THE USE OF PROXIES: LESSONS OF SOCIAL CO-DESIGN FOR INCLUSIVE DESIGN FOR PEOPLE WITH COGNITIVE DISABILITIES

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Abstract: This article concerns how designers sought to create improved social relations among severely disabled residents in a care home in Denmark. Rather than to rely on paid help, the care home management wanted to increase the number of voluntary friendships between the residents of the home and members of the local community. From a design standpoint, the project explored ways to determine the needs of individuals with severe communication difficulties. This presented a very demanding challenge since the key "users" were unable to express themselves. The methods designers typically choose to find out about their target user group involve interviews and discussions. Most design processes assume the user is able and willing to communicate their needs. This condition did not apply here. The paper builds on work done (Herriott 2012) which looks into methods and approaches that get past the problem of the "absent user." The paper examines how the use of proxies affects the design process and the way in which social design produces not only a "product" but affects the conditions in which it will be used.

Keywords: Inclusive Design, Industrial Design, Welfare Design, Fourth-order design.

Introduction

This paper deals with designing for individuals with cognitive disabilities. The individuals are unable to communicate verbally and as such the usual channels for communication with the users are not available. As Brereton notes "When participants have a different cognitive, sensory experience of the world, it is particularly important to engage them fully in the design process, as designers have little experience to see the world from their perspective" (2015, p4). In such cases, design processes must be adapted (Francis *et al.* 2009, p.121) Nonetheless, the project described did achieve useful results by finding workarounds for the communication barriers.

For many designers working in the area of disability, Inclusive Design (ID) is a reference point. ID is "….design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible on a global basis, in a wide variety of situations and to the greatest extent possible without the need for special adaptation or specialised design." British Standards (2005) and has a two-decade history behind it, beginning in the Universal Design movement (Storey *et al.* 1998). It differs from Universal Design in that it has a stronger emphasis on industrial design for consumer products and does not expressly deal with architecture. Work such as Herriott, (2012) has shown that ID´s roots in consumer product desig can explain why it has not addressed the problems of providing for those with communication difficulties. Primarily, this is because the disabilities and capacity losses that ID works to accommodate do not include communication and cognitive disorders to any great extent. The literature of ID also emphasises design for tangible products (Brown, 2011 is an example of one for cognitively impaired users).

This paper examines a case where the users were severely cognitively impaired and where the "product" was improved social connections between residents of a long-term care home and the local community. By examining how to discover the needs of the "users" it explores how to design for people who are hard to communicate with so as to provide intangible, non-material outcomes. Although the designers in this case study were not using

Inclusive Design (and were not aware of the concept) it is possible to analyse their processes in the light of ID methods to see how the Skansebakken project can inform Inclusive Design.

Skansebakken is both a home and a workplace. Severe cognitive and developmental disability characterises the residents, all but one of whom have no capacity for speech. This factor dramatically reduces the means by which the residents can communicate their wishes. Thus, the carers take on an important role as proxies for the needs of the residents.

In this project, the users of the resultant "product" are understood to be the residents and the carer while the direct beneficiaries are the residents. The managers and carers of Skansebakken recognised that there existed a need to improve the social relations of the residents whose primary social interaction was with employees. The local municipality recognized that many of their care institutions had a similar situation where social relations were essentially paid for. They wished to improve voluntary social relations so that their institutions gained better connections to the wider community. It was also implicit in this that voluntary social relations had an extra dimension that staff-resident relations lacked. With this in mind, the municipality asked the Design School Kolding to investigate ways to create and implement changes to the way the home was run. The Design School Kolding (DSK) is one of Denmark´s leading design and research institutions. It has a strong tradition of interdisciplinary work in industrial design, communications and graphic design.

Skansebakken: a home and workplace

Skansebakken is located in Vejle Municipality, central Jutland, Denmark. 45 residents live there full time and 110 people serve as carers, administrators and general staff. Built in the mid-1960s, the buildings of Skansebakken typify mid-century Danish modernism that emphasizes simplicity in material and forms. However, coupled with the functional requirements of caring for its extremely physically disabled residents, the physical structure resembles a hospital more than a home. Its residents thus lived in a setting that had an institutional and impersonal quality. Before the Designing Relations project

began (2013 to 2014), the common rooms were devoid of personal decoration. The presence of features such as suspended ceilings, hospital furniture and assistive technology indicated that functional requirements dominated the more social, human need for conviviality.

On the social side, regarding the relations of the staff and the residents, it had been recognised by the municipality that there was a need for change in the direction of less reliance on the paid staff and greater contact with the wider community. For the 45 residents, most social interaction was with the staff and their activities were organised around the daily routines of the residence which was seen as a workplace first. The municipality recognised that there were not many links to the wider community and that to improve the well-being of the residents, the development of voluntary social relations was necessary. This was also seen to be a problem existing at all social care institutions under the local authority´s management; by using Skansebakken which was an extreme case, the municipality hoped that methods could be found to improve social relations at other institutions under their management.
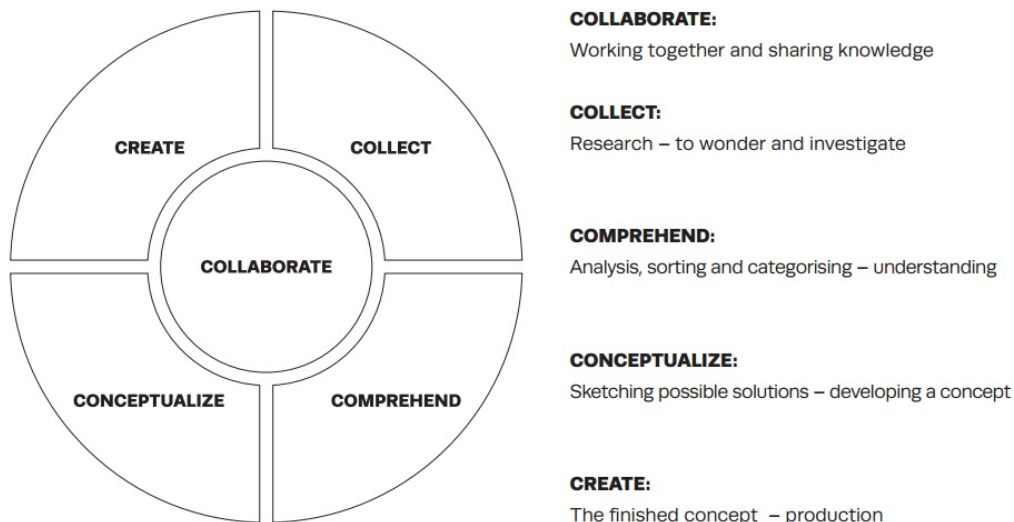
Design Process

The Design School Kolding´s (DKS) methodology is derived from a process devised by IDEO (2015). As used by DSK the method has these phases: collaborate, collect, comprehend, conceptualise and create. For comparison purposes, the ID design method outlined by the Cambridge Engineering Design Centre (EDC, 2015) has these elements: explore, create and evaluate. Each of the three phases has between three and five sub-steps and these are interdependent, which is indicative of the iterative nature of the design process.

There is other work related to-design for people with cognitive disabilities where family members and teachers helped in the design process (Dawe, 2005 and Dawe, 2007). In these cases, the individuals were not severely cognitively disabled. Interviews and ethnography were deployed to gather data. Boyd-Graber (2006) described using proxies to assist in design for

people with aphasia. Here the problem is not that people cannot communicate but that the verbal channel is not available. Francis *et al.* (2009) discuss revisions to the co-design process, an instance where the users are people with autism and high-functioning Asperger´s syndrome. It was possible to make use of written methods of inquiry, a means not available to the residents of Skansebakken. Brereton *et al.* (2015) worked with "people living with cognitive or sensory impairments and children identified with language delays and autism spectrum disorder" (p.4). Again, like much of the work involving cognitive disorders, it relates to individuals capable of some level of expression.

Figure 1. Design School Kolding´s process

COLLABORATE:
Working together and sharing knowledge

COLLECT:
Research – to wonder and investigate

COMPREHEND:
Analysis, sorting and categorising – understanding

CONCEPTUALIZE:
Sketching possible solutions – developing a concept

CREATE:
The finished concept – production

Design School Kolding´s Process

The process (See Figure 1) starts in the collaboration phase by defining the terms of co-operating with the stakeholders, to do with where, how and who shall contribute. Thereafter the success criteria and framework for reporting is defined.

In the 'collect' phase it is through desktop research, user-centered processes, observations and discussions with expert consultants that designers gather knowledge about the "ecosystem" to be changed. There is a broad look at the work locations' physical conditions, cultural and social resources as well as the practices, values and the history of the site. Design

methods are chosen to support the establishing of participative courses with the stakeholders.

In the 'comprehension' phase insight is gained into the existing situation by organising the gathered material to show links between the elements and how they are related causally. This insight leads designers to the possibility of dealing with the material and thinking about the form change may take. What are set out in this stage are 1) the relevant interests of the various stakeholders, 2) the emotional barriers to, and 3) drivers of change. The insights are presented to the interested parties in small workshops which create a shared understanding of the next phase. The range of participants is broad so that they feel that it is a project they have responsibility for. Thereafter the analysis is processed with a focus on those aspects which offer a means to effect change. This phase, according to DSK, is not just about understanding, but about creating a sense of ownership for all the parties.

In the 'conceptualise' phase new ideas are developed to encourage original ways of doing things. With fresh ideas, the existing barriers to change can be identified. Some ideas are not successsful but a few can be identified which can have meaning for those involved. The ideas are tested in controlled conditions to determine possible problems. Thus, the difficulties encountered are not too costly to rectify in terms of time and effort. At the same time, those involved in the process were able to see their input having an influence on how the concepts were worked through. This further re-enforces the shared sense of "ownership" of the resultant solution.

In the 'create' phase the designers try to show the project´s potential to the various interest groups; the concepts are prepared and then, in conditions that are close to realistic as possible, they are tested. In the test phase the entire process is subject to examination in the sense that the prototypes´ validity is a proxy for the validity of the process. In this part of the project, a larger number of users get to validate the design than are involved in the initial stages. Seen from a broad perspective, the scale of the process increases: more people involved, there are more detailed solutions and they

are tested in more and more realistic conditions. This *"create"* phase constitutes a combination of making and testing.

In the Conclusion section the DSK approach will be compared with the model proposed by the Cambridge Engineering Design Centre. Both will be considered in the light of Buchanan´s (2007) concept of fourth order design.

Inclusive Design

Having discussed the DSK process, it is time to turn to a general look at the Inclusive Design process which is aimed at generating accessible designs for people with capability loss.

The original ID process was a waterfall model (Fig. 2) but was modified by the Cambridge EDC in 2013 to suggest better the iterative nature of working through a project (Fig. 3). The main stages are: explore, create and evaluate. The relevance for this paper is that Inclusive Design is a design method intended to focus attention on users with capability loss. This method primarily assumed to be physical, for example, Mountain *et al.* 2006, Mayagoitia 2006, de Couvreur 2011. Savitch *et al.* (2006), Orpwood *et al. (2008)* and Van Steenwinkel *et al* (2012) deal with design for dementia sufferers but not those cases where the individuals have lost much verbal capability.

Figure 2. Original Inclusive Design process (after Cambridge EDC). Source: author.
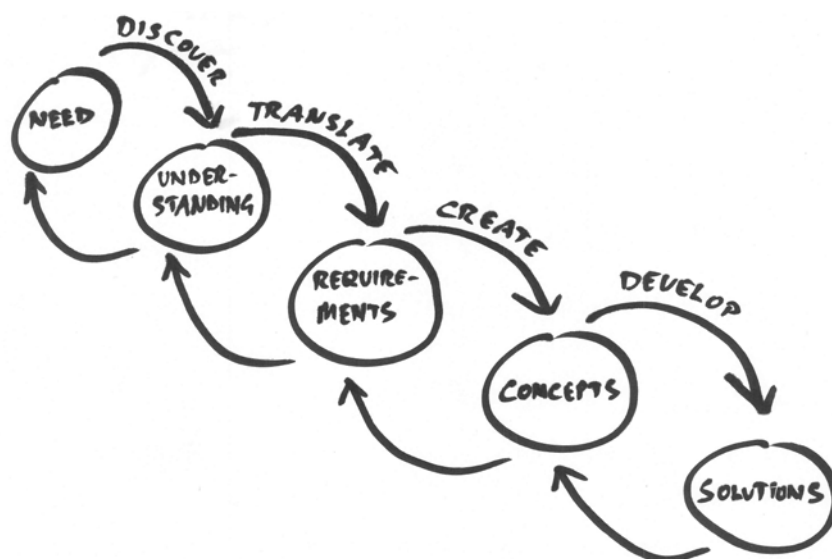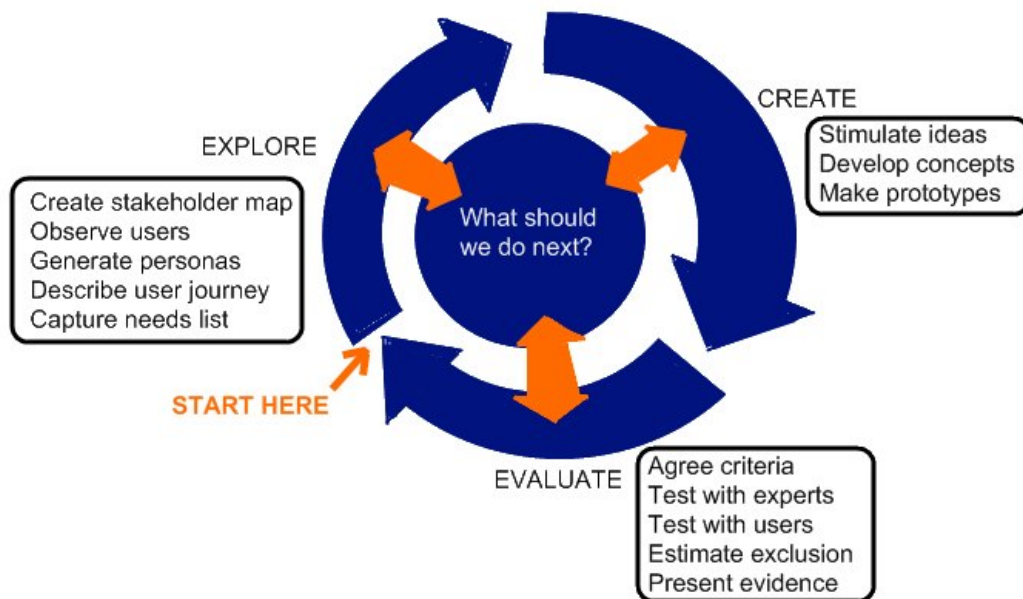
Figure 3. Inclusive Design Process (after Cambridge EDC). Source: author.

ID has two approaches to design for accessibility. The first is to ensure that the research makes full use of ergonomic methodology regarding the physical aspects of the design, to objectively measure capability loss and physical dimensions as well as reference to ergonomic best-practice.

This approach relates the solution to guidelines for physical dimensions and force requirements for manipulating objects or operating controls. The other dimension is cognitive, relating to objective and subjective perceptions of the design. When using ID, one ideally carries out intensive user consultation at all stages of the process; relevant stakeholders are as much a part of the process as the end-user. The method is generally reliant on the users and stakeholders being capable of communicating their preferences. Inclusive Design also proscribes self-testing, one of the fallacies of ergonomic testing (Porter *et al* 2002) but as we shall see, when the user can not be directly involved, one needs another means to test the acceptability of the design.

One of the benefits of ID is that in trying to avoid exclusion by design, the resultant product will have greater usability for users who have no capability loss. An example might be designing the controls of a device with large, clearly contrasting lettering and easily sensed buttons. While such a design

might be just sufficient for users with reduced visual capacity and poorer fine motor skills, they will be extremely usable for users in the normal range. Another example is the elimination of level changes in the floor of a rail carriage. This is useful for wheelchair users and older people with walking aid, but it also makes life easier for people pulling suitcases, pram users or parents with small children.

Unlike the work cited above, Herriott (2012) and Herriott and Cook (2013) addressed the matter of trying to design for users who have greater levels of difficulty communicating directly with researchers. In Herriott (2012) the users were not addressed directly by designers on the grounds that cognitive or psychological disabilities made this unfeasible. Others were severely restricted in their capacity for communication due to their illness (chronic obstructive pulmonary disorder). In Herriott and Cook (2013) some of the users were individuals with middle to late stage dementia for whom toilet equipment was required. Both of these papers looked at design for assistive technology through the lens of inclusive design processes. The iterative nature of the inclusive design process was observed but the elements relating to users´ direct validation was necessarily reduced or absent. The aim of the design was to produce a tangible product and in that sense the processes were versions of the classic industrial design methods. The 'explore' stage in the inclusive design process was conducted in the expectation of a generally understood design solution that needed refinement for an optimum fit. In the DSK method there the collaborative element at the centre of the model, implying that the user or their proxies participate throughout. In contrast, the process described in Herriott (2012) and Herriott and Cook (2013) imply that the user is encountered periodically or intermittently in the process. Where they are similar is in the type of user and the type of capability losses, and the user-centredness of the ethos of the process.

Methodology

The data used in this paper was gained from conducting interviews with designers from the DSK and examining the literature produced to support

their work. For clarity the interview material has been edited to present a readable narrative. The approach described is then compared and contrasted with work reported in Herriott (2012) and Herriott and Cook (2013), which described cases where the users had difficulties in communication but were still able to articulate their wishes verbally. In this way, two design approaches are explored and explained. The insights gained in understanding design for those who lack communication skills then informs and description and analysis of an inclusive-type design process.

Data

DSK´s approach in Skansebakken

An introductory (or "kick off" in their terms) workshop began the process. It was used explain and introduce the project to all the stakeholders and participants, or 100 people. In this instance, the design team used a food event. The aim of this 'meal-design' process was to change the staff´s preconceptions of design. The process of specifying and selecting the exact form of a new meal was used to show the salient features of a design process. In this instance, a meal stood in for the designed object and the participants´ intentions were to be passed on to the chef ("producer") to be turned into a dish. In using the food metaphor, the participants could understand the process of deciding what is needed, how to define it, and communicating their notions or ideals to a producer and thereby understanding what can and can´t be defined. This makes clear the distinction between the explicit and the implicit.

To help the designers understand the conditions of the residents and staff, the participants drew up schemes known as user journeys which were journals in which was recorded what the residents did on various time scales (day, week, months). The findings served to reveal which activities were more meaningful than others. Some of the routine activities that were not considered social turned out to be very much worthy of special significance . Through the use of the journals, the staff and design team thus gained a shared awareness of the way the institution ran. It changed the way the staff

viewed their activities as well. The design process, through triangulation for example, helped to align the understandings of the designers and the stakeholders. Initially, the problem formulation was not clear; it became so through the initial stages of data review and small workshops (of 5 to 20 people, divided into groups of five). The later and larger workshops (20 people) added more data to that already gathered and the path to a design solution was laid out more clearly, with all stakeholders having an increasingly shared vision of the way forward.

During fieldwork staff completed detailed charts recording what happened throughout the day, also noting locations. This generated a dynamic impression of the way the staff and residents used the home´s interior and exterior areas. Ethnographically, the designers observed the relations between the staff and the residents. In so doing they noticed it was more of a workplace than a home in terms of the rhythms of the routine. For example

Figure 4. Creating photo-ethnographic presentation with photos arranged associatively.

workplace routines governed the sequence of activities. In other words, the residents were not the the drivers of the activities. This was shown in the photo evidence where designers made a gallery of grouped photos that illustrated these aspects. The photos showed the place in a way the staff had not previously seen it. Semi-structured interview with workers, leaders, relatives, nurses supported this visual ethnographic data.

To investigate non-verbal means of communication, six individuals formed a test group. For example, in the case of Dorthe, an adult who has a developmental age of three, pointing served as her means of expression. This information, the importance of pointing, was then noted on a Facebook page set up for her. Having this information available to new visitors to Dorthe meant a shortened process of getting to know her and her needs. Another example is Jens, the only resident with any speech capacity. Jens, who is in his 50s, can be reached through song and by relating through his pet. Thus, resident-specific information was made accessible to visitors who did not necessarily have to communicate with staff.

In principle then the pattern of research was to find out the special needs and particular modes of communication of each resident and then make that clear and available for all who were to interact with them socially.

In the *comprehension* phase the design group triangulated the data gathered. This meant cross-referencing between the data sources (a strategy mentioned in Inclusive Design too). During desktop research the designers found that an employee had written a report as part of a diploma course. The conclusions contained therein indicated resistance to change. A commercial consultancy firm had also studied Skansebakken but their analysis underplayed the problematic aspects of the residence.

Following this stage, the group identified three areas of opportunity. Initially, the designers and management had intended to choose only one for further development but eventually it was seen that all three could be developed as part of the proposed design solution. The construction of an entirely new building solved the physical problems of the site. The two remaining social categories eventually fused into one unified design solution.

The areas of opportunity had these themes: 1) home and work 2) help for social contact and 3) a need for change. Under the first category, designers planned to improve the surroundings by making the place more clearly home-like and to have it less visibly governed by eight-hour shifts and work routines. Under category 2, it was seen that the citizens needed considerable help to make contacts; their needs and preferences were not easily found out which slowed or stopped new people from developing social contacts. It was concluded that visitors to Skansebakken needed a communication platform to introduce themselves. Such a platform, if introduced, would reduce the mediating role taken up involuntarily by the staff (discussed above). Under category 3, there was a need for physical change and a need for the organisation´s mind-set change along with the attitudes of the local community. Regarding this, the staff at Skansebakken were discovered to be anxious about unexpected contact with the community. This had a discouraging effect on the formation of new links between the residents and the community.

Following this phase, the designers developed ideas that could solve these problems, and they then tested them. In the co-creation workshop people from the community – "experts in everyday life" were called in to provide insight and also to ensure a sense of ownership to the solutions. A second workshop involved co-creation and validation with the staff. A relations-tree diagram showed who could be invited in from the outside community and this helped the staff visualise the otherwise abstract relationships that existed. Then the team and staff developed ideas about how better to link from inside to outside the home; in other words, diagrams were developed which explicitly showed the two-way relations between the home and the community: people going out and people coming in. A third workshop dealt with the relatives and their needs.

Evaluation of the process occurred constantly. Given the varied inputs (verbal and written) plus ethnographic methods, it was possible to triangulate the data and increase confidence in the interpretation of the findings. The indicators the team looked for were accord from the stakeholders and acceptance and comprehension of the proposals. The stakeholders had to signal comprehension of the design process (and were asked to test these methods themselves). Each set of work-shops (see Fig. 4) built on agreed understandings developed from the previous ones and in one sense can be viewed as prototypes themselves.

Figure 5. Schematic diagram of inter-relationship between workshops. Data from one builds on the other. Other inputs such as ethnography and literature review also inform this structure.
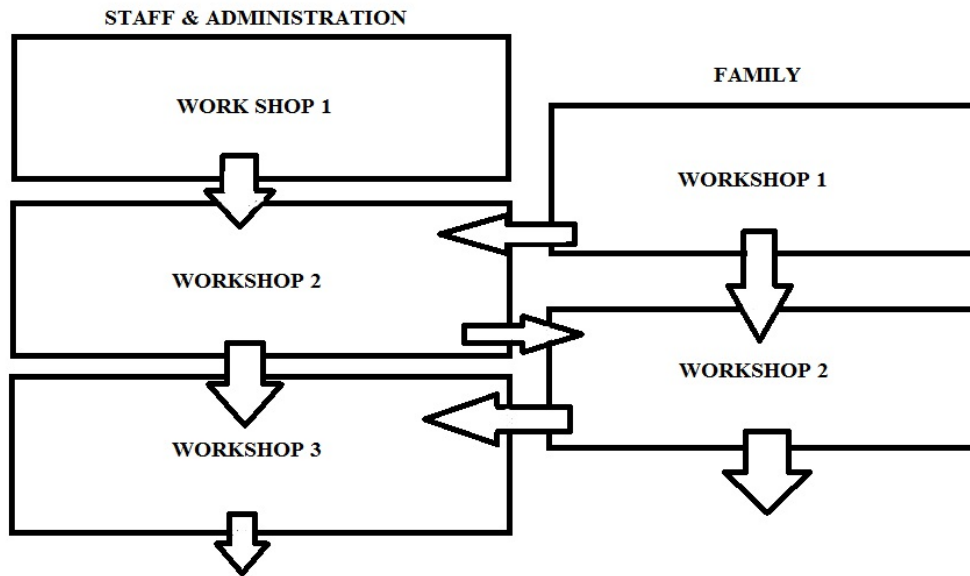
Designers used material models as communication tools. These included wooden materials, iPads and coloured adhesive tapes which allowed tangible representation of the ideas and their mode of interconnection. It is important to note that none of this material could be used with the residents due to their limited communication capacity. The staff served as proxies for the residents. The designers identified the range of needs described by all the stakeholders and synthesised them to produce a compromise blend which met the needs of the residents themselves. What they found out was that visual means were the best tools to communicate with the residents. Sound recordings could also be used. All of this pointed towards using iPads to mediate the visuals and sounds to which residents could react. Some of these solutions existed in an undeveloped and underused form: there existed a communication book that the residents sometimes used but it was not transportable, and it was not personalised in the way the iPads could be. In contrast, the iPad tablet was transportable and it allowed the data to follow the residents who could see the pictures. Guests could read the photos and use it as a shared reference.

The design team and the stakeholders found that other sense channels besides speech were most important. It was non-verbal with respect to the residents but

there was a heavier emphasis on the stakeholders' verbal communications. In other words, communication channels other than speech were being under utilised.

During the 'create' phase social prototyping allowed the simulation of new activities. Illustrating this, a designer arrived at Skansebakken unexpectedly and set about trying to find the space to make waffles. Waffle making was not part of the normal routine and the staff needed to understand how routines and the spontaneity of social visits had to be reconciled. The waffle-making demonstration tried out the concept of unexpected visits and helped the staff understand the concept of spontaneity which was missing from the institution. Another social prototyping trial resulted in the creation of an "idea tree". Guests could hang up a thing that could serve as inspiration for something to do with the residents. These could be objects such as a spoon to suggest something to do with food or an activity set which is a set of cards which provides details on how to engage in some game or interaction. People arriving could choose a suggestion from the idea tree if they could not think of one themselves. This idea-tree structure acts as an aid to memory and a visual prompt. It externalises the mental process of casting around for ideas for activities.

Finally, a method workshop was held to help the staff understand how the designers reached their conclusions. This meant the staff tried to experiment with design methods – to fly the plane themselves, as it were e.g. they made three rapid prototypes for communications: an iPad, a colour fan and "Top Trumps" cards so that the staff of Skansebakken could understand their possibilities. The participants agreed the iPad was the best tool to achieve the objectives. They had had gained first-hand understanding of the tool of and the other possible alternatives. As a result, they also accepted the validity of the process and of the proposals it generated.

This section has outlined how the generalised design process of the Design School Kolding was used in specific conditions. It specifically deals with two areas that Inclusive Design (discussed below) references but which might be said to underplay. Those are 1) designing for those who can not communicate and 2) finding accessible ways to ensure that stakeholders have ownership of the process and can validate the outcomes.

Results

The methodology of the DSK´s work and its results are closely intertwined. Some of the physical and behavioural aspects have been discussed in the previous section. From the outset, the managers of Skansebakken and the designers wanted to improve social relations between the residence and the local community and thereby to bring more voluntary social interaction into the lives of the residents. Resulting from the introduction of digital media and physical interventions such as the ideas tree, they attained these objectives. In the first instance, students from a local school began visiting the residents as part of a school programme. However, most of the social relationships continued when the programme stopped. Further, local members of an organisation for disabled citizens also began to visit Skansebakken. The staff became more open to the outside world and no longer viewed the residents as "theirs" only. The Social Inclusion Lab´s work allowed the staff to step back a little from their previous role, allowing space for others to join in the life of Skansebakken.

Seen from a more general point of view, the project showed how multi-sensory communication can aid the process of design research. When dealing with users in the regular range of capabilities there can be a natural reliance on verbal and written modes of communication. This process demonstrated that even when these methods can not be so easily used, there are other ways to open channels for dialogue with individuals and to thereby determine their needs, using proxies.

Dealing specifically with design using proxies, it becomes more necessary to focus on careful observation of the resultant prototypes in action. If one can not ask the intended user about their responses, ethnographic methods take a position of increased importance. The designer needs to define what a successful outcome is in changes of behaviour. A precisely and testably formulated question about what success looks like is needed. In the case of Skansebakken that test related to an increase in social connections, simply the arrival of more, new people into the residence and the continuation of social relations after the project period. These conditions were met so even

if it was not possible to directly ask the "users" about their experience one can monitor how many new visitors were getting involved. One could suggest there is always an element of doubt about design for proxies – how can one really be sure the design is appropriate? The answer is that essentially all design assumes a level of pragmatism. It is good to be cautious about proxy-based design but at the same time, this must not lead to a state of design paralysis. All design is, to some extent, merely the best that could be done under the circumstances. If the alternative is to leave the status-quo, then it is apparent that proxy design can lead to an outcome one can conservatively term "much better than doing nothing".

The Skansebakken project showed how even when the target user groups have severely limited communication ways can be found to gain useful insights. The strategies of co-design workshops and the triangulation of information allowed the designers to be confident that the design requirements were valid and appropriate for the special needs of the user group.

Conclusion

The Designing Relations project forms a useful example of a fusion of design methods, being as it is on the borderland between assistive technology and social design. Many of the problems that concern Inclusive Design are at play in the Skansebakken. However, the design solution is assisting not a physical disability but cognitive and social ones, though the physical disabilities are naturally part of the context. Bühler notes (1996) "assistive technology plays an very substantial role for independent living of people special needs". The design solutions described here allow the users to be more independent of their paid carers which in a sense, makes it assistive *social* technology. Further, if Inclusive Design understandably focuses on the user, albeit part of a wider context, this case can be said to have a holistic approach. The users – the residents – are still at the heart of the design activity, but the purpose of the solution is about the devices and new social arrangements putting the residents in contact with other people. It is a means to allow some form of

communication and social contact. The design solution is not operating at the same level as the walking frame or hearing aid, for example, but at a level more fundamental, person to person interaction.

As stated in the introduction, Inclusive Design explicitly sets out to design for the needs of excluded users; the residents of Skansebakken fall into this category on the basis of their disabilities. Inclusive Design has not addressed this class of user so much as extended consumer product design in the direction of greater inclusivity. In interviews with the designers, the author discovered that they were not familiar with the concept of Inclusive Design but nonetheless demonstrated the approaches one could use in dealing with excluded user-groups. Thus, it is instructive to see how a design method which ought to be able to address disability (but was not used) compares with a method that not so specialised (and which was used successfully).

Orpwood *et al.* (2004) go partway to treating the problem of users with communication difficulties and acknowledge that it is best to leave user testing to the point where the product is quite mature. The Designing Relations project goes further than this in its attempt to ensure reliable data gathering. Of particular interest is the dynamics of triangulation. What did it mean to "triangulate" between the information offered by the stakeholders who were management, staff, relatives? It centred on obtaining a wider range of responses than can be obtained using verbal and written tools and by workshops and expert discussions where the data gathering was tuned in the light of previous discoveries. This parallels the findings of Boyd-Graber *et al.* (2006) who used speechtherapists to stand in for aphasic users when devising a communication system. However, that work did not exhaust the implications of using non-verbal communication in the research phase itself and the proxies could stand in directly for the user group, which was not possible here.

It is also an aspect of non-verbal means of communication that they will tend to elicit strong yet very emotionally laden responses. It is precisely this kind of subjective yet relevant and valuable feedback that can have the greatest value. Purely quantitative, verbal research might provide a logical

statement e.g. "the user does not like orange" but perhaps a sound, an image or a sculpted form might better capture the aversion to the phenomenon and so better alert the designer to the significance of the phenomenon.

It is time to turn to examine this work in the light of the concept of Buchanan´s Fourth Order design. First and second order design are best understood as classic design methods applied to objects. Buchanan´s (2013) argument is that third order design deals with how people relate to people and fourth order design relate to the environment and systems in which the people and things exist. The ideas are set out in greater depth in Buchanan (1992, 1996 and 1998). DSK´s work can be seen to be a manifestation of Fourth Order design, yet also touching on first and second in that specific objects were created too.

Buchanan (2007) addressed two boundaries of service design, which in essence, the DK project is. The first boundary was the crossing over of graphic design methods to be used a communication tools. The second is the use of products to mediate communications: "How do we use artifacts in establishing relationships among people? Now this is not something that's a news flash for industrial designers. But to shift the focus toward the use of the artefact and its role in experience or activities or being together. That's different. A boundary was crossed" (Buchanan, 2013). DSK´s work crosses those boundaries or can be said to form a nexus between what are fields considered to be separate.

The Designing Relations project is one in which design for inclusivity is relevant as an end in itself and as a means. The disabilities of the user group necessitated an inclusive approach and the involvement of all stakeholders. It was a service design project in as much as it did not aim to create a new product but to alter the way in which people relate to one another; finally, its methodology illustrated points made by Buchanan generally and also specifically (2007) with regards to the inter-relation of third and fourth order design.

Turning to Buchanan´s observations which are at the methodological and teleological level (after Love´s classification, 2000), this project is illuminating in several ways. At a high level, the project has addressed a "wicked problem" by not only asking the stakeholders to contribute to the information gathering but also by getting them to try out the data gathering method. This dual approach to what is the most contested aspect of a project – defining the problem – creates trust and ownership of the resultant process. In a sensitive case like this, the emotional state of the affected parties matters as much as their well-being. Potential causes of anxiety and disagreement have been avoided by ensuring that the point of the project is agreed by all involved. This makes this a fourth order design issue under which is nested a particular design outcome, the use of off-the-shelf digital devices to support a change in behaviour and to facilitate relationships.

Sanders and Stappers (2014) discuss approaches to making in co-design. They present a concept for movements in design (ibid., p.13) which places social design as being a development for the near future. They also assign this mode to the category of designing "with" the users. However, looking at the kinds of interventions the Lab made with Skansebakken, we can also see that the project to some extent used aspects of critical design and design interventions. Here one thinks of the "waffle chef" strategy which was a way of drawing attention to the institution's awkward response to unexpected visitors. Sanders and Stappers situate designing *for* and designing *with* on opposite poles of a spectrum (which may very well be merely a graphic design artifice) but it is useful to note that design-for and design-with can happen in the course of the same project.

Additionally, the project demonstrated how designers skills and methods can be used to repurpose existing technology. In Broadbent´s (2003) outline, the first phase of design was to shape materials to a new purpose; the second was to design by drawing and entrust manufacture to another; in the third hard-systems methodology was used to define each aspect of the physical problem; in the fourth, psychology was taken into account (soft-systems methodology). All four deal with making a thing. Designing Relations has used the fourth generation of design to re-purpose an existing object.

Conceivably, in the digital age, the role of the designer will be as much working out what can be done with infinitely flexible hardware and software as designing these things in the first place. It is about finding out new functions for existing tools. This echoes the findings of Dawe (2005, p.21) about how most AT in the home is existing technology with a new purpose assigned to it.

Brereton *et al* (2015) discuss the view of design as relational process and in so doing cite the following: "Suchman (2002) has argued that rather than focusing on the designer/user opposition, we should see design as an 'entry into the networks of relations that make technical systems possible'". The Skansebakken project is precisely this where the 'output' is not only a 'thing' to be used but also a re-ordering of the understanding of how stakeholders relate. In a simplified view of various Design For All processes and design in general, the designer bolts on a new product to an existing set of elements. In a classical version, there is a need or a problem and a new product satisfies that need. This model can only be extended so far before it does not reflect what is going on in projects as described here. We are thus made alert to the boundary of a model derived from traditional product design. If one approaches a situation and a set of relations that need to change, the design process is not an only examination of what is going on but also an intervention. Assuredly there is an element of this in all but the simplest design projects. What happens clearly in Designing Relations is that the process itself becomes, as it were, the product. The *inputs* into the process are changed. Skansebakken´s community is not the same as it was before the project began whereas one could say the consumer with the new toothbrush or even stair-climbing aid is the same person only with an improved device. The teeth still need to be cleaned and the stairs climbed. In designing relations the end result of the process feeds back into the process itself. That reflexive characteristic becomes more and more apparent the more cognitive and social elements become features of the problem to be handled.

An important point to emphasise in closing this article is that Designing Relations showed how design methods can make a profound difference to the

most vulnerable members of our society. While some of the theoretical aspects are of interest, the immediate value of this kind of work that it echoes the ethical spirit of Papanek´s (1971) Design for the Real World and is design that matters.

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