overcome physical, cognitive, or sensory impairments in relation to specific tasks (e.g., (Azenkot et al., 2011; Hagiya, Horiuchi, & Yazaki, 2016; Wherton & Monk, 2010), or assist in potentially health and safety-critical situations (e.g., (Dahl et al., 2016; Wan et al., 2014)). At the same time, increased attention within HCI research has been paid to the role of interactive technology in the social well-being of people with special care needs and the complex socio-technical context this can entail.

One study to explore the problem of designing information and communication technology for the life circumstances of elderly care home residents was described by Müller et al. (2012). The study helped identify a set of core sociotechnical themes – *sociality*, *trust* and *memory* – that impact interactions between residents as well as between residents and stakeholders involved in their care.

Waycott et al. (2016) took a different approach to understand the life situation of elderly and the problem of fitting technology into it. The study investigated user acceptance of technology among community-dwelling elderly with special care needs, and particularly why some individuals rejected solutions (in this case a mobile media sharing application) designed to promote social interaction. Waycott et al. identified aspects related to the personal, social, and technological context as reasons for non-use.

A recent paper by Gerling et al. (2015) describes lessons learned from experimenting with playing console games as a social activity in a care facility. The study, while also reporting positive outcomes, identified several social challenges arising in the wake of the gaming sessions including, learning difficulties, discomfort of playing in front of others, and frustration related to awaiting one's turn. Based on their findings Gerling et al. recommended careful attention being paid to social structures when implementing similar solutions.

Blythe et al. (2010) and Gaver et al. (2011) explored how *ludic technologies—*innovative technologies encouraging curiosity and play—can support cross-generational engagement in a residential care setting and challenge stereotypical representations of care homes and elderly people. The study of Blythe et al. (2010) drew attention to the notion of *interpassivity*, i.e., how people sometimes choose to take a passive role in interactions, letting others (humans or technology) act on their behalf, while still achieving positive experiences. Blythe et al. further suggested that the notion of interpassivity can play an important role in design for cross-generational engagement.

Investigating the circumstantial nature of social interactions Svensson and Sokoler (2008) considered how *tickets-to-talk*, i.e., incidental openings for social encounters, may be utilized in design of Social Television for elderly care home residents. Using the phenomenon of ticket-to-

talk as a basis, Svensson and Sokoler suggested that technology might offer value to users by providing conditions that allow for social interactions.

We consider the studies cited above to be of particular relevance for our work for three reasons. Firstly, they all offer important insights of the social life of people with special care needs and/or life in residential care settings, and related challenges for design of social inclusion technology in such contexts. As such, the studies provide a knowledge base upon which we continue to build.

Secondly, some of the studies (i.e., (Blythe et al., 2010; Svensson & Sokoler, 2008)) propose key concepts that help describe particular phenomena of relevance that may be utilized in design of social inclusion technology. Drawing on such predefined concepts and terminology of this emerging research domain is particularly helpful in the analysis and comparison of empirical results.

Thirdly, the variety of interactive solutions explored in the studies cited above (e.g., games and play-like interventions, Social Television, mobile media sharing applications) suggests that the potential design space for social inclusion technology is rich. Much of this space has yet to be investigated.

Preliminary Research

Three residential care centers, located in different Norwegian municipalities, acted as research sites in our investigation. In order to familiarize ourselves with the centers and local practices related to social activities, we first performed an on-site open interview with a department manager or an activity coordinator at each site. In connection with the interviews, we were given a guided tour of each care center facility. This helped us gain further insights into how different areas at the centers were used for social purposes.

Based on the preliminary research activities, we learned the following key lessons about the care centers' residents, social activities, and those involved in forming the social environment:

Care residents: The residents living in the different care centers formed a highly heterogeneous group, with varying levels of functional decline and care needs. For those with less care needs, the centers provided external independent living apartments. Those requiring more extensive care, were provided rooms located in the various care center wards. The care centers served people of various age groups including youth.

Social activities: All the care centers involved in the study offered various organized social activities for residents. This included daily and weekly group events, such as handicraft (e.g., needlework and painting) and song, music and dance activities. It also included more occasional events such as group excursions, festivals, and seasonal festivities. Interactive technology was generally not used as part of these social activities.

Other stakeholders: At each center, multiple local stakeholders would often contribute in planning, preparing and facilitating social activities. Stakeholders taking part included not only healthcare personnel, but also people from the local area and community (e.g., cultural service providers, relatives, neighbors, and children and employees from the proximate kindergartens).

Study Methodology

As pointed out earlier, we learned that many stakeholders played a part in forming the social environment of the visited care centers. Based on this insight, we decided to follow a participatory approach in the continuation of our research. By inviting stakeholders with different roles to take part in workshops, we hoped their combined effort would contribute to a more holistic understanding of the research topic. Workshops are suitable for exploring existing

practices and problems, and participants' ideas and views on possible future solutions (e.g.,

through prototyping activities) (Dahl, Linander, & Hanssen, 2014; Svanæs & Seland, 2004). As

described below, we addressed both these aspects in the conducted workshops. Each of the

workshops lasted approximately 3 hours, and was divided into three main segments; an initial

group discussion (ca. 50 minutes) in which one of the researchers acted as discussion leader by

means of semi-structured interview methods. This was followed by a short demonstration and

testing session of the low-fidelity prototype (ca. 20-30 minutes). After this, the larger group was

split into two smaller work groups – each facilitated by one of the researchers – in which the

participants developed their own design concepts (mock-ups) that would support collocated

social interaction (ca. 50 minutes) that were later presented (by the group members themselves)

and discussed in plenum (ca. 30 minutes). More details on the different workshop segments to

follow.

Workshops

  Physical setting. We conducted one workshop in each of the three residential care

centers. One center was located in an urban setting, and the other two in more rural settings.

Each workshop took place in facilities frequently used as arenas for organized social activities

(e.g., in the canteen or dining area, in the main entry hall and in the gymnasium).

  Participants. The department manager or the activity coordinator at each residential care

center assisted us in identifying and recruiting participants. Based on their recommendations, we

invited a number of stakeholders including care residents, professional care providers, and others

playing a part in shaping the social care environment.

  Table 1 provides an overview of the various participants per workshop, and their

affiliation with the particular care center. We decided not to involve residents with severe

functional limitations in the workshops. Existing studies (Hendriks, Huybrechts, Wilkinson, & Slegers, 2014; Holbø, Bøthun, & Dahl, 2013; Lindsay et al., 2012) suggest that active participation of such groups, demands tailored approaches that can be difficult to apply in multi-stakeholder workshops. For similar reasons, we decided not to directly involve children from the local kindergartens in the workshops.

---Insert Table 1 about here ---

Scope of prototyping activities. As pointed out earlier, multiple interactive technologies may potentially play a role in promoting social interactions between people. However, in order to narrow the scope of the prototyping activities, and provide frames for the co-design work, we decided to focus on the interactive possibilities offered by large interactive displays. Studies (Müller et al., 2012; Rogers & Lindley, 2004) suggest that such displays have many qualities that make them suitable as enablers of collocated social interactions. Examples of such qualities include shared viewing, touch-based interaction, multiple simultaneous user input, and the possibility of combining displays with sensor technology in its physical environment.

Structure. The structure of each workshop were as follows:

Introduction: Each workshop opened with a preliminary briefing. First, participants provided a short description of themselves and their roles at the care center. Next, we (the moderators) explained the motivation for our research and presented the general workshop structure.

Discussion of current practices and perceived challenges: To get an understanding of current practices, and perceived challenges in maintaining a socially active care environment, we

had an open discussion. The participants first made individual notes of current practices and challenges on post-its. These were later fed into discussions in plenum.

Prototype demonstration: To give the participants a first-hand experience of using large interactive displays in combination with sensor technology, the participants were invited to try out a simple Kinect-based prototype supporting full-body interaction. The prototype allowed users to interact with virtual objects (polygons) continuously "raining down" on a silhouetted screen-representation of themselves (Figure 1). The primary purpose of the demo was to boost creativity for the upcoming prototyping activity.

Prototyping activity: After experimenting with the demo application, the participants were asked to co-design mock-ups representing their visions of social inclusion technology at the care center. We invited them to work in groups and come up with ideas and concepts as to how large interactive wall, floor or table displays could be used to promote and support social interactions. The participants were encouraged to use a set of low-fidelity prototyping tools (pen, paper, post-its, clip-art, etc.) to build user interface mock-ups, and use colored tape to mark the display area.

The participants were encouraged to communicate during the prototyping activity and share their rationale for design suggestions and choices. We (the authors) acted as facilitators throughout the activity. We also asked follow-up question to get a more in-depth understanding of the participants' views and ideas.

Group presentations and discussions of mock-ups: After the prototyping activity, we asked the groups to present their mock-up solutions to each other. This allowed the groups to elaborate on how the solution would respond to interactions, and in which way their solutions

may promote social interaction. After each group presentation the proposed solution was discussed in plenum.

---Insert Figure 1 about here ---

Data Collection and Analysis

The workshops were audio recorded and field notes were taken continually. The recorded data was transcribed in its entirety. To analyze the transcribed text and field notes and organize them into meaningful units, we attached codes to text segments. The coding process consisted of three iterations. First, one researcher (author) reviewed the transcribed data giving each emerging theme descriptive keywords, such as "Place of interaction" or "Social meaning", combined with some words from the quote to capture the essence. Next, two researchers (both authors) reviewed the descriptive codes for consistency. This involved checking that the codes were used in the same way for different text segments. It also involved combining codes (i.e., using the most descriptive term) where different codes had been applied to describe the same theme. Finally, the codes were grouped and labeled into thematic categories covering themes that were recurrent across the three research sites. The resulting categories are described in the section that follows.

Results

The workshop discussions brought up a number of interrelated considerations relevant for design of social inclusion technology for residential care homes. The considerations relate to the following five thematic categories or topics:

- *Users*: Promoting inter and cross-generational interaction.
- *Places*: Integration with "hubs" for social activity.

- *Themes*: Concepts enabling social partaking.

- *Value*: Adding value for care residents.

- *Role*: The supplementary role of social inclusion technology.

In the following, we first describe each of the above topics in further detail. Next, we describe three selected design proposals (mock-ups).

Design Considerations

Users: Promoting inter and cross-generational interaction. The first group of emerging considerations we draw attention to relates to the participants' general understanding of what defines a socially active care environment, and how technology could accommodate this view. In particular, the participants considered not only interaction between elderly, but also cross-generational interaction as a key component of socially active care environments.

As noted earlier, the care centers that took part in the study collaborated frequently with different local resources (individuals and public institutions) in facilitating various social activities for the care residents. In this sense, these resources played an active role in the shaping and maintenance of the care centers' social environment. The added social value resulting from cross-generational interaction between elderly care residents and children from the local kindergartens was frequently highlighted during the workshops. Referring to when children from the kindergarten had visited the care center, one of the kindergarten employees explained:

"The children have weaving projects that they brought with them and sat and worked with at the center, and the residents were working on different handicraft projects too. So we all sat together, and could help each other."

At another occasion, the same kindergarten employee told us, they had arranged for the children to come and build a gingerbread model of the care center together with the residents:

"*It was very successful. The kids had fun, and the residents had fun too.*"

The importance of cross-generational interaction as a key component in a socially active care environment was also reflected in the mock-ups resulting from the workshops. As the design solutions described later illustrate, the participants envisioned that social inclusion technology could play an important role in generating positive social encounters across generations. For example, in the context of grand children visiting elderly residents, one activity coordinator envisioned that social inclusion technology could provide something that would fit both stakeholder groups:

"*Then they [the children] may think it's a bit boring to just sit down. And then [using social inclusion technology] it might be possible to go and do something together.*"

Thus, according to the participants, the *users* of social inclusion technology should not be restricted to care residents (or particular groups of residents). Rather, the participants envisioned that care residents could use the technology together with representatives of multiple stakeholder groups contributing to the social life at the care centers.

Places: Integration with "hubs" for social activity. *"Place"* was another concept that emerged as central in the workshop discussions on how care environments could benefit from social inclusion technology. Especially, finding the "right" location for interactions mediated by social inclusion technology was a main concern.

We learned that each care center contained multiple physical areas that served as "hot spots" or "*hubs*" for various social activities. This included places for regular, organized social activities (e.g., the handicraft room, the care center gymnasium, the healing garden), as well as transition points (e.g., the entrance hall, the local café or dining area). Figure 2 shows examples of social activity hubs in the different care centers.

---Insert Figure 2 about here ---

A general perspective among the participants was that the social activity hubs would serve as suitable locations for social inclusion technology. This was both due to accessibility concerns, but also due to the social meaning associated with the hubs.

Accessibility: It was argued that placing social inclusion technologies in existing social arenas, such as hubs, would increase their likelihood of being used, as many of the hubs were considered more physically accessible for care residents. However, it was also pointed out that to accommodate less mobile care residents, some design solutions could be located closer to their rooms, e.g., at more locally established hubs inside the wards. As discussed later in the paper, most of the mock-up solutions resulting from the co-design activities were designed with specific hubs in mind. The following transcript excerpt involving a nursing assistant (NA) and a kindergarten employee (KE) illustrates a typical workshop discussion regarding choice of location for the solution they were to co-design:

NA: It [the solution] could be in the café area, on the floor; or, it could be inside a ward.

KE: Or in the transit points [ward entrances], the ones you call *intersections*.

NA: Or inside the ward, on the floor. But the intersections may be better because that's where you enter each ward, in a way it's your first encounter with it.

KE: But then it [the solution] becomes for that particular ward, then…

NA: But I was thinking we could have one [solution] in each intersection.

Social meaning: In addition to the accessibility concerns, the stakeholders' attached social meaning or significance of the various hubs was a central discussion point in relation to

the placement of social inclusion technology. Both care residents and their care providers tended to associate the various hubs with particular activities (e.g., handicraft work, song and music performance, sensory experiences) and also particular "*modes*" of interaction, i.e., what type of (social) behavior one would associate with a given place. For example, the care centers' healing gardens were places the participants associated with peace and tranquility. In a similar manner the cafes or ward entrances (*intersections*) were examples of places affording conversation and more "lively" activities.

In order for social inclusion technology to "fit" a particular hub, the participants argued that the technology should reflect the hub's attached social meaning. The mock-up solutions described later in the paper provide examples of how the participants envisioned this could be achieved.

Themes: Concepts enabling social partaking. The next group of considerations addressed *how* social inclusion technology applied in care environments can evoke the interest and motivate use over time. The question fueled discussions about suitable concepts or "themes" on which design solutions could be based. In particular, the participants were concerned with identifying themes that could help build bridges for social interactions. From the participants' perspectives this required themes that are recognizable and easy to relate to for residents or others associated with a specific center. Examples of one of the themes that were proposed and used as a design concept in one of the emerging mock-ups was the history and development of the local community:

"*When you grow old, it means a lot [to you] to talk about things from the old days. You may begin to talk about something that happened here, say 40-50 years ago, and they will know a lot about it.*"

Another proposed theme was related to musical reminiscence and performance. The

motivation for the solution was based on the important role song and music meant in many of the

care residents' lives:

"Old songs are something [the care residents] really know, and think are fun!"

Examples of yet other themes included physical activity and play.

Many of the design proposals emerging from the co-design work also contained visual elements

that were likely to be familiar and relevant for care stakeholders. Examples of such visual

representations included elements from the care centers' healing gardens, local buildings and

places, and various curiosities of the local community.

Value: Adding value for care residents. Yet a central topic emerging from the

workshops was related to the need to provide value to the heterogeneous composition of care

residents at the three specific care centers. Especially, the challenge of accommodating both frail

or technology reluctant residents, on the one hand, and those more functional or tech-savvy, on

the other, was discussed. Many of the concepts emerging from the prototyping activity, intended

to support various degrees interaction.

Some of the participants argued that design solutions, such as the demo application, did

not necessarily require care residents to use the application themselves in order to have a positive

social experience. For example, it was pointed out that the elderly often would have a positive

experience from watching children from the local kindergarten sing or play, even if they did not

actively partake themselves. Yet, these events would often open up for social interaction between

the elderly, by offering a common experience to refer to and discuss on later occasions. In this

sense, the added social value of these passive, yet *immersed* experiences, was not necessarily

realized in course of the observed activity, but in the aftermath.

Some participants argued that for many of the care residents, particularly the oldest and most frail, the primary value of social inclusion technology may actually come through such *passive-immersed* experiences. Referring to the prototype demonstration, one of the activity coordinators stated:

"In fact, the elderly may say that this [the prototype] is so much fun for the children, but probably won't even reflect upon themselves having a good time as well, either they are just observing or actually taking part in the game activities. Either way it's activating and involves social interaction."

One of the workshop participants also pointed out that, while technological solutions would perhaps not necessarily add equal social value to all, their interactive aspects could still offer care resident a positive *sensory experience*, and thus contribute to their well-being.

The supplementary role of social inclusion technology. The last group of emerging considerations draws attention to perspectives on the overall role of social inclusion technology in residential care environments. The relevant perspectives highlight key requirements for social inclusion technology to accommodate practical aspects of life and work in a residential care setting.

As described earlier, the care centers offered various organized social activities. The workshop participants expressed a general positive attitude toward the social events and activities arranged at the care centers, and there was a consensus that these enriched the residents' social lives and added value to other partakers.

One key concern, however, was related to the perceived problem of offering all care residents the same opportunities for social activities. Care personnel participating in the workshops expressed that providing an equal share of social activities to all residents raised a

problem of resources, as the activities generally required planning and coordination. Also, these activities typically needed to be managed by personnel. For them, the perceived shortage in personnel resources raised a dilemma of "whom to prioritize", as facilitating an activity for one group of residents leaves too little or no personnel to provide for others. One of the nurses explained:

"The [social activity] may be really good, but when it results in personnel being tied up solemnly for that particular activity, it may result in some very important tasks being left undone. Then it's like one thing kills the other."

The participating care residents also acknowledge the problem of personnel resources:

"One knows that while there is an ongoing [social] event its virtually impossible to get assistance for doing something else, simply because all personnel is tied up."

Given the challenges related to providing all the residents equal possibilities for socially active lives, many participants considered interactive technology a potential supplement to existing organized social events. Fulfilling such a role, the participants argued, was not trivial:

"The challenge is to find activities that fit the residents - something they want to do - and that are not too [work] demanding for the staff, so that it becomes a joint thing."

The quote above captures, in many ways, a central problem that some of the participating care personnel associated with the use of shelf-ware gaming technology as a social enabler in the care environment. We learned that one of the care centers had experimented with using Nintendo Wii gaming technology for such purposes. Based on the care personnel's experiences, this relied heavily on the availability of staff to manage technology and help the residents play. One of the nursing assistants explained:

"We have tested some gaming technology [Wii Bowling] and we have to make it easy enough so that they may almost be able to start it themselves. That's the dream, because it's not easy when you are alone at work and you are supposed to be many places at the same time. It requires planning."

One of the activity coordinators followed up:

"It was more the personnel trying it out than the residents."

Summary of Design Considerations

Before we discuss the results, we recap the key empirical findings:

Users: Cross-generational interaction emerged as a key component of the participants understating of a socially active care environments. Hence, the participants considered both care residents and other stakeholders (e.g., care personnel, families, neighbors, and local institutions such as kindergartens) to be potential users of social inclusion technology.

Place: The workshops revealed that existing hubs for social activity in the care centers could in many cases serve as suitable locations for social inclusion technology. Accessibility concerns, and particularly the social meaning already attached to these hubs by stakeholders, were given as rationale for this view. Participants considered it important that design solutions for social inclusion reflected the social meaning attached to the hubs.

Themes: In order to capture the interest of care residents (and others) and promote use over time, it was considered important to base design solutions on meaningful and familiar themes. Typically, the proposed themes were highly contextual and inspired by local curiosities, history or events.

Value: Given the diverse composition of residents, different means of offering value via technology were discussed. For older and frailer residents, the potential value of providing passive yet immersed experiences was emphasized.

Role: The care personnel considered social inclusion technology as primarily a supplement to existing organized social activities, and an extra "arm" in providing care resident social experiences. As such, possibilities for spontaneous interaction and low dependence on personnel to manage the technology emerged as key requirements.

Emerging Design Solutions (Mock-Ups)

To illustrate some of the variety in the mock-up solutions emerging from the workshops, we briefly present three concepts: *MyCommunity*, *FloorScore* and *JukeBoard*. The proposals do not represent novel interactive concepts as such. Similar concepts exist as computer games and for educational purposes. Yet, from a research perspective they are of value, as they represent concrete expressions of how technology can accommodate the considerations described above (i.e., *Users*, *Place*, *Themes*, *Values* and *Role*).

MyCommunity. The first mock-up solution we present was created in one of the workshops conducted in a rurally located care center. The participants co-designed a concept that could accommodate both frail resident and those less functional limitations. To accommodate the first group, the participants chose the entrance to the ward as location for their solution.

The chosen theme for the solution was the historic development of the local community, from the beginning of the 20th century (i.e., the childhood of the oldest residents) until present time. One of the motivations for selecting this theme was the observation that the local community and its history formed a frequent subject of discussion and a topic of nostalgic value for residents. Another central motivation for the chosen theme was to support knowledge transfer

from care residents to other stakeholders (e.g., children and care personnel). Many care residents

had considerable knowledge about the history and past development of the local community.

Based on this understanding of care residents as potential *resources* to learn from, the

participants co-designed a solution to support this view.

The concept was designed as an interactive tabletop solution with a touch screen, so that

users could easily gather around it, and allow frail users to remain seated. The participants

suggested that the tabletop would present an interactive map of the local community, with

buildings, structures and other sites. It was further suggested that an interactive timeline would

allow users to "revisit" the past, with the map and its contents (buildings, sites, roads, etc.)

changing to depict the community as it was during that particular time period. By pressing on,

for example, a pre-existing farm shown on the map, small pieces of information about the site

(who used to live there etc.) would be displayed to open up for conversation. In addition, it was

suggested that the tabletop could display information about key local events relative to the

selected year.

Figure 3 shows the mock-up solution of MyCommunity, with the navigable timeline on

top and the map (with various local buildings and sites) below.

---Insert Figure 3 about here ---

FloorScore. Another mock-up solution, FloorScore, was based on the concepts of

physical activity and playfulness. The solution illustrates the participants' ideas of how the two

concepts can be used in combination to foster social interaction. The solution was designed as an

interactive floor display, partly due to lack of free wall space at the center. One of the main

intents was to open up for cross-generational social interaction between residents and children from the adjacent kindergarten. FloorScore was designed for the gymnasium (Figure 2, lower right) near the kindergarten entrance, making it more easily accessible for both user groups.

FloorScore was designed as an interactive pattern on the floor, resembling a large chessboard that would signal an individual target point for each player to reach. The players would each be represented by a color, designated to them when they joined the game, and the floor would show a path for the user by lighting up board squares with their assigned color together with sounds. It was also suggested having different difficulty levels, e.g., the path and pace, to accommodate users of different functionality levels.

JukeBoard. The last mock-up solution we present was designed specifically for a handicraft room (Figure 2, upper left), which formed a key social activity hub. The room had a large table where the care residents and others regularly did needlework and other types of handicraft. As the handicraft activities often involved singing, the participants decided to use a musical theme as foundation for their design solution. The participants concluded that the handicraft room and its usual activities could easily accommodate a song and music based concept.

The concept aimed to promote and support musical reminiscence and performance, by combining the functionality of a traditional jukebox with karaoke.

The participants suggested that the tabletop would display photos, each linked to a particular associated melody. By pressing one of the photos, the melody would begin to play, allowing those gathered around the table to join in. It was also suggested that the table could display the lyrics.

The possibility of supporting inter-generational musical activities was one key value associated with the JukeBoard.

Discussion

The Role of *the Local* in Design

Our investigation was motivated by the following research question: *How can interactive technology contribute in the forming of supportive, inclusive and socially active care environments from the perspectives of key stakeholders?* The findings from the workshops provide several relevant insights in this regard.

At an overall level, we regard our findings to reflect some of the same concerns Müller et al. [8] raise when they describe the problem of (quote) "'parachuting' ICT into a care home". The results from the workshops highlight the many socio-technical concerns the use of interactive technology can raise in such a setting. In particular, the data collected from the workshops draw attention to how contextual and locally specific aspects need to be taken into consideration when designing social inclusion technology for care environments. In this regard, reflecting *the local* in design stood out as a central notion in all workshops. The local, as the notion is understood here, refers to the wider social context in which care residents live and in which activities and things gain social meaning and value. This wider social context includes the immediate care environment, but also the community in which the care center is located and in which many residents have lived their entire life. Moreover, it encompasses the nexus of people, places, objects, customs, and events strongly or more loosely connected to the specific center.

The design concepts (mock-ups) emerging from the workshops illustrate, in many ways, how the participants envisioned local elements—e.g. people, places and objects—an integral part of the solutions, thus highlighting the socio-technical relations that are involved. We found that

the communities surrounding the care centers already played an important role in the social life of the centers, frequently contributing to planning and facilitation of various events and activities. The notion of social inclusion technology was mainly seen in light of these highly co-produced care environments, and as a means for facilitating or strengthening this co-production. Allowing social inclusion technology to arise out of, and blend into, the care environments social nexus was considered essential, in order for such innovations to fulfill their initial purpose. In order to achieve this, we encourage designers to consider the local not only as the context of use, but as the design space for social inclusion technology. In this sense, the local represents resources and inspiration for designers to draw on. Below, we provide two brief examples from our findings illustrating how the local can be used as such.

Identification of tickets-to-interact. The mock-up solutions described earlier illustrate how the participants found inspiration in the wider social context to allow their designs to offer openings for social encounters. With reference to the tickets-to-talk phenomenon (Svensson & Sokoler, 2008), our findings draw attention to the potential value of locally anchored tickets-to-interact. These locally anchored tickets may not offer the same openings for social interaction elsewhere. For example, in MyCommunity, the history of the local region was proposed as a way to trigger and support interaction between care stakeholders. FloorScore, on the other hand, utilized nearby social resources (kindergarten) combined with the location of the designated hub (near the kindergarten entrance and inside the center). The solution was designed with the intention of offering residents and children a ticket-to-interact by means a playful concept. JukeBoard drew on existing activities in and social meaning associated with a particular hub.

The examples provided above illustrate how tickets-to-talk, as a design concept, may be tailored for specific use contexts and be built on the existing role of the local.

Empowerment. Our co-exploration also revealed how the local can potentially be used in design to empower care residents in various ways. Similar to the ludic systems described by Blythe et al. (Blythe et al., 2010), concepts such as MyCommunity in many ways challenges stereotypical perceptions of care homes and their residents. One intention was to enable elderly residents to become the active part rather than remaining passive in interactions with others. The participants envisioned that their design could allow elderly to become providers (of knowledge about the history of local community), and other stakeholders (e.g., healthcare workers and children) the receivers. As such, MyCommunity illustrates how the local can inspire designs empowering care residents to contribute actively in the forming of their own social environment. The concept also has the potential to support what Blythe et al. (Blythe et al., 2010) refer to as interpassivity by allowing for passive-immersive positive user experiences for bystanders.

Engagement of the care receiver, at the best of his or her ability, is a central principle in Kitwood's person-centered care philosophy (Kitwood, 1997). In the context of social inclusion technology, this principle highlights the need for solutions that can support an interaction continuum from passive-immersive involvement to active, hands-on interaction.

Technology as a Socially Disruptive Factor

So far, we have focused on technology-enabled possibilities for supporting social interaction in residential care centers. However, our findings also raise a need for critical reflection concerning the "sensitivity" of the setting vis-à-vis the socially disruptive (and sometimes unforeseen) effects technology.

The care personnel who participated in the workshops envisioned social inclusion technology a supplement in providing social experiences for care residents. In light of these considerations, two concerns arise. First, it is easy to discard the subtle negative effects

technology may have on a social environment. For example, the central theme in MyCommunity (i.e. local history) was designed to accommodate and promote everyday conversation around the coffee table at the ward entrance, thus reflecting the associated social activities of the hub. However, there is also a risk that premises set by technology in terms of, e.g., size, form, weight, robustness of an interactive tabletop, may have an obtrusive effect on the very activity it was intended to support. In a similar way, there is a risk that solutions such as the JukeBoard, which was designed with the handicraft room in mind, may reduce the room's original use potential.

Secondly, while the care personnel desired technology that could reduce the workload related to managing social activities for residents, it is easy to underestimate the (manual) effort required for solutions to work according to their purpose. Some of the care personnel had first-hand experience of this type of challenges when trying out existing games in a care context. The strong need for facilitator support in gaming sessions at care homes has also been reported by Gerling et al (Gerling et al., 2015). As our findings suggest, facilitating technology-supported social activities in a care environment does not only involve managing the technology and instructing users. It may also involve mundane, yet potentially time-consuming work tasks, such as helping care residents to and from relevant hubs. These tasks still need to be carried out even in the context of more self-managing technologies.

The two concerns we raise above illustrate how design of social inclusion technology requires careful consideration not only of how to encourage social interaction for residents, but also of the wider practical implications these solutions can have on a care environment. As discussed above, this includes considering the risk of potential negative effects on other social activities as well as implications for care work.

Summary of Design Lessons Learned

Below, we briefly summarize from the above discussion the key design lessons learned from this study.

- We identified *the local*, i.e., the wider social context in which care residents live (ranging from the immediate care environment to the wider community) to form a rich design space for, and source of inspiration to designers of social inclusion technology. In effect, then, the notion can help identify key aspects of context of use for social inclusion technology, e.g., suggesting potential *user groups* and use environments (*places*) we recommend designer take into consideration. However, the notion also goes beyond helping identify potential context-of-use "components". In particular, our findings suggest that in residential care environments the local acts in many ways as the "social glue" offering meaning and value to different stakeholders including residents, care personnel and other contributors.

- In particular, we found the local to be a valuable source for identifying openings for social encounters, i.e. locally anchored tickets-to-interact, which may be adopted in social inclusion technology to help the design act according to its social purpose.

- By tapping into the local we identified ways by which social inclusion technology potentially can *empower* residents by allowing them to take an active part, rather than staying passive, in social interactions.

- Technology designed for social purposes in care environment risks having a socially disruptive effect if aspects such as how it affect other social activities performed in the same environment are not taken into consideration. Also, the extent to which the technology "ties up" personnel is a factor which may implicate the success of the technology as a social enabler.

Reflections

Some Methodological Considerations

Through our participatory approach, we managed to get a rich understanding of considerations relevant for design of social inclusion technology for residential care environments. In retrospect, we realize that the extent to which a multi-stakeholder participatory approach is fruitful in terms of putting the care residents first—i.e., prioritizing care residents' needs over other stakeholders—is intimately dependent on the existing care culture within a specific center. It is also dependent on the non-residential participants' empathic dispositions towards care residents and their psychosocial needs. All workshop participants had significant experience from taking part in social activities at the care centers. This type of first-hand, local experience proved highly valuable when charting out the possibilities and challenges related to social inclusion technology in this context.

Limitations of the Study

We recognize that our work has certain limitations. One potential limitation relates to the generalizability of the workshop participants' views and experiences. In order to keep the workshops manageable, only a limited number of representatives per stakeholder group could participate in each workshop. The extent to which the experiences and opinions of each participant apply for the stakeholder group he or she represents is therefore an open question. Personality bias, i.e., putting too much emphasis on individual personal traits, is a potential risk when stakeholders are closely involved in design processes (Roos , Nilsson, & Wheatley, 2013). We have attempted to compensate for this by focusing on the recurring themes emerging from the workshops, rather than on one-off statements.

Another potential critique of our research may be that, judging from the composition of the workshop participants, our results may be biased from the perspectives of non-residents, as this group outnumbered the residents. However, we consider this problem to be considerably reduced, as the group of participating non-residents was diverse in terms of their roles in forming the social care environment. As facilitators, we attempted to make sure that each participant, independently of his or her role, was provided the opportunity to express views, ideas, and reflections during the workshops.

Lastly, we recognize that working creatively with low-fidelity prototyping tools, participants may potentially end up building naïve or unrealistic design solutions, as technological constraints, usability and other aspects of use (e.g., potential obtrusive effects in social settings and on care work) are not properly accounted for. Our primary aim with the prototyping activities was not to come up with design solutions as such, but rather to provide participants concrete points for reflection during the workshops. Hence, we do not think of the mock-up solutions as design "blueprints". Instead we consider their primary value to be the collective knowledge, experiences and design considerations they represent.

Concluding Remarks

Taking inspiration from Kitwood's person-centered care philosophy (Epp, 2003; Kitwood, 1997), we have followed a participatory approach to better understand how interactive technology can help form positive, supportive and socially active care environments in residential care settings. The emanating design considerations highlight to the importance of social inclusion technology being firmly anchored in the locally and collaboratively produced care environment. The design considerations also draw attention to how the wider social context in which the care residents live, can potentially inspire socially engaging designs. By drawing on

familiar concepts, existing social relations and established social meanings of objects and places, the workshop participants envisioned designs that emerged from, but also could blend into, the social life and structure of the care centers. Based on our findings, we consider the local – a multi-dimensional concept entailing *geographical* (what is physically available or nearby), *historical* (memories of how it used to be, physically and socially) and existing local *social practices and societal functions* – to offer rich opportunities for designing socially engaging interactive solutions for care environments. However, our findings also point to the necessary to be mindful of the potential side effects of using technology in this setting. Taken together, or finding highlight the intimate relationship between designs for social inclusion and the local. We recommend that designers of social inclusion technology pay specific attention to this relationship.

In our future work, we plan to continue exploring the rich possibilities the local, as a design space and source of inspiration for social inclusion technology, offers. In this regard, the current study offers a knowledge platform on which we can build further.

We hope our work may inspire further research and development in this emerging domain.

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Table 1

Participants and roles per workshop (W1-3)

Role	W1	W2	W3
Care resident	2	2	1
Activity coordinator		1	1
Department manager	1		
Nursing assistant	2	2	2
Kindergarten employee	2	1	1
Culture coordinator			1
Care technology coordinator		1	
Municipal manager			1

Figure 1. Care personnel and residents experimenting during prototype demonstration.

Figure 2. Social activity hubs: Handicrafts room (upper left), Healing garden (upper right), Ward entrance (lower left), Gymnasium (lower right).
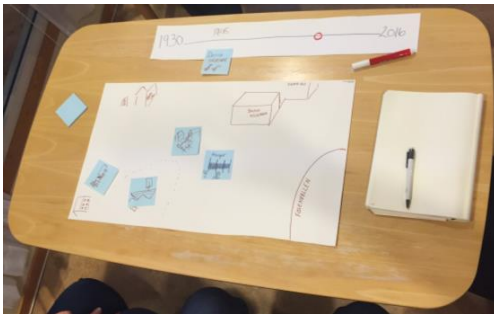

Figure 3. *MyCommunity*.

Biographies

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