Designing to Bring the Field to the Showroom through Open-ended Provocation

Janet Kelly [1,*] and Stephan A. G. Wensveen [2]

[1] SPIRE Centre, The University of Southern Denmark, Sonderborg, Denmark
[2] Department of Industrial Design, Eindhoven University of Technology, Eindhoven, the Netherlands

Engaging formats are required to communicate designerly understandings of field studies to a broader audience within organisations. Here we present a case where the format of an exhibition, consisting of a collection of open-ended provocative design concepts, has been used to disseminate knowledge and to engage two medical device manufacturers in the results of field studies that involved what we have described as the 'pre-users' of their devices, people who are not yet using the devices but are on trajectory to do so in the future due to the progression of a chronic medical condition. We go into detail with examples that show how the concepts in the exhibition reflect understandings from the field and were designed to provoke new ways of looking at the field. We elaborate on how the exhibition as a whole, rather than presenting ultimate solutions, mapped out a rich and complex landscape for design, and make an initial evaluation of it based on responses from visitors from the organisations. The discussion revolves around what can be achieved through open-ended provocation in this kind of format and what needs to be taken into consideration when designing in this way.

Keywords – Constructive Design Research, Exhibition, Medical Design, Open-ended Provocation.

Relevance to Design Practice – This paper presents an example of how open-ended provocative design concepts can be used in an exhibition format to communicate designerly understandings of fieldwork.

Introduction

User-driven designers and design researchers have found it fruitful to go out into the field and collaborate with the people who may become the future users of the designs, and other relevant stake holders. However, it is rarely possible to take everybody involved in the project into the field and involve them in the research. Findings from fieldwork may need to reach beyond the immediate design team and influence a wider audience within an organisation. In their case for a participatory innovation approach, Buur and Matthews (2008) argue that such projects should aim to "generate knowledge about users/customers in a format that inspires company employees to reflect on product, producer role, and company identity" (p. 268). It is not enough to simply communicate fieldwork findings, but the findings must also be communicated in a way that engages and makes them relevant to the audience.

Several authors have explored ways to communicate field study findings in an engaging way in order to generate empathy (Mattelmakki, Brandt, & Vaajakallio, 2011), but empathy alone is not enough to foster innovation that creates valuable offerings for users and other stakeholders. In companies that have already adopted a user-driven approach and have a lot of knowledge about their users and potential customers, employees may still find it difficult to apply many insights about users to their work. Field study findings also need to be made actionable (Jaffari, Boer, & Buur, 2011) in an engaging way that allows people in the organisations to understand not only what is going on in the field

but also how it can be used. Furthermore, in a complex context for design, formulating findings into problem statements or a list of implications for design will at best over-simplify the fieldwork and strip the findings of their analytical auspices (Dourish, 2006).

As designers are interested in how a current state can be changed into a desired state, the field is not just something to be observed and analysed alone, but something which is explored through the act of designing. In constructive design research the act of design and construction itself takes a central place and becomes "*the key means in constructing knowledge*" (Koskinen, Zimmerman, Binder, Redström, & Wensveen, 2011, p. 5). Field work is important because it contextualises design, allowing designers and researchers to follow it though society and explore "how people and communities understand things around designs, make sense of them, talk about them and live with them" (p. 69). Like anthropologists, constructive design researchers study the material world, but this material world is a combination between the existing and an imaginary world, "a special kind of make

*Corresponding Author: Janetakelly@gmail.com

believe world, which is partially of their own creation" (p. 79). Introducing these imaginings into people's lives allows them to be followed, but these imaginings can also act as an analytical lens, bringing particular aspects of an existing context to the foreground and highlighting issues that should be taken into account when designing for that context.

The implication is that design itself can be used as a means to communicate fieldwork and that the understandings developed from ethnographic fieldwork can be represented using an artefact. According to Buur and Sitorus (2007) "the product in a sense *embodies* the ethnography" (p. 149). There is a risk however when using this approach out with the original context of again over-simplifying the fieldwork findings (Koskinen et al., 2011, p. 97). When the findings are presented in a single design concept it implies there is also a single obvious problem to be solved in the field. This might encourage company employees to evaluate the design concept as a solution, rather than reflecting upon what the issues behind the design and the fieldwork imply for their work and their organisation. Making a collection of significantly different design responses is one way of demonstrating a broader design space. Another way is to encourage deeper reflection by moving the designs beyond being seen as solutions and closer to the domain of *Critical Design*, where artefacts are used as a way of making people think. *Critical Design* originates with the work of Dunne and Raby in the 90s and brings conceptual art practice into the world of design. "We hope the work will inspire people and encourage them to see things differently and open up new spaces for discussion" (Parsons, 2009, p. 145). Through strange, ambiguous and provocative artefacts that cannot be understood as real world design solutions, *Critical Design* attempts to provoke a different way to see the world.

Critical Design belongs to an alternative to the 'Field' research programme in constructive design research, the *Showroom*. The *Showroom Programme* as it is defined by Koskinen et al., (2011) comes out of the tradition of art, as opposed to the Field Programme that comes from the social sciences. Here design becomes a means to conceptualise issues, provoke discussion and highlight controversy. "Showroom is about exposing, debating and reinterpreting problems and issues. Ambiguity and controversy belong to it just as they belong to contemporary art" (Koskinen et al., 2011, p. 103). Research exhibitions are an important means of research communication in the Showroom Programme. Exhibitions can be considered as "thought experiments" (Ibid, p. 94) that offer a greater freedom than academic writing alone and have been used to bring design research issues to a broader public audience (Kerridge, 2009), and to develop discourse around issues such as sustainability (Mazé & Redstrom, 2008).

This paper presents a case that hybridises these two constructive design research programmes (Koskinen et al., 2011), bringing the *Field* into the *Showroom*. It is based on an exhibition held in November and December 2012 across several locations on the premises of two medical device companies located in Denmark, that presented a collection of provocative design concepts alongside stories from the field. We chose to create an exhibition, because other possible formats such as workshops (see Jaffari et al., 2011, for an example) which have been shown to be very effective have the drawback of only being able to reach a limited number of people, while more easily distributed formats such as books (see Halse, Brandt, Clark, & Binder, 2010, for an example) we believe still require a specific interest and commitment to engage with. We wanted to reach people in the broader organisations who had not previously had an interest in the project. The advantage of an exhibition within the company settings was that it allowed many people to encounter it as part their daily working lives, without having to make a specific time commitment to go and see the work. The exhibition was intended to communicate fieldwork findings in a provocative and open-ended way that invited people in the organisations to engage and reflect on the issues and themes that the artefacts embodied.

Provocation and Open-endedness

Provocation is a notion that is often used in relation to *Critical Design* and the Showroom Programme in design research as a means of changing people's thinking. Although the term provocation has connotations of confrontation, it also has a broader sense that encompasses inciting new thoughts, emotions or behaviour, either positive or negative. Some ways in which other authors have used the term in the Field Programme of constructive design research include attempts to stimulate new practices (Mogensen, 1992) and obtain a greater understanding of the context for design (Boer & Donovan, 2012), and also to describe the stimulation of novel ideas in co-design processes (Bowen, 2009). While being provocative can mean being confrontational and challenging people's expectations and beliefs, it can also means eliciting positive emotions such as empathy, stimulating inspiration, or inciting different behaviours and different ways of seeing.

Janet Kelly has recently completed a PhD with the SPIRE Centre at the University of Southern Denmark (2014). Her research has explored how "pre-use", what happens before people become users, can be useful for design. As part of this she has work closely with two international medical device manufactures, Novo Nordisk and Oticon, to develop methods and approaches to involve the pre-users of their devices in participatory design and innovation processes. Her current research interests include the explorative and analytical roles that artefacts can play in design research. She holds a Masters of European Design (Product) from the Glasgow School of Art (2009) and currently holds a position as a lecturer at the Department of Product Design at the Glasgow School of Art.

Dr. ir. **Stephan A. G. Wensveen** is Associate Professor in the Designing Quality of Interaction group at the department of Industrial Design at Eindhoven University of Technology. He has an MSc (1995) and PhD (2005) in Industrial Design Engineering from TUDelft. In 2002 he became an assistant professor at TU/Eindhoven and joined the DQI group with Prof. Kees Overbeeke. His interest is in using the power of design to integrate research, education and innovation, which he demonstrated as project leader for the /d.search-labs and as initiator and research director of Wearable Senses and the nationally funded project on Smart Textile Services. Many of his papers are part of the standard curricula in interaction design schools and he is co-author of the book 'Design Research through Practice'. In 2011 he expanded his horizon on multi-disciplinary design and Participatory Innovation when he joined the SPIRE group of Prof. Jacob Buur at MCI. Since 2013 he is back in Eindhoven.

The specific sense in which the exhibition presented in this paper would be provocative was left intentionally ambiguous; the idea was to create a diversity of artefacts where each of them could be received in multiple ways depending on the visitors. This was an acknowledgement of the open-ended nature of the way any kind of material will be appreciated by the viewer, who will always understand the material in a different way from what the presenter anticipated (Mattelmakki et al., 2011). Rather than try to limit the possibility for different understandings, Mattelmakki et al. have argued that not only should these be recognised, but the different understandings can even be used constructively. "In the open-ended interpretation context this means acknowledging the variety of interpretations, and at best benefiting from them" (p. 80). In our case the idea was to make it evident that the concepts could be interpreted in different ways, to prevent them from being seen as straightforward solutions and to encourage deeper reflection. Additionally allowing these different interpretations to be incorporated into the exhibition by including a section where visitors could post feedback on the other exhibits helped to create a greater richness and depth to the discussion around them. It allowed visitors to see how their opinions reflected and/or differed from others, moving it beyond an individual interpretation to a more nuanced collective interpretation of the material.

Designing successful provocation is not easy (Bardzell, S., Bardzell, J., Forlizzi, Zimmerman, & Antanitis, 2012). According to Dunne and Raby (2001) "a slight strangeness is the key—too weird and they are instantly dismissed, not strange enough and they are absorbed into everyday reality." (p. 63). In other words, it is important to find a balance where the concept is both in some way recognisable and therefore able to be identified with, but still in some way challenging to what is assumed to be normal. Although this makes sense conceptually, crucial to this is sensitivity to what will be perceived as strange or not strange to the recipient of the concepts ideas. What may be provocative in one context will not be at all in other contexts. Therefore this necessitates having some understanding of what will be new and strange to the viewer (in this case, company employees) as well.

The format of an exhibition was in itself a way of creating a slight strangeness within the industrial context. Proponents of the Showroom Programme have argued for the importance of the subtle difference in the concept of an exhibition as a showroom, which suggests commercial roots, as opposed to a gallery, which comes from the world of art. The importance of this distinction has been used in reference to public exhibitions where the intent has been to engage people in a form of "conceptual consumerism" (Dunne, 2005), where art practice's ability to provoke is moved into a larger, more accessible context. Yet in our industrial context, which is dominated by commercial practices, maintaining some kind of link with the practices of art is also an opportunity to introduce additional tension that can provoke people to consider what is being presented more deeply. This was why in the end, the presentation of the exhibits ranged from commercial showroom style, to art gallery and even interactive museum exhibit style.

Finally, presenting ideas in the form of product concepts was a deliberate decision to maintain the balance between the familiar and the strange in this industrial context. The more conceptual and abstract artefacts of *Critical Design* require a lot of work from viewers to be interpreted and could easily be dismissed in a business context, where visitors might expect something which could be applied to their work. However when *Critical Design* artefacts that take the form of a product concept are presented in a public domain setting, they run the risk of being treated as a real consumer product (Koskinen et al., 2011, p. 97). It is precisely this aspect, the possibility that the concept could be interpreted as a potential product, which can create engagement and tension in an industrial context. In an industrial setting product concepts speak directly to people's everyday work life, as these are the people who have the influence over what the technologies will actually be like. Using product concepts to embody fieldwork findings, was a means to encourage company employees to relate the issues they brought to light to their own work and engage in reflection over their meanings.

The Case: *Pre-user Innovation*

The exhibition presented in this paper was held as the concluding event of a PhD project which was a collaborative project between medical device manufacturer Novo Nordisk, which make diabetes treatments including insulin injection devices, and Oticon, which makes hearing aids, and also the SPIRE research centre for participatory innovation. Two PhD candidates were involved, one from an Anthropological background and the other from a Product Design background. The project began because, although they work with very different kinds of medical conditions, both device manufacturers had a similar problem : many of the people who could benefit medically from using their treatment devices delayed starting to use them. This delay could have a detrimental effect on the health and wellbeing of those potential users. These people were defined in the project as being the 'pre-users' of the medical devices and the overall project aim therefore was to create an understanding of the barriers inherent in the transition from 'pre-user to 'user', as well as to develop methods to involve pre-users in innovation processes in order to uncover new product development and business opportunities for the companies.

Both diabetes and hearing impairment are long-term medical conditions that require constant treatment as they are chronic and incurable. In the first case, the delay of initiating insulin treatment increases the risk of severe complications, such as blindness, heart disease, and, eventually, death. In the second case, reluctance to use hearing aids impedes participation in social life and may lead to early retirement from the work force. In both cases, the crucial issues were to overcome barriers and to expedite patients' access to a medical device in a way that would benefit their well-being and quality of life.

In the project, *pre-users* are defined as distinct from *non-users,* who have made a choice not to use a technology, and *potential users* who have chosen not to, but may be swayed. *Pre-users* are instead defined as people who do not currently use

technologies but who are in a life situation in which they may become users of the technologies at some point in the future due to the progression of a current medical condition. This means that pre-users of hearing aids are people who suffer from a hearing loss that is causing recognisable problems in their lives, but who do not yet have a hearing aid, and the pre-users of insulin injection devices are people diagnosed with Type 2 diabetes who are not yet using insulin/injection treatments.

The project has involved a combination of ethnographically inspired fieldwork and constructive design research. As part of the project the researchers spent time in clinics with both, hearing care professionals and health care professionals, observing and recording their consultations with pre-users. In total 23 professionals were recorded in action in 77 consultations. In addition to this the researchers made follow-up interviews in clinics with 31 pre-users and visited a further 21 pre-users in their homes from one to three times. Throughout the project a total of six exploratory design workshops were held with pre-users, two sets of probe style kits were deployed, and several additional workshops were held with company and university employees. During the project the researchers were located within the companies and participating in the daily routines of the organisations.

The Exhibition

The exhibition was held two and a half years into the project, after the fieldwork had been completed. It was held over a period of three weeks in four different locations internally, both at Oticon and Novo Nordisk, which were all located in the greater Copenhagen area. The overall aim of the exhibition was to communicate fieldwork findings to a broader section in the organisations in a way that was engaging and made them relevant to the audience. We wanted to make the fieldwork findings actionable and to inspire people to reflect on the issues and themes that had emerged from the fieldwork, so that they would be able to apply them to their own work going forward. It was intended to be provocative and a bit critical in order to give people at the companies a different perspective from that which they currently held of what the treatments of the conditions are and could be. There were eleven exhibit stands: two presented stories from the field for each domain area (i.e., hearing loss and diabetes, three stories per stand); eight stands presented design concepts (four for each domain area); and the final exhibit offered a chance for visitors to comment on the exhibits and incorporate that feedback into the exhibition Representatives from each company were invited to a special guided tour at the opening where they were asked to give feedback along the way. This feedback was included in a closing presentation on the last day.

The overall idea behind the exhibition came from fieldwork findings about the relationship between the conditions and their treatments. Firstly, the fieldwork showed that when a treatment was made into an option it changed the relationship people had

with their condition by foregrounding certain aspects of it and back grounding others. For example, when hearing aids were made an option, hearing problems could become an issue with the individual's failing body, instead of being about bad acoustics or another person's poor enunciation. Conversely, the relationship people had with their condition influenced their attitude towards a treatment option. For example, if people felt that they were constantly failing to treat their diabetes well, then injecting insulin could become a symbol of ultimate failure, as opposed to just another treatment option. Therefore, the exhibition was intended to both introduce this idea of interdependency between condition and treatment, and suggest that through interventions that changed people's relationships with the conditions and their treatments, different aspects of both could be foregrounded. Presenting a range of concepts was also meant to highlight that in this complex design space, that there is not a single problem to be solved but rather a multitude of possibilities to reshape the space in different ways.

This exhibition (shown in Figure 1) was both a deliverable to the companies intended to inspire and offer a different way of seeing the world, as well as an opportunity to reveal some of the assumptions and attitudes of the visitors through the reactions they provoked. The concepts developed for this exhibition draw from findings about how these conditions are treated and understood by pre-users, but also on the experience of nearly three years working closely with these two organisations.

In order to communicate both the depth of the issues and themes each design concepts embodied, and the breadth of the considerations involved in the exhibition as a whole, we will first present examples of two of the concept exhibits. The examples describe in detail the themes from the fieldwork that led to the design concepts and we present images of the exhibits in order to draw attention to some of the design decisions involved (Gaver, 2012). We will then give an overview of the exhibition as a whole, highlighting the main themes and relationships between the concepts presented, and follow with a preliminary evaluation of the exhibition based on responses.

Concept Example 1: *Revealable Hearing Aids*

A key theme that came out of the fieldwork in the hearing loss domain and was explored in the Revealable Hearing Aids concept was *Self-Stigma*. Reluctance to get hearing aids is often attributed to a fear of being stigmatised and we did see evidence of this fear of stigma in our fieldwork as some people were concerned that hearing aids might make them look old and pathetic. For example, one of our Danish participants, whom we will refer to as Ole, was afraid that people would see him wearing them and think "that poor old man can't hear." This has also been an issue that the hearing aid industry has tried to address for many years; hearing aids have gotten smaller and more discreet as a result, so that some models are hardly noticeable. Ole explained that he had discovered recently that someone he knew had worn hearing aids for years without him noticing. "Actually I found out, at this

Guests from both companies browse the exhibits during after the closing presentation.

A presentation being given to employees from Novo Nordisk

The exhibit with space for feedback.

Guests from SPIRE exploring one of the more interactive exhibits.

Figure 1. The exhibition in various locations.

silver anniversary thing, that a young woman we know, well she is around 50, but she had used hearing aids for 15 years, I've never noticed." His comment indicated he seemed to be surprised; both by the technology which he expected to draw more attention to itself, and by the wearer who he had not associated with needing hearing aids because of her age. However, not everyone is afraid that hearing aids will stigmatise them. For example, with one of our American participants whom we will call Alex, stated in one of the workshops that he would be more likely to wear a visible modern-looking device than an invisible one. "If I had a hearing aid I would want it to be visible—I am hard of hearing and not trying to hide it," he said. Alex's comment suggests that hiding the hearing aid would mean one was ashamed of the hearing loss, so it can also be argued that making the devices discreet is actually compounding the self-stigma that hearing loss is something people should hide.

Another related theme that was explored in the concept had to do with *Identifying with Users*. The focus on making the devices smaller and more discreet comes with several other drawbacks, with two things in particular standing out when it comes to encouraging people to become users of them. Firstly, because the newer models are relatively unnoticeable, the ones people do see on others are the larger or older models. One of our American informants described what he thought hearing aids were "those flesh coloured things that you do not want to put into your ears." He had a very clear image of what he thought a hearing aid looked like, which is probably an image many people share. Additionally making hearing aids less visible makes it harder to notice the amount of people who are wearing them, which also discourages their uptake. We found that encountering someone that one can identify with, and who is happy wearing hearing aids can be a powerful factor in influencing people's perceptions of hearing aids. As an example, we spoke to one Danish woman, whom we will call Anna, who was in her thirties and had known she had a hearing loss for many years but resisted getting hearing aids as she felt she was too young to be wearing them. When Anna met a woman of a similar age she noticed her wearing hearing aids and started a discussion about them, after which Anna initiated the process of getting them herself. One way of looking at this is that by making modern hearing aids more visible, it could actually encourage pre-users to become users of them, because pre-users would be more aware of and could identify with the people around them who are users.

Finally the concept also incorporated the theme of *Shared Responsibility*. Although fear of stigmatisation and negative perceptions of the devices are part of the issue, they are not the only reasons why pre-users are reluctant to get hearing aids. Accepting that there is a need for hearing aids can also be very difficult for some pre-users. This kind of consideration can be seen in the way people sometimes downplay their hearing problems by comparing it to someone who has worse problems, for example an older relative, or by blaming it on environmental factors and other people.

Right, and I get frustrated […] some part of me is thinking; well she's on the other side of the apartment facing away from me she knows my hearing isn't great so why doesn't she turn around and speak louder.

This quote is from an interview between a husband and a wife in the USA. The husband, who has hearing loss, responds to his wife's comment that she often thinks he is ignoring her, by explaining why he thinks it is her responsibility to make sure he hears her. If hearing aids were proposed as the solution to this problem instead, the responsibility to solve the problem would become entirely his. Hearing aids can mean that the responsibility for communication problems is placed solely on the shoulders of the person with the hearing loss, when previously these problems would have been the responsibility of both parties to solve. This then might suggest that if hearing aids could turn communication back into a shared responsibility, it could make the decision to get them easier for people with hearing loss because they would not have to accept full responsibility for communication problems.

The three different themes from the fieldwork, *Self-Stigma*, *Identifying with Users*, and *Shared Responsibility* were drawn together for the *Revealable Hearing Aids* concept (see Figure 2). This concept for hearing devices allows the wearer to have the devices light up and draw attention to themselves in situations where they needed extra help to hear. The devices would therefore create a presence for themselves and actively engage in social activities. The idea of the concept was to demonstrate how hearing aids could make communication a shared responsibility and in doing so make pre-users aware of hearing aid use. The concept was intended to suggest a world where hearing loss is changed from an individual's problem to a communal responsibility. The idea is that the wearer can choose to use the devices to show others that they need to communicate extra clearly in specific noisy situations, and in those situations the hearing aids would light up. To demonstrate this, a video was playing in the background showing different clips from either noisy places, such as a restaurant or a busy street, or quiet places, such as an empty park or office, while the hearing aids lit up or shut off accordingly. An existing hearing aid that the Oticon company already produces was used to make the model as the concept was intended to make the qualities of these already existing designs more obvious. The colour blue was chosen for the light as it was visible but had a relatively ambiguous meaning in this context. The devices would have an automatic mode which responds to the amount of background noise, lighting the hearing aids up and drawing attention to them; or the user can choose to switch the lights on or off as they wish. To demonstrate this, function controls were added to a streamer device that Oticon already produces and this was meant to emphasise that users had control over the visibility of the devices. The devices were presented on a dummy head on a pedestal at head height, so that visitors could find it easier to imagine what meeting someone who wore them might look like. On the pedestal were the exhibit title and a plaque with the concept description with the heading: "What if hearing aids made communication a shared responsibility?" This heading was intended to suggest a world where the meaning of the devices' light signal was understood.
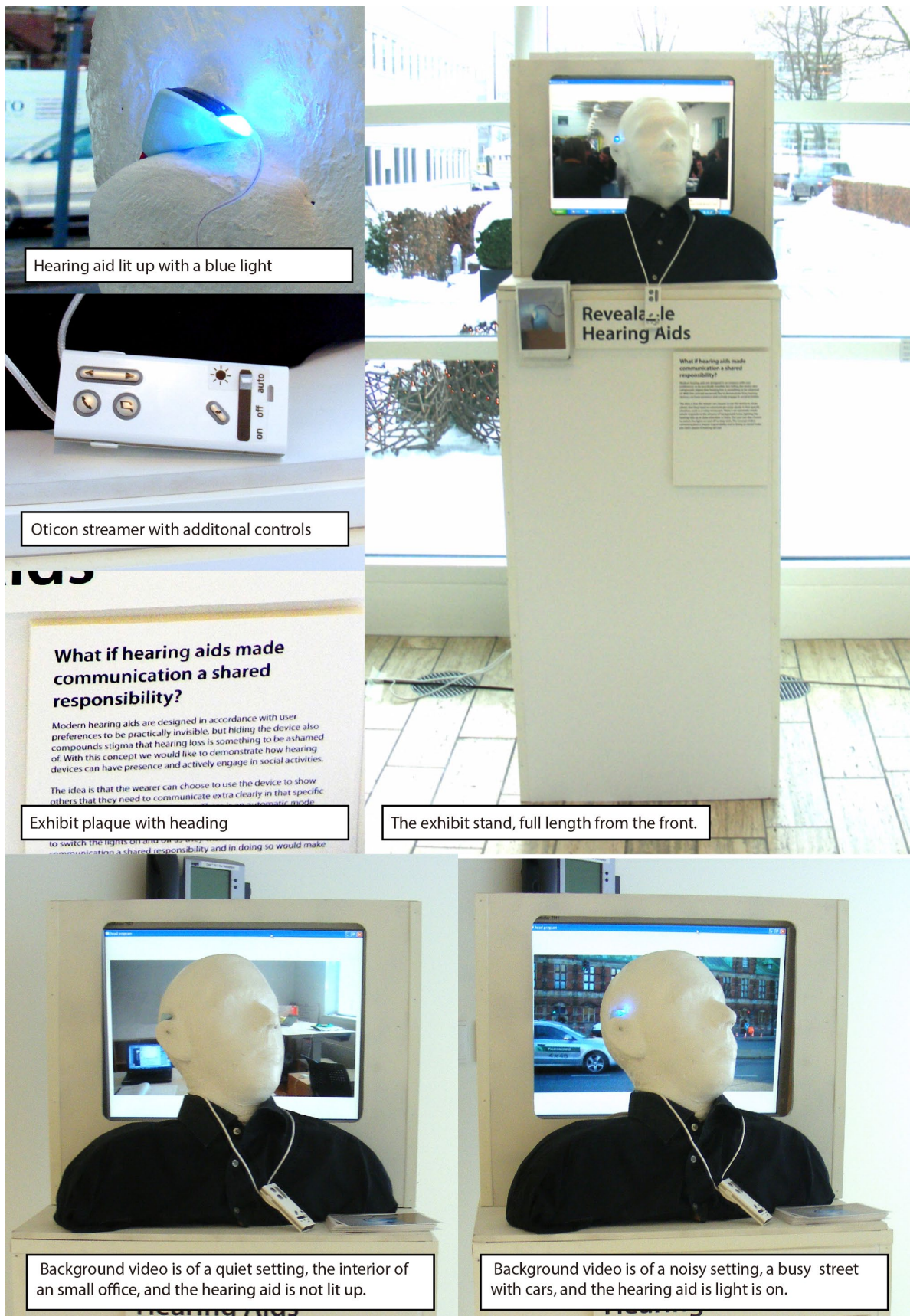
Hearing aid lit up with a blue light

Oticon streamer with additonal controls

Exhibit plaque with heading

The exhibit stand, full length from the front.

Background video is of a quiet setting, the interior of an small office, and the hearing aid is not lit up.

Background video is of a noisy setting, a busy street with cars, and the hearing aid is light is on.

Figure 2. Revealable hearing aids exhibit.

Concept Example 2: *ACT on Diabetes*

An example that responded to the diabetes domain was the ACT on Diabetes concept. One of the key themes behind the concept was the issue of *Numbers and Measurement.* Measurements are a major part of living with diabetes, since the condition is diagnosed by measuring blood sugar and the treatment routine is also monitored through measuring blood sugar both at home and in the clinic. Often the condition is relatively symptomless when it is being treated and the reason to keep the blood sugar at the target level is because it significantly lowers the risk of complications in the future, rather than preventing any immediate consequences. These future risks include blindness, amputation, and death. As a result, people with Type 2 diabetes find themselves treating an abstract number and a risk percentage, rather than anything they can feel in their body. One participant described the way her body felt gave her no indication about rises and falls in her blood sugar: "I don't feel it. I never do, I never feel any different when it's low or high." We explored the relationship pre-users with Type 2 diabetes had to measuring in several workshops, with a series of artefact concepts (Kelly, 2012; Kelly & Matthews, 2010). These investigations showed that although blood sugar was abstract, people who had the condition for a while felt they had become expert in understanding it, and knew things like food and exercise would affect their results when they measured. In one workshop in the USA with people who had been diagnosed with the condition for several years, a concept for a device was shown. This device would read barcodes on food and use the information to indicate what effect the food would have on blood sugar. In response, one participant explained that although he thought it would be useful for people who were newly diagnosed, for himself and others in the room it was not relevant: "In the beginning it definitely would be useful […] you could say this food might do this or this food might do that, but for someone like me or everybody here knows the deal so it wouldn't any more." So although abstract numbers define diabetes, experienced patients learn to understand how the things they do in their lives relate to these numbers.

Another related theme was *Interpreting the Condition.* Despite people's ability to understand what cause changes in their blood sugar levels, studies have shown that frequent monitoring of blood sugar does not necessarily mean people have lower blood sugar and reduce their risk of future complications (Davidson, 2005). In the workshops, responses to the artefacts showed that although people understood how various things would affect their blood, this did not mean they felt a need to act on this knowledge. One participant, in a workshop where a concept for a body worn device that would constantly tell you what you blood sugar level is was presented, pointed out that he felt if a high number could be accounted for, that it did not need to be addressed. "When you sit down and eat a cake, at that moment it will suddenly go right up […] but that does not mean you should actually do something because in half an hour it will be ok again." A blood sugar measurement is something that is actually open to interpretation. We witnessed in one consultation a patient even tried to use the number for negotiation with the nurse who was treating him. He argued that because he had maintained his target blood sugar

levels, he did not actually have diabetes: "I think I just had a bad day, when you first checked it." He was not convinced that the measurement that first diagnosed him actually meant he had diabetes. Although people with diabetes may understand what affects their blood sugar levels, the abstract nature of the measurement means that they are able to interpret its meaning in different ways and how they should respond to it, which could imply other forms of assessment might be more successful in getting people to treat their conditions well.

The third main theme related to the concept was the issue of *Failure.* Blood sugar measuring can actually become a symbol of failure, as people with diabetes struggle to stay in compliance and maintain their target level. One pre-user we interviewed explained how an unexpected measurement could affect her emotionally and demotivate her: "Then I will stop measuring—I get the feeling: No, I do not want to be confronted with it …. To be confronted with these numbers that just go up and down—I cannot handle that at all." She felt overwhelmed by the measurement and that the numbers were judging her. As diabetes is a progressive condition that can be treated but not cured by lifestyle changes and will get worse over time no matter how diligently people treat themselves, this can often cause a sense of failure. As it gets harder and harder to achieve their blood sugar target, people can become demotivated as it seems like their past efforts have been in vain. Changes in medication, particularly the initiation of insulin which is often considered the treatment of last resort, can also represent failure and demotivate people. It could then be argued that instead of focusing on targets that people fail to achieve, they should focus instead on the things they can do to treat their condition. This way people might be more motived, have more energy to make changes in their lifestyles and be less likely to perceive treatment changes, such as the initiation of insulin, as another failure.

ACT on Diabetes (Figure 3) is a concept that draws together these themes of *Numbers and Measurement*, *Interpreting the Condition*, and *Failure*. It is about finding other ways to assess success in treating diabetes than just blood sugar number. The blood glucose monitor would be similar to existing devices, but instead of giving a numerical reading of the blood sugar measurement, it would offer people direct suggestions on how to manage their blood glucose levels. The accompanying app records small achievements, through letting people ask for motivational prompts on demand, then tracking when these are accepted. It would allow people to activate different forms of motivation such as competing against themselves or others, or using family members for support. Notably the app would let people choose to be motivated, offering an alternative way of considering motivation than something that is 'given' to people.

The exhibit included a model of the blood sugar measuring device and a video of the app running on a smartphone, as well as a scenario that put the concept in context and related it to a person. The concept title was above the scenarios and there was a text with the concept description on the podium with the title—*what if diabetes was assessed by action instead of by abstract numbers?*—intended to draw attention to an alternative, as opposed to a supplement, to measuring. The app included an option to scare

Video of the app running on a smartphone like device (left) and model of the bloodsugar measuring device (right).
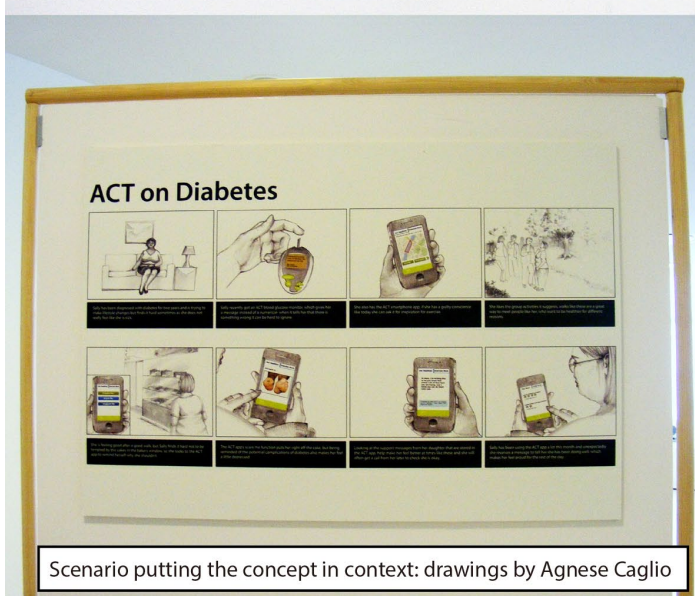
Scenario putting the concept in context: drawings by Agnese Caglio
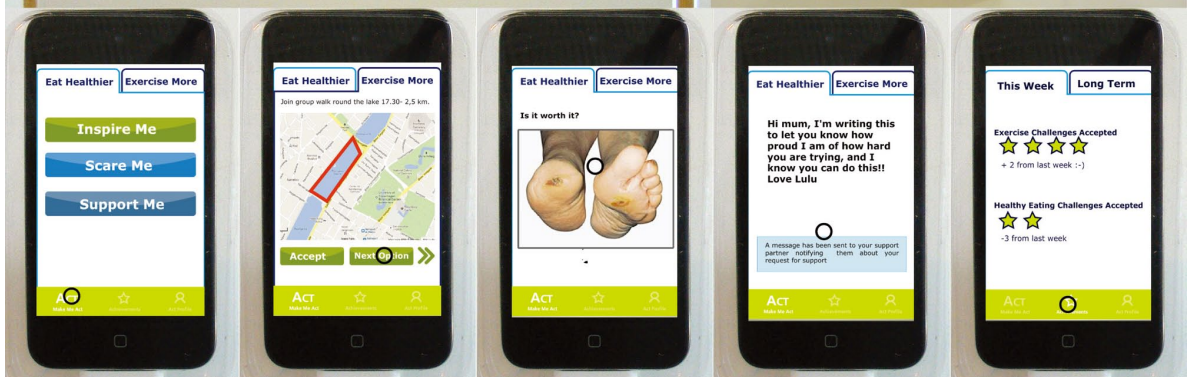

The exhibit stand, full length from the front.

Figure 3. ACT on diabetes exhibit.

yourself, as relating to the risk of serious complications can be one of the hardest things. Although sometimes the industry tries to avoid the subject of the serious complications of the disease in order not to depress or scare people, some pre-users we spoke to claim they found it useful to be reminded or shocked sometimes, which is why a very graphic image of amputated feet was used.

The Complete Collection

As a complete collection the exhibits mapped out a broader space for design, where the concepts presented were not to be seen as the ultimate solutions, but points on a complex landscape of possibilities. The idea behind this resembles Gaver's (2012) notion of an annotated portfolio where a portfolio of design concepts are annotated and presented together in order to demonstrate the designers way of understanding what design could be within a particular area.

> If a single design occupies a point in design space, a collection of designs by the same or associated designers—a portfolio—establishes an area in that space. Comparing different individual items can make clear a domain of design, its relevant dimensions, and the designer's opinion about the relevant places and configurations to adopt on those dimensions. (p. 944)

Similarly the collection of design concepts in this exhibition was intended to show how the field could be understood as a domain for design. The concepts explored the same domain and interrelated themes in different ways in order to demonstrate a way of thinking that people within the organisation might be take with them and apply to their own work. The design considerations for the exhibition revolved around balance, diversity and coherency in order to demonstrate the richness and complexity of the domain.

One of the starting points for deciding to make an exhibition had been a desire to demonstrate how the conditions and their treatments make up design space consisting of a complex network of relations involving various actants (Latour 2005). In order to do this an effort was made to make sure the concepts intervened in a range of different sets of relations with different sets of actants. For example, the *Revealable Hearing Aids* concept was a proposed intervention to alter the relation between pre-users and the hearing aids, but did this indirectly by also activating the relations between the hearing aids, users and their communication partners. The *ACT on Diabetes* concept on the other hand, was proposed as an intervention in how pre-users relate to their condition and does this through their relation to blood sugar measuring devices. Figure 4 is a conceptual representation of how all eight concepts could fit into the network and create new relations between actants. It shows how the complex landscape of possibilities of how a pre-user (in the centre) might become aware of the condition (diabetes in blue, hearing loss in pink) and the treatment devices. The design concepts are points in this landscape targeting the relations between the pre-user and other actants. For example, the Revealable Hearing Aids concept was a proposed intervention to alter the relation between the Pre-User and the existing hearing aids (Devices), but did this indirectly by
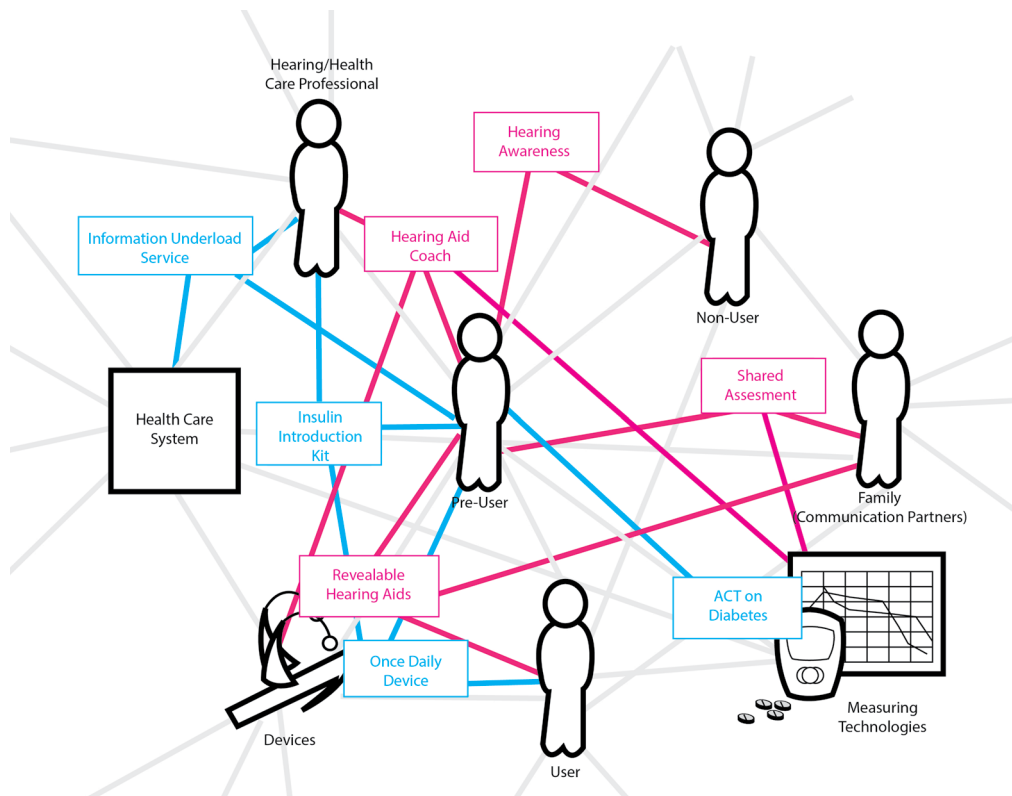

Figure 4. A conceptual representation of the network of actant relations.

also activating the relations between the Devices, the User, and their Communication Partners. The ACT on Diabetes concept on the other hand, was proposed as an intervention in how a Pre-User relates to their condition through their relation to blood sugar measuring devices (Measuring Technologies).

We also wanted to show that various themes that had emerged from the field could be developed and combined in many different ways resulting in different aspects on the conditions and treatments being fore-grounded and back-grounded. Different themes appeared several times throughout the exhibits in order to show this. For example, the *Shared Responsibility* theme that was embodied in the *Revealable Hearing Aids* concept was also explored in a concept called *Shared Assessment*, a two part leaflet that included tools for reflecting on the impact of hearing loss on others, as well as advice for partners living with someone with hearing loss. The theme of *Shared Responsibility* was also evident in one of the stories from the field presented on the hearing loss domain stories from field stand, which presents the interview from the USA where the husband with hearing loss is interview his wife, and they are discussing who is responsible when they have problems communicating. Another example is the theme of *Numbers and Measurement*, which in addition to relating to the

ACT on Diabetes concept relates to two hearing loss concept as well including the *Shared Assessment* concept and another called the *Hearing Aid Coach*, which would be an app with counseling tools to be used before and after hearing aid fittings to help people learn to use the devices, and to assess and reflect on the extent to which the devices are is helping them. Additionally the *Numbers and Measurement* theme was represented in stories from the field on both the diabetes and the hearing loss stands where conversations between healthcare professionals and pre-users discussing the meaning of measurements are presented.

Balance, diversity, and coherency were also central considerations in the physical design of the exhibition. Several different formats were used for the concepts. Generally there were two of each (two devices, two applications, two information kits, one service, one set of photographs). The space was laid out so there was no single way to walk through it, no path with a beginning and end, but rather an open landscape with the stand that offered a chance to give feedback in a central position. The format of the exhibits was also diverse and as balanced as possible (four were boards with small display podiums, two were larger podiums, two were installations set-up with furniture, and the feedback stand along with the two stories from the field stands
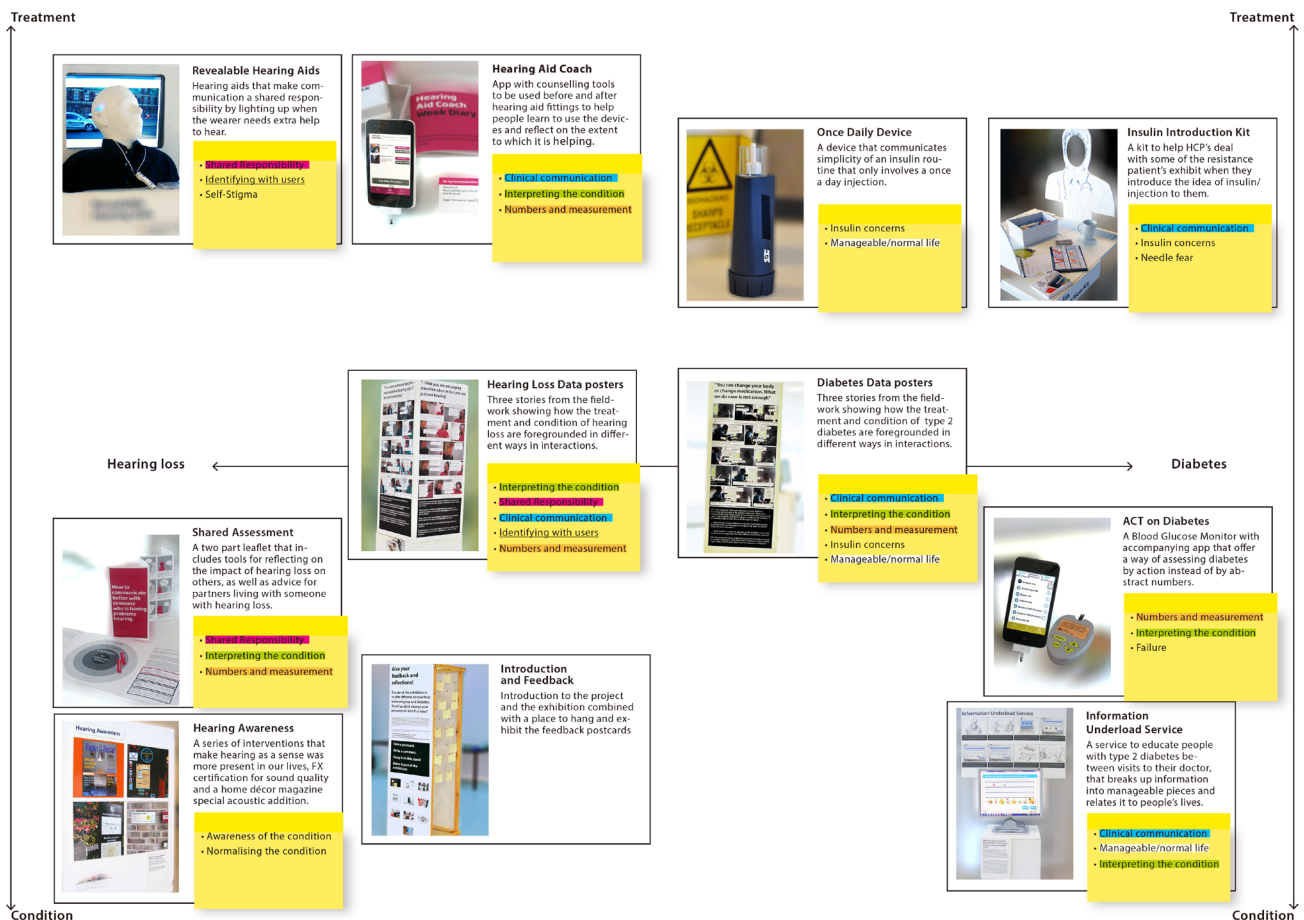

Figure 5. The collection of the eleven exhibits with their themes from the fieldwork.

were full height pillars). Finally, the presentation style, graphics and the fidelity of the concepts had a certain coherency in order to create a sense of a unity that encouraged the exhibition to be read as a complete piece, as opposed to a group of unrelated objects. Maintaining balance within these dimensions was a way to leave the exhibition open for people's own interpretation without forcing direction to how it should be read. It showed richness and variety and was manifested across a range of dimensions including the combinations of themes, different formats, actant relationships, and whether the focus was on the condition or the treatment; as well as the existing diversity between different medical conditions.

Making a Preliminary Evaluation of the Exhibition based on Initial Responses

In order to get initial feedback from the visitors' postcards were placed at each exhibit. These had an image of the exhibit on one side and on the other side the questions, "did this exhibit offer a different perspective and in what way" and "what did it make you think of" were written. These questions where intentionally chosen to be leading in order to provoke strong responses for or against. Under the questions there was a space for comments to be written and visitors could then hang their filled out postcards on the feedback stand where they could be viewed by other visitors. In total 73 postcards were filled out, covering all the exhibits with the exception of the feedback exhibit itself. The majority of the responses came from visitors to the opening presentation, who had been asked especially to fill them in. People who were invited to attend the opening included representatives from corporate strategy, device developers, marketing as well as people working with user insights and education within the organisations. The responses they gave can be used to give some kind of indication of how the exhibition was initially received.

One of the original aims of the exhibition was to inspire visitors to reflect on the issues and themes from the fieldwork it presented and several of the responses indicated it was successful in this. For example, one postcard that referred to the *ACT on Diabetes* concept stated, *"I very much like the thoughts about moving away from the numbers, and also in some way turn away from a reactive to a proactive approach- how can we in NN (Novo Nordisk) apply this?"* This comment indicates the viewer recognised that the idea behind the concept was interesting and speculated how it could be made relevant. However, some of the postcard responses indicated several of the exhibits were seen rather as completely implemental solutions by some visitors. For example, one comment for the Hearing Aid Coach stated *"Brilliant, we should do this ASAP."* While in other cases, people even became engaged in developing the details of the concept further, such as another visitors response to the *ACT on Diabetes* concept, which was to suggested ideas for additional features, it could include like one building on the idea by incorporating the concept of balance: *"I suggest building on a concept of 'balance' combined with suggested steps for improving/maintaining balance."* Even the Hearing Awareness concept, which was

probably the concept that was farthest away from the companies' existing offerings, was also taken as being an implementable solution in itself. For example one exhibit which presented an idea for a special addition of a special acoustic edition *Home & Décor* magazine elicited the following response from a company audiologist (a health-care professional who specialises in hearing), *"a great idea. Not provocative, just great! I'd buy it right away and recommend it to all my test subjects (hearing impaired) and their adult children!!!"* These responses which speculate on implementation do suggest that people were found the exhibits engaging and relevant in a way they could apply to their own work, which was part of the aim of the exhibition, However, they also suggest it was the concepts themselves rather than the fieldwork findings behind them that were sometimes the main focus.

The actual combination of the findings and concepts from the two medical domains seemed to in itself encourage reflection. For example with regard to the issues that were raised by the *Hearing Aid Coach* concept, one person working with Novo Nordisk recognised that there could be similar issues in the diabetes domain: *"Makes me reflect on what the 'parallel' situation in diabetes is—by having it 'mirrored' in the hearing aid world J thank you!"* While another person suggested the diabetes *Information Underload Service* concept could work for hearing loss too, because it could give *"a way of contextualising hearing and making the hearing 'sense' relevant for the individual,"* indicating they not only recognised the issues of contextualising experiences and individual relevance the concept dealt with but also reflected on how these might also be relevant to address in the other domain. These kind of responses suggested that merging the findings and concepts for both companies together into one exhibition was work well for inspiring ideas. It also allowed people to reflect further on their own domain by making links between the concepts for the other companies' business areas and by making connections with the ideas behind them in new ways.
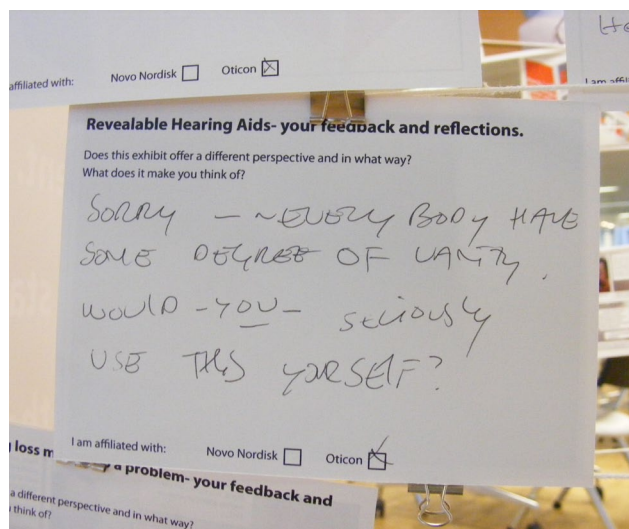

Figure 6. Postcard with response.

Furthermore, the exhibition was intended not just to communicate but to provoke. However, based on the postcard responses, only the *Revealable Hearing Aids* exhibit seems to have been truly provocative in the sense of being confrontational. The responses to this concept indicated that some people had quite a strong emotional response to it even to the extent of being offended, as one person's response implied it was stupid even to consider such an idea because no one would use it, *"sorry, everybody has some degree of vanity. Would 'you' seriously use this yourself?"* Another expressed dislike of it on the grounds that it would stigmatise people with hearing loss, *"I don't like this concept, may stigmatise the hearing impaired person."* Yet not everyone had the same reaction, with other comments stating that the idea was excellent and even had the potential to work as an actual solution: *"I think the idea is brilliant!", "perfect! I think it would work or provoke a discussion. Start a new fashion."* Reactions to this concept were generally either strongly positive or negative suggesting that it touched upon important issues for the visitors and had succeeded in provoking them. As another postcard comment argued, the concept was highlighting an ingrained industry attitude *"quite provocative [...] the 'invisible hearing aid' is an industry fetish,"* it was making visible an assumption that is held across the industry.

Yet the aim of the exhibition was not only to provoke through confrontation, but in the broader sense of the word to provoke people to see the field in a new way. Several of the postcard responses explicitly addressed whether or not the visitor felt they had been shown something new. While many expressed the opinion that a particular exhibit offered a new perspective, there were several instances where another person in the same company expressed a contrary view that the ideas in the exhibit were not new at all in the organisation. For example, one response to the *Shared Assessment* concept from an Oticon employee was *"(does the exhibit offer a different perspective?) Yes it does! It makes me think of the inadequacy of pure tone audiometry—perhaps we should do other tests,"* suggesting that it had made them see current practice about assessing hearing loss in a new light, but another person from the same company argued it was not new at all and that similar things already exist, *"there are a lot of tools for this already."* Even the controversial *Revealable Hearing Aids* concept had one response that claimed that it was an idea that had been considered before, *"this is a concept we have discussed earlier on."* These differing responses indicate that the exhibits were left open to the viewer's individual interpretation, dependant on the knowledge and values they brought to it. They also actually reveal information about the companies themselves, showing that ideas and attitudes in the organisations are not unified, but are varying and dispersed.

Discussion

The *Pre-users of Medical Devices* exhibition was an attempt to disseminate design knowledge that had been gained in fieldwork throughout organisations in a format that was engaging and caused the companies to *"reflect on product, producer role, and company identity"* (Buur & Matthews, 2009). By not just communicating stories from the field, but presenting design concepts too, the exhibition attempted to communicate the kind of knowledge about the field that is constructed through the act of designing. The exhibition was conceived as an interrelated collection that was intended both to communicate an idea of interdependency between condition and treatment in the domains of hearing loss and diabetes, and suggest how design could be used to foreground different aspect of the conditions and their treatments to those aspects that are foregrounded in different ways currently. Open-ended provocation was used as a means to get people to think without attempting to pre-determine how they should react.

Presenting the fieldwork findings in the form of product concepts can be considered to be one way of communicating fieldwork findings in a way where it is not just about communicating knowledge and generating empathy, but actually making the findings actionable, demonstrating different ways that the findings can be applied to product development. Yet there is also a risk with this approach of oversimplifying the issues at stake and that the concepts end up being interpreted as straightforward solutions to problems, rather than making people think and reflect on the issues behind them. In our case, responses to several of the concepts indicated that visitors saw them as viable solutions which could imply that the visitors were not driven to reflect further on the concepts meanings and the findings they embodied. However, as the individual concepts were part of the exhibition as a whole, juxtaposed next to more controversial concepts, it can be argued that the viability of these less controversial concepts added to the diversity and depth communicated by the exhibition as a whole. Presenting a range of concepts, each at different levels of controversy, plotted points on a landscape of design possibilities within the field. Rather than implying the possibility of single over-simplified solutions, it demarcated a complex space that could be altered and communicated, but not solved, by design.

Another risk of presenting fieldwork findings in the form of design concepts was that much of the thinking behind the concepts, and the issues that had inspired this thinking, could have been hidden. In this exhibition, there was a great deal of effort to embody the many understandings and findings from the fieldwork in the ideas. Due to the format of the design concepts, the deeper understandings and finding were probably not possible for the visitors to entirely decode. Showing multiple stories from the fieldwork alongside the concepts, as well as trying to imply the main themes in the titles and descriptions of each exhibit, was a way of encouraging people to make connections between the concepts and the issues of the field. Additionally, viewers also brought their own knowledge and ideas of what they find important to the exhibition. In our particular case, most of the people visiting the exhibition were employees at the two companies who were able to bring some of their own understanding of the field to the exhibition, and were therefore able to recognise many of the issues at stake in the exhibits. In these situations, giving the viewers that already have a lot of domain knowledge a different perspective on what they already know, may be just as useful for innovation as giving them new knowledge.

Giving people a different perspective also means allowing them to make their own connections between the exhibits and what they know about the field. There was a balance to be achieved between being provocative enough to make people to see things in a new light, and not being so provocative that the ideas were dismissed entirely because they do not relate at all to what people already know. In our case, it was probably a good thing that the majority of the concepts were not perceived as provocative in the confrontational sense, as this could have resulted in the visitors dismissing the ideas and exhibition entirely. It was also good to include those few responses that did express a slightly outraged reaction alongside the extremely positive responses to the same concept, as it demonstrated the range of ways that the material could be interpreted. The kinds of responses suggest that the exhibition did indeed succeed in provoking people to see things in a different way. The range of responses on single concepts and on the exhibition as a whole also indicated open-endedness, allowing the visitors to interpret meanings based both on the material presented and their own knowledge and understandings.

The format of an exhibition seemed to work well as a way of communicating to a broader audience, but we have little data that can give us an indication of how many people actually saw the exhibition and to what extent they engaged with it. Although the general experiences and the initial responses imply that the exhibition made an immediate impression on those who did visit it, and was provocative and open-ended, real success depends on the longer-term impact it has within the organisations. In order for the exhibition to have contributed to innovation within the organisations, it will need to have a long-term impact. While the initial responses indicate the kind of impression the visitor received, they cannot indicate what the people will do with these impressions subsequently. Follow up interviews over time might reveal whether visitors had considered the presented themes and issues well after the visit, whether their views had been significantly changed, or whether they even worked to implement any of the ideas it had inspired. However, much of the impact of the exhibition may not even be traceable in this way. It is hard for people to evaluate whether this one-off event had provoked any small enduring change in thinking, and if so whether this thinking has been disseminated effectively into the wider organisation. The exhibition did not present or address one single issue, but was meant to elaborate on a complex set of issues regarding how treatments and conditions are interrelated. If the exhibition did make a successful contribution to innovation within the organisation, by nature, the contribution was a subtle one.

Acknowledgments

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