**Displacing use: exploring alternative relationships in a human-centred design process**

This paper presents a case from an ethnographically-informed design process in which the concepts of *use* and *the user* were intentionally displaced in order to investigate the design relevance of alternative person-product relations. The case concerns a participatory innovation project run in collaboration with two medical device companies who were interested in better understanding and improving the uptake of their devices by patients. We begin the paper by critically revisiting the concept of use in design. In subsequent sections we present the design project case, identify the non-use relationships that emerged as relevant for design, and outline several design strategies suited to addressing this design space. Our concluding discussion treats the value and limitation of these ideas as an approach to design more generally.

**1. Reflections on the concepts of use and the user in design**

In design, the concept of the *user* of products and systems has a considerable legacy (e.g., Norman & Draper 1986, Grudin 1993, Luff et al. 2000, Wasson 2000, Tuomi 2005, Krippendorf 2006, Marti & Bannon 2009). It is also a concept that has undergone significant evolution over the decades since it was first introduced. The notion of “user-centred design”, a phrase originating from computer systems development, was a valuable rallying cry for software designers to consider aspects such as workflow and the ergonomics of use in the conception and deployment of software systems (Schneider et al. 1980). It was also a critique of the then-current fashion to model the human beings who used computer systems as rational problem solvers who were, at base, information processing systems themselves (Kling 1973). In these early formulations, an emphasis on the user of designed systems was a means of bringing neglected aspects of the contexts of system use into the picture as having central relevance for the successful design of systems. The success of these systems was conceived in terms of utilitarian ideals such as “maximal efficiency, productivity and job satisfaction” (Schneider et al. 1980 p.116), or in terms of how well systems addressed what would later become known as *the requirements problem*, namely how to construct a system that actually met the needs of the people who would end up working with it (Kling 1977). The users in view here were synonymous with *workers*, and contexts of use were understood in terms of workplaces and divisions of labour. The emergence of *user centred design* as an identifiable approach to systems design in the US in the 1970s was roughly coincident with democratic design developments in the UK, e.g. the Design Research Society’s 1971 conference on design participation (Cross 1972) and Mumford’s (1983) “sociotechnical” approach to designing with users, and also in Scandinavia, where a “work-oriented” approach to design had emerged out of pioneering collaborations between computer scientists and workers’ unions (see e.g. Kyng & Mathiasen 1979; Ehn 1988; Floyd et al. 1989).

Although it was with respect to the design of computer systems in work settings that “users” became a standard term of reference, other design disciplines naturally had their own terms for people who stood in a very similar relation to what was being designed, e.g. industrial design’s focus on the “consumer”, or architecture’s idea of the “occupant” of a structure. However, “user” is the term that has gradually infiltrated disciplines outside of systems design, having become the case as consumer products from coffee machines to automobiles are increasingly embedded with microprocessors and user interfaces, and hybrid disciplines (such as interaction design and service design) have emerged at the intersections of new technologies, practices of consumption and innovative business models. Concurrent with these developments, “user centred design” has become understood as a valuable approach to design with broad applicability across design domains. Yet such developments have also necessitated an evolution in the concept of the user. The shift from work settings and software interfaces to domestic environments and consumer electronics, for instance, significantly changed the very idea of “use” in a number of important respects. For one, the corrective changed. For early advocates such as Kling (1973), a concept of the user of systems was initially introduced as a conceptual device to challenge software developers’ rationalistic assumptions about the people and work processes being supported by systems. In industrial design, however, the introduction of the idea of the user was a challenge to a different set of (mis)conceptions of the people who lived with products. While it might be argued that industrial design’s occasional idealisation of the consumer as an amateur aesthete[[1]](#endnote-1) deserved as much critical scrutiny as computer science’s rationalistic idealisations of system users, the corrective offered to industrial design by the concept of the ‘user’ is a very different one. As such, the ideas of ‘who the user is’ and what is relevant to a ‘context of use’ also evolve as these concepts travel through different design disciplines. Furthermore, the settings where designed products and systems were deployed transitioned from (mainly) workplaces to other arenas such as domiciles, public spaces and mobile devices, the focus on utilitarian aims closely allied with work (such as functionality, productivity, task orientation, efficiency and usability) made way for new design ambitions that are more closely associated with “homo ludens” (Gaver 2002): playfulness, enjoyment, engagement and delight (e.g. Djajadiningrat et al. 2000). The use of a spreadsheet application is a very different kind of thing to the use of an interactive media centre or social network portal. And yet a concept of “use” still proves valuable irrespective of these important differences in aims, contexts, purposes and people. Users may have become ubiquitous in design, but they are not all of a piece.

Vital contributions have come to design via an emphasis on use. As we have mentioned, a focus on users was one way of complicating the kinds of misleading stereotypes designers held of the people who lived with their artefacts. It did this by replacing theoretical or conceptual models of people with actual living, breathing human beings who encountered designed artefacts in the ordinary courses of their daily lives. Secondly the pairing of the study of users with their actual contexts of use led to a much more holistic appreciation of the design ‘problems’ that were being addressed through the introduction of new products and systems. The ethnographic reclamation of the indigenous logic(s) of users in their own contexts remains a vibrant enterprise through which design continues to learn a great deal about the contextual, i.e. environmental, spatial, temporal, sequential and instructional aspects of successful and unsuccessful technologies. Suchman (2007) remains a touchstone of this species of work, along with cognate studies of other worksites where professionals use technology, e.g. air traffic controllers (Bentley et al. 1992), surgical teams (Heath et al. 2002), helpline call operators (Whalen & Vinkhuyzen 2000) among many others. The imperative to take users seriously and on their own terms has led to a widespread recognition of the need for field studies within the design process to enrich design. Real people are studied through ethnographies of practice (Hughes et al. 1994, Wasson 2000), or actually invited to participate in design through codesign workshops and other formats (Bjerknes et al. 1987, Greenbaum & Kyng 1991; see also Marti & Bannon 2009). Furthermore, as user centred design has been applied in domains far beyond the computerisation of workplaces, a notion of the user of technologies has informed the broadening focus of design beyond aesthetics and utility (or form and function). In these respects the concept of the user has been, and remains, invaluable to design.

It has not been beyond critique, however. In several influential papers, Grudin (1990, 1993) critically examined the idea of the users of technologies, suggesting that “user” was a techno-centric term. In other words, it is only technologies that ‘have’ users, and it is only from the perspective of the technology that a “user interface” is needed. From the users’ point of view, they interact with a *computer’s* interface. As Grudin (1993) astutely notes, “’user’ suggests a view from inside the system, peering out through the display” (p.117); “the computer is assumed; the user must be specified” (p.112). Grudin’s critique arrived on the scene as a part of an agenda that bears a strong affinity with that of original proponents of user centredness such as Kling (1973, 1977). So although critiquing the concept, Grudin was similarly concerned to dislodge the techno-centrism of computer systems design.

One aspect of Grudin’s (1993) critique of the concept of the user was that it was not specific enough. He argued instead for terms like “secretaries”, “nurses”, “writers”, or, when no professional title was suitable, “system users” or “application users”; each of these was preferable to a generic user. These are certainly improvements of a kind, but notice that for Grudin, it is the *workplace* that is now assumed—the *professional* role of the user, and his or her context of use. Ironically, then, Grudin’s recommendations replace one brand of conceptual rigidity with another that may (or may not) be more relevant; we simply cannot say *a priori*. His recommended substitution of “nurse” for “user” preselects the actor’s likely interests in the designed artefact in view. Such preselection introduces a natural bias towards the *occupational relevance* of actions with the artefact. In many cases, however, occupation is not the only category of consequence, and certainly cannot be assumed to be universally relevant to design. Alternatively factual descriptors of the person may, in any one case, turn out to be of greater design relevance: that he is a nurse may be of less consequence than the fact he is (also) a father, a debtor, a patient himself or a past victim of identity theft. As much as the concept of “the user” might suffer as a design tool for its techno-centrism and lack of specificity, the overspecification of design-relevant relationships is a tack that invites new blind spots of its own. Curiously, Grudin’s critique of the concept of the user ultimately has the effect of more deeply entrenching the concept of *use* by foregrounding the professional tasks and duties that the use of the technology is intended to support.

Other critiques of the concept of use relate more closely to the constructive nature of design as an undertaking. The recognition that design is engaged in an effort to transform existing situations (e.g. Simon 1981, p.129) is one that has consequences for the concept of the user and its usefulness in design processes. To the extent that the introduction of new artefacts actually changes an existing state of affairs, then there (logically) can be no users of the artefact during its design process. “Users” only come into being once there is something to be used (Redström 2006, 2008; Ehn 2008). As much as “the user” was a corrective to more distant rationalistic or consumeristic abstractions of human beings, it too is an abstraction. In many cases, it is the idea of a fictional or future user that is present in designers’ conversations during design (c.f. Matthews 2007, Sharrock & Anderson 1994), or it is a concept representing a specific figure through which designers’ expectations can be enacted and mediated (Wilkie & Michael 2009). Thus it is a user-figure that becomes a tool through which particular design decisions are made. Furthermore, use is not, and cannot be, determined in the design process; and so the meaning of the artefact will be something that emerges instead as it is used in practice (Matthews et al. 2008; Wilkie 2011). Just as real users may not bear close resemblance to the user-figure that was deployed in the design process, the enactment of use often diverges in practice from the one envisioned during the artefact’s development (Akrich 1992, Redström 2008). Many products create value for people and are enacted in practice, in ways that do not at all resemble the use practices that their designers intended. Far from indicating a failure in their design, the success of many artefacts has been defined by how people have unexpectedly reinterpreted them in practice (see Redström 2006)[[2]](#endnote-2). Conversely, some of the great failures in design’s recent history (several modernist post-war inner city housing schemes would certainly qualify here) can be attributed to attempts to rigidly define the practices that constitute “use”.

Insights such as these have led design theorists to argue against designing new technologies that overly prescribe how artefacts should and should not be used (Redström 2006, c.f. also Akrich 1992). Relatedly, some researchers have recommended alternative values for design to embrace: openness to reinterpretation in use, ambiguity, flexibility, and reconfigurability after deployment (e.g. Gaver et al. 2003, Boehner & Hancock 2006). The imperative of such strategies, according to Sengers and Gaver (2006), is not to create artefacts that are so open to interpretation their meaning becomes indeterminate, but for designers to consider “multiple co-existing interpretations” (ibid. p.106), depending on the appropriateness for the application under consideration. Redström (2006) suggests designers use their understanding of the current use context to make the artefact “ask questions about use that were open for its users to answer” (pp. 136-7).[[3]](#endnote-3) It is along such lines that Tuomi (2005) argues that “the phenomenon of use, therefore, needs to be conceptualized as a relation between the user and the artefact, where the user and the functionality of the artefact mutually construct each other” (p.22). This serves as sharp contrast to ideas of use in design that identify design success with the successful prescription of correct use as in, e.g. Norman’s (1990) classical text.[[4]](#endnote-4)

In each of these critiques of users[[5]](#endnote-5) and the concept of use, however, *the central relationship for design remains a relationship of use* between the person and the artefact. Grudin’s critique instructively supplants a techno-centric view of “users” with a more human centred view of people as responsible professionals, yet reinstates use as the ultimate object of design. Redström’s critique reveals the unsettledness of the idea of use as a viable tool for design by demonstrating that the ultimate meaning of technologies are often determined by their unexpected possibilities for reinterpretation. But so long as “meaning is use” (to misappropriate a Wittgensteinian trope here), it is still use that takes centre stage; insofar as the corrective for design is to embrace the possibilities of opening artefacts for pluralistic reappropriation in use, it is use that remains central.

We have not drawn these observations in service of criticising Grudin or Redström; indeed, we see ourselves engaged in a wholly allied enterprise here. Rather, these comments are made only to bring into sharper relief *relationships other than use* that can constitute constructive material in design research. Other relationships are rarely promoted as having essential importance for design because of their tangential relevance to use. In this paper we report on a series of these relationships that have emerged in the course of a multi-year project that investigates design opportunities for patients with chronic medical conditions.

**2. A dual case study: hearing aids and insulin pens**

The *Innovating with Pre-Users of Medical Devices* project is sponsored by two companies who produce medical devices, Novo Nordisk who produce insulin injection systems, and Oticon who produce hearing aids. Both these companies have experience in involving the users of their current devices in the development of new products, but have come to recognise that some of the most relevant people (from a market perspective) are the people not yet using their technologies. The goal of the research conducted in this project was to adapt user driven and participatory design methods to involve these two groups of ‘not yet users’[[6]](#endnote-6) in order to investigate possibilities of overcoming any barriers to the uptake and use of these products.

The companies jointly initiated this project because they shared a common concern, in that they both have a large and currently inaccessible market consisting of people who could medically benefit from using their technologies, but who delay or decline to begin treatment for significantly long time periods. From a medical point of view, this delay or refusal can create additional complications to the patients’ conditions and their overall wellbeing; the relationships that these people (whom the project initially termed “pre-users”) have to the companies’ devices are important because significant delays in initiating treatment could have detrimental effects on people’s lives. Notice the centrality of a concept of “use” to this characterisation of a state of affairs.

The circumstances are considerably more complicated than this, however. Firstly, function (and by implication, use) is not central. Whereas in a commercial context of consumer goods, a product’s lack of acceptance in the market might easily be attributed to its inability to fulfil valuable functions, or the undesirability of the functions it does fulfil, here the issues are not so clear-cut. In this context, improving use issues (in terms of, e.g. form, function, interactivity, usability) will have little or no effect on getting the devices in people’s hands any faster. The issue is more closely tied to the fact that the very use of the product is predicated on the user’s acceptance of having a medical condition that nobody wants to have. Influential concerns tied to one’s identity and self-image are implicated in taking up the device and crossing the threshold from pre-user to user—both hearing impairment and type 2 diabetes are often accompanied by influential social stigmas. Furthermore, the use of medical devices such as these is not market-driven in any simple way. Access to these devices is controlled by health care professionals who have the responsibility to prescribe them in line with their diagnosis of the patient’s condition. Through the fieldwork we have conducted, we have observed that different health care professionals (HCPs) can harbour a wide range of views on the usefulness of the devices and the urgency of patients’ needs to have access to them. Additional complications arise in this regard, since a country’s health care system subsidies for prescription devices (or lack thereof) has enormous consequence on the ultimate cost of treatment that is passed on to the patient/user/consumer. This is especially so for hearing aids, which are sometimes classified as an optional prosthesis rather than a medical necessity, and are not always subsidised under many nations’ health care systems.

So even though the person with the condition will ultimately be the one interacting with the physical device (i.e. using it), they are only enabled to do so by virtue of their healthcare professional’s practices of treatment, and this only in the context of wider societal frames in which the treatment of these conditions has unmistakable moral, economic and/or political overtones. And we are yet to raise the role of national medical regulatory bodies that have an influential say in defining the scope and functions of the technologies, and establishing standards. Attempts to generate a “user centred” process from the ground up in this ocean of institutional interests meet with stubborn obstacles.

‘Pre-user’ (the term which was originally chosen to describe the individuals we were involving in our design process who were not users of these devices) aptly describes the companies’ interests in these people. We acknowledge from the outset that this is not an emic term (i.e. ‘pre-user’ was not a participants’ concept we encountered in the field). To be sure, many of the people involved in our studies did not seriously consider themselves future users of these products, so they certainly could not identify with being pre-users. The term relates only to the companies’ perspective. However the concept was constructed as the project itself was being framed as a means of delimiting the field under examination. Within the project, “pre-user” has come to stand for people who have a diagnosable medical condition in which there is a fair likelihood that in time they will become users of these medical devices. Specifically we have defined the pre-users of hearing aids as those people who have an early stage hearing loss but do not yet own a pair of hearing aids, and the pre-users of injection devices (typically insulin) as people with type 2 diabetes who have not yet started to use injection treatment. Pre-use can be seen as a way of making a collection of non-use practices relevant to an industry perspective.

The project has involved trying to gain an insight into the practices that are relevant to pre-users from a company perspective and co-designing with people who represent this group of non-users. In our fieldwork we chose to focus for a large part on the clinical interaction between doctor and patient, where the practices involved in the decision to adopt the devices seemed most evident, and we spent time in clinics and recording interactions between hearing or health care professionals, general practicing doctors in the case of diabetes and Ear Nose and Throat Specialists or Audiologists in the case of hearing loss, and pre-users. We also wanted to contextualise this in relation to how the conditions were experienced outside the medical, so we complemented the clinical studies with interviews with people in their homes, and followed the healthcare professionals through their daily professional practices.

The empirical work has been conducted both in Denmark and in the USA. In addition to ethnographic fieldwork, we conducted multiple co-design workshops and also deployed a form of auto-ethnography and probes we labelled “enquiry kits”. In Denmark we initially conducted a pilot study that we later extended into a larger investigation, which included interviews with 16 pre-users, video recordings of consultations in seven clinics, and four exploratory co-design workshops. In the USA we interviewed seven pre-users in their homes (each of whom also completed enquiry kits), and participated in or video recorded consultations in five clinics, as well as conducting three co-design workshops.

Our analysis of this material suggests that while it may be important how people in this situation relate to the medical device, there is no defining relationship analogous to use. Rather there are many different ways in which people are connected, directly and indirectly, to these medical devices. The people and artefacts are linked through networks of different relations of varying strengths. In some of these, the artefact plays a direct role; in others it is only indirectly present. In the next section we will present some examples from this project of relationships other than use that are of interest to design in this case.

***2.1 The relationship between the healthcare professional and the device***

In the case of these medical devices, the companies’ customer is generally the healthcare professional who will be prescribing the device, rather than the end user and in some cases the healthcare professional may have never even seen the devices, let alone experienced using them. Although the healthcare professional may be influenced by their other patients’ experiences of use, considering use alone will not necessarily account for all practices that are relevant to the relationships the healthcare professionals have, or could have, to the devices. By focusing on the clinical interaction in our fieldwork, several other practices that could offer interesting potential for design became evident and one in particular that stood out involved the activating of the device in order to persuade the patient to accept the treatment option. In several clinical interactions, we observed healthcare professionals introducing the idea of using the devices to their patients. In some of these instances, the physical devices were actually shown; in others they were not. In the cases when they were shown, the devices often became a tool for the health care professionals, used to attempt to alleviate some of the patients’ fears and misconceptions about them as a treatment option.

With regard to insulin or injection treatment, the issue of having to inject often arose in the discussions between doctors and patients, with the patients citing needle fear and the fear of pain as reasons why they did not wish to start taking insulin. In response to this, we observed some doctors use words alone and talk about how small the needle was, or that it did not hurt as much as blood sugar measuring. One doctor for example tried to explain how little the insulin needle was while she gave her patient a flu vaccine injection with a large needle. *“You are afraid of the needle because I am giving you the needle, but when it comes to the fact that you will be doing it yourself, and when the needle is not like the one I am using but it is a needle that is like a hair and it really does not hurt*”. By contrasting them, she may have also associated the non-present insulin needle with the vaccine one, which was actually physically there and being used. Other doctors on the other hand used different tactics which deployed the injection device themselves. For example, we witnessed one nurse in the USA get a sample device out and ask the patient to inject himself within five minutes of her having decided that he might benefit from injection treatment. In another interview, a Danish doctor explained that he used the device on himself to demonstrate to his patients how painless it was to inject; he then proceeded to stick himself with the device during our interview (see Figure 1). In these different practices needles and devices were brought into interactions with patients in order to alleviate their needle fear; having the physical device there was a way of helping to make patients’ abstract fears concrete and to deal with them directly.



*Figure 1: Doctor in interview showing how he demonstrates to patients that injecting does not hurt.*

With regard to the hearing devices, patients often have concerns about how visible the technology is and how comfortable it will be to wear. It is only rarely the case that ear nose and throat specialists have hearing devices in their offices, as they do not fit them themselves[[7]](#endnote-7). In such cases they have to try and alleviate people’s concerns through describing the devices. In one consultation we witnessed, the doctor explained “*you will get the new ones, those where you have a tiny device behind the ear and then a very thin tube that sits in your ear, you get no closed stopper inside the ear. So you can’t even notice you are wearing hearing aids”.* Thisdoctor in Denmark tried to reassure his patient by arguing that the technology is not intrusive, but without the devices present both he and the patients might have very different images of what they were talking about. On the other hand two of the hearing professionals we spoke to, one ear nose and throat doctor and one audiologist, actually had hearing aids themselves and brought these in to the discussion in order to convince the patient of their benefit, for example by identifying with their condition. *“This is your audiogram... it is similar to mine, and I told you I wear hearing aids.“* Here the doctor tries to persuade his patient by arguing that they are similar and drawing attention to the fact he is wearing hearing aids himself during the conversation.

How the healthcare professional relates to the medical device affects the way his/her patients are introduced to and encounter them. We saw both the hearing aids and the injection devices being introduced by healthcare professionals as agents for persuasion and to alleviate patients’ concerns (two agendas that are often difficult to separate). Healthcare professionals are not necessarily users of the devices, but they use them nevertheless, e.g. to demonstrate, persuade and teach. In this context, patients’ relationships to these devices are heavily mediated by those in institutional positions. Physical access to the devices is mediated by the medical practitioner; so too is information about them; and this so in the course of *other* actions that are conducted in consultations such as advice giving and fear-assuaging.

***2.2 The relationship between the healthcare professional and the pre-user***

It is not just the practices that involve the device that can affect its uptake. Other aspects of the relationship between the healthcare professional and their patients also had significant bearing. The issue of trust was something that came up frequently in our interview both with the healthcare professionals and the people with the conditions. It was generally recognised that the patient needed to trust the healthcare professional in order to accept the treatment, but the treatment was also an obstacle to this trust. For example one diabetic we spoke to explained how she had for a period stopped going to see her doctor, because she did not trust him partly because of the way he prescribed treatment, *“I felt like he just wanted me to take the pills – he never gave me the information that convinced me that he was right,”* as her doctor did not explain how the pills would help she was able to trust neither him nor them. This was equally problematic in the situation of hearing loss. Healthcare professionals who diagnose hearing loss are often in a position where they need to persuade the patient that hearing aid technology could benefit them. While there can be national health system subsidies for the purchase of hearing aids, these rarely cover the total cost of purchasing the devices. To complicate matters, once hearing aids have been prescribed to a patient, it is often the audiologist who confirms the patient’s hearing loss and sells the hearing aids. It can be a delicate operation to balance between healthcare professional and salesperson; audiologists can find themselves in precarious situations when persuading people to use/buy hearing aids.

But it was not just the healthcare professional’s ability to obtain trust that was an issue as very often the people coming in with the conditions also had their own agendas and were not necessarily willing to defer to the healthcare professional’s judgment. We observed in some consultations, how people would work very hard to demonstrate to the healthcare professional that they did not need the device as a treatment. For example with hearing loss people would often create their own arguments as to why they did not need a hearing aid, despite the results of the audiometric tests. In one case we saw the patient re-state the doctor’s assessment that she was unable to understand correctly 15% of the words she heard in a test as a positive in order to argue that she did not need hearing aids *“oh well, I can be satisfied with that…my sister has lost 85% of her hearing”*, activating both the test and her sister’s hearing in the discussion, and making it difficult for the doctor to argue for the benefits of getting the treatment without contradicting her.



*Figure 2: Doctor and patient discussing blood sugar measurements as part of a control visit.*

With the type 2 diabetes consultations, people would often list the different kinds of exercise that they were doing, or the foods that they were eating apparently in order to show the doctor they were in control of the current management of their condition. The blood sugar measuring they did at home themselves was also something they could introduce in order to demonstrate their skill (see Figure 2). For example, consider one patient’s explanation of his measurements when asked by his doctor a closed question about the readings:

*Doctor: “What is your blood sugar number when you measure it yourself? Is it always under ten?”*

*Patient: “I take, I will take it for example, one time a week, and I shift. Between different days, I take it two hours after breakfast, two hours after lunch and two hours after dinner, and so it lies between 5.6 and 7.2.”*

Notice the patient’s display of competence in his answer. He repeats “two hours after [a meal]” three times, underlining his awareness of the importance of the timing of these measurements to their (medical) validity. In stating the actual measurement numbers, he upgrades the doctor’s scale of measurement (“under ten”) by an order of magnitude, stating accuracy to one decimal place. In these kinds of situations it becomes increasingly difficult for the healthcare professionals to make a recommendation for a change in treatment (e.g. to prescribe the patient to begin using a medical device) without undermining the competence the patient is demonstrating with respect to his/her own awareness and mastery of the condition.

It isn’t wholly surprising that the interaction between the healthcare professionals and people with the conditions involves practices that bear on whether or not people become users of the devices. But it is worth emphasising that these interactions are not always directly related to the devices themselves, i.e. attributes under the control of designers. Trust is a central example here. If the patient does not trust the healthcare professional, if they do not understand their arguments or are not convinced of their motivations for recommending the devices, they are less inclined to initiate treatment. Equally, if the healthcare professionals are not equipped to align the need for treatment with the patients’ arguments about their own abilities to handle the condition, then it will be a struggle to convince patients of the benefits of the devices.

***2.3 Pre-users’ relationships with the conditions***

Another relationship that can involve barriers to the adoption of the devices is one that people have with their own body and the condition. In both the hearing and diabetes cases, the consequences of symptoms can be subtle (in the case of hearing loss), or difficult to connect to the conditions (in the case of type 2 diabetes). Many sufferers find it hard to *feel* like they have them. The onset of the condition is usually gradual, taking place over many years. For instance, people may not notice for several years that their hearing has diminished, and they may not be acutely aware of sounds in their environment they are missing. As one man with hearing loss explained during an interview, *“I do not notice what I don’t hear.”* The condition is defined by an occasional absence of a symptom (rather than its sudden and discernable appearance), which makes it harder to notice in some situations. When problems of hearing or understanding manifest, it can be difficult to distinguish the extent to which the difficulty is a result of hearing loss (the condition) as opposed to, e.g., environmental factors such as poor acoustics or high levels of ambient noise. Many of the people we spoke to questioned whether a significant proportion of the problems they were having could be the fault of other people not speaking clearly, because in some situations they had no difficulties hearing. One reason for this is that when people experience hearing loss, they tend to do so only for certain frequency bands, which results in a reduced ability to distinguish between sounds and words, rather than a blanket loss of all sound. The consequences for the person experiencing the loss include becoming tired from concentrating harder and frustrated at miscommunications; this in turn can lead to social withdrawal and isolation without the person necessarily associating these outcomes with their hearing.



*Figure 3: Project participant explaining how he does (and does not) experience his hearing loss.*

With the Type 2 diabetes the issue is that it is generally symptomless, but you treat it to try and reduce the risk of developing serious complications in the future. This idea of treating risk is an abstract one, and it is not easy for people to motivate themselves to do this because they do not feel like they are sick. As one diabetic told us, “*you have to be careful, because if you’re not feeling as if you have the disease then, you know, you get too comfortable…”.* People do not notice the condition in their daily lives so it is easy to ignore*.* The result is that the treatment of the disease seems more unpleasant than the disease itself, because that is what is being experienced now. To compound this issue healthcare practitioners often present avoiding insulin as the goal patient should be aiming for, as opposed to presenting avoiding serious medical complications as the main aim, reinforcing the idea that the treatment is itself problematic and a part of the disease.

The result of this detached relationship to the conditions and their consequences is that people do not recognise that the condition is responsible for problems they are having now, or may have in the future, and are less able to accept the need to treat it. In this situation using the devices, which requires a certain amount of effort and diligence, can seem like the problem itself (as opposed to a solution). Although this is not directly caused by the device’s design, this relationship can have a profound effect on the extent to which people believe the devices will be good for them; this is therefore relevant to consider in design, since continued use (known to health care professionals as “compliance”) is essential to the functions of the devices.

***2.4 Relationships between users and pre-users***

Even when the devices are activated in a use relationship, they may have roles to play in other relationships. These medical conditions are often assumed to be stigmatised socially. In our studies, however, we found evidence that the conditions were self-stigmatised as much as they were socially stigmatised. In other words, people with the conditions presumed that others thought the condition was something they ought to be ashamed of, whether or not that turned out to be the case. This attitude could be changed through encounters with people who they admired who also had the condition. In the case of both hearing loss and diabetes, the devices could actually become a way of recognising and making contact with others who also had the conditions. For example we spoke to one woman in her late thirties who had known she had hearing loss for several years, but had felt she was too young to have to wear hearing aids. She explained she was finally convinced to consider them after she met another young woman, around her own age who was wearing them. It was on account of the other woman’s very similar story that she was encouraged to actually try them out for herself.

The stigma of type 2 diabetes is rather different, as often it is associated with blame. A diagnosis of type 2 diabetes can be accompanied by value judgments with respect to the patient’s lifestyle (diet and exercise particularly) and a latent implication that it is the patient’s own fault. Many patients do not talk about it, nor do they easily identify with other people who have the condition; on the other hand, people who personally knew someone else who also was living with the condition often found that very motivating. One informant talked about one of her friends who also had type 2, explaining that even though she was taking insulin, it did not stop her from doing the things she wanted to do. *“I know someone who is on insulin and she lives her life as though she is not on insulin she follows the [doctor’s orders], eats healthy and everything but she goes anywhere. She goes anywhere, she goes on cruises, goes anywhere she wants to go. She enjoys her life and that showed me that diabetes is not a setback. You can live a long life with diabetes so you know she was an inspiration to me.”* She also explained that this woman would happily inject herself in front of others, and that had inspired her not to be ashamed of having the condition herself.

Currently the design of both these devices is very focused on discretion, which is driven by an understanding that this is what users of the artefacts want, but this approach also plays an indirect role in reinforcing the stigma associated with the conditions, overlooking a powerful agency the devices could potentially have to activate relationships between users and pre-users. This means that although they could have the potential to help pre-users find people to identify with, who can both inspire them and demonstrate the advantages of use, they are deliberately designed to avoid this potential. Currently, people may often not realise others are users, or even have the conditions. Of course, being able to identify users could have negative consequences if people subsequently associate the devices with individuals who they are unable to identify with and/or do not admire personally, but it is perhaps more interesting that the devices have the potential to serve a role in initiating people to talk about their condition, helping to undermine some of the stigma that surrounds them, particularly for others who are facing similar diagnoses.

**3. What can displacing use mean for design?**

The relationships presented above emerged in the course of a project in which the central position (for design) of the concept of use was intentionally displaced. What was observed, however, is bound in essential ways to the idea of pre-users, a fabricated concept that provided just enough scope and definition to find and follow specific people who had a tangential but potentially valuable relationship to the medical devices in question. It is conceivable that some of these relationships might have been uncovered in a traditional user centred design process that investigated sites of use. For instance, the medical consultation is where new users are taught how to use the devices and might be a focus of a user centred design process for new hearing aids or insulin pens. However, it is also unlikely that the specific observations we have collected would have been given the kind of weight we have given them. It isn’t that these relationships would not be noticed at all; rather it is that they appear at first blush to be largely tangential to the design of these devices. It is only when we displace use (i.e. by holding functionality, usability, etc. on the margins of the process) in favour of relations such as these that we are compelled to take them seriously as design material. This in itself is a generative strategy for design. In the following we suggest two additional strategies designers might use in order to seriously treat relationships other than use. The first relates to alternative interpretations of an artefact apart from that of use. The second relates to the consideration of practices which do not involve, but could affect, use practices.

***3.1 The artefact multiple***

The devices we have been considering move in different contexts from being a drug delivery system, to a threat, to a demonstration tool; at one time it is part of a solution to the medical condition, at another it is a conspicuous symptom of the illness it is designed to combat (c.f. Mol and Law’s 2004 discussion of the “body multiple”, to which we are indebted). The multiplicity of the roles of the artefacts we design is clearly not delimited only by how that device is used, but by the many different contexts in which it might make a cameo appearance as a momentary agent of influence or reference (see also Jaffari & Matthews 2012). This is not so much a matter of creating artefacts with ‘open scripts’ (in Akrich’s 1992 sense of script) but in shaping artefacts in valenced ways (c.f. Woodhouse and Patton 2004) so that they facilitate (or resist) their enlistment in the local institutions and agendas they already appear within.

For example, from the cases presented above, and considering the multiple roles the devices can play, this could involve developing the devices in ways that afford communicating the conditions to others. Hearing aids could be designed to be visible, or to have a more dynamic interactive role in conversations, so both the person wearing them and the people they were communicating with could activate them. Similarly how the injection devices might play a role in public practices, such as eating out, becomes an open question for design. Different roles the devices can play in the clinical interaction, e.g. as identifiers, teaching aids or bargaining tools are brought into relief. Taking these other roles into consideration in both the physical design of the devices and the way they are packaged and marketed has the potential to support the healthcare professional’s ability to use them in these different ways. It is not just that we can or should think of artefacts as ‘multiple’ in this sense, as this is something design research has understood for some time. Early ideas about reconceptualising the space of design solutions, i.e. redefining form/context boundaries (Alexander 1964) or frame shifting design problems and thereby their solutions (Schön 1983) are among design theory’s core insights into the successful practice of design. What, if anything, is unique in this proposal is that this approach of “displacing use” imposes a discipline on the direction in which the design situation is to be reframed. By displacing use and yet remaining wedded to the ideals and context-sensitive methods of user centred design, we discover (rather than invent) participants’ alternative framings of the artefact and the networks of relations it centrally or peripherally participates in.

***3.2 Networks of practices***

In addition to focusing on the multiple roles the artefact plays, we can also centre the different practices that affect, directly or indirectly, the design issues we are addressing. This is a question of respecifying what we are designing and for whom. If we consider the context for design as a network of interlinked relationships, we can begin to identify different junctions in this network where a design intervention might be fruitfully introduced. We can also explore how activating indirect relations will affect the design issue we are addressing, and through engaging these sites in a design process we discover how interventions will alter relationships across this network.

This involves recognising the importance of indirect relationships, and introducing interventions that can alter these. In the cases presented, the kinds of design spaces this opens up include ways to help establish trust in the healthcare professional-patient relationship, or to help equip both participants to communicate their different interests, and in doing so facilitating the adoption of the devices. Here we suspend any interest in the role of the medical device in these practices, but are rather interested in supporting or enhancing the practices themselves. This requires an appreciation of how the conditions are understood and related to by the people who have them, and recommends design focus on developing solutions that respond to an emic interpretation *of the need to treat*, rather than the form of treatment itself. As above, however, the point is not just that this introduces a broader or alternate space for design to explore, but that it does so in a way that is neither imaginative nor speculative but remains grounded in fieldwork and tied to people’s existing practices; these just happen to be practices that are not of *use*.

***3.3 Summary***

Taking these observations together, we can more clearly articulate the value (and limitations) for design in pursuing a pre-user centred process. The issues and relationships identified above—between the healthcare professional and the device, the pre-user and the healthcare professional, between pre-users and their own conditions, or pre-users and other users—are not relationships of use. However they do bear an important relation to the ultimate use of the medical devices: they clearly identify a number of the *contextual conditions* that preclude or occlude the uptake and use of insulin pens and hearing aids. For example, the manner in which the device is introduced within the clinical encounter brings into relief the extent to which pre-users’ relationship to the devices are mediated by institutions (such as healthcare systems), professional practices (e.g. diagnosis) professionals themselves (doctors’ familiarity with, and attitudes towards the devices) other people (users or patients) and identity concerns that can greatly affect pre-users’ expectations of use. These contextual conditions are important not only to people transitioning to use these devices, but for the use of these devices themselves, since the use of these medical devices is embedded within these same institutions, professional practices and user communities. In contrast to Grudin’s (1993) overspecification of peoples’ professional roles in interacting with technologies, our conditions were identified through a process that deliberately *under*specified the relationship between the people studied (pre-users) and the devices in question. On account of the fact that no prior use relationship existed through which to define people, functions, tasks or contexts of use, our ethnographic approach to design displaced use and users uncovering other design-relevant relations—contextual conditions—that are of interest to design and that prefigure use.

**4. Conclusion**

The concept of the user is, and remains, extraordinarily fertile for design. Even in attempting to articulate an alternative to it, we have difficulty describing our efforts and results in terms other than those of function and use. It is a struggle to conceive of design apart from use. In this paper, however, we have sought to displace (rather than remove or replace) use from its central perch in user centred design. We have done this by constructing a concept of the pre-user of medical devices. This concept enabled us to identify a collective of people with tangential and fragile relationships to the medical devices in view. Through adapting user centred design methods to engage these people in an ethnographically-informed design process, we identified a set of relationships other than use that are of relevance to design. This has been advanced as a general approach that is both grounded (in fieldwork and participation) and generative for design. In particular it is an approach that offers the possibility of ethnographically identifying the contextual conditions that are prior to and determinative of use—regions of design worth generating approaches to explore.

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Endnotes

1. This is exemplified, for instance, in how industrial design research may treat its objects of design as aesthetic pieces, where judgments of industrial design quality are made in terms of the visual impression that a product makes on potential consumers. Hekkert et al. (2003) is representative. [↑](#endnote-ref-1)
2. Redström (2006, 2008) mobilises a fascinating set of examples of this, including the unanticipated use of the turntable as a musical instrument by hip-hop DJs, or the use of urban handrails as furniture for the performance of skateboarding stunts. [↑](#endnote-ref-2)
3. Contemporaneously, the articulation of these ideas have narrowly preceded the emergence of global smartphone platforms that have demonstrated the potential of leaving the use of an artefact open (to a degree at least) to end users, who have the possibility of configuring their own range of functions for the artefact (within the constraints of the pairing of its hardware, operating system and applications). Simultaneously, this has opened the possibility for almost anyone to become a developer—the openness of Google’s Android Open Source Project and the availability of Apple’s Xcode development kit for iOS are movements in this general design direction, in concert with the widespread availability of online programming learning resources, user communities and tutorials. The principal point to be made is the radical degree to which the multifarious ends that smartphones are now employed is not constrained by the imaginations of the designers of the platforms that have allowed these subsequent redeployments, nor is it constrained by users’ current practices with these devices. [↑](#endnote-ref-3)
4. Norman (1990) essentially identifies usability as the match between the designers’ and users’ mental models of the designed system. In this view, a system is successful to the extent that designers are able to communicate to the user, through the behaviour of the system*,* a correct understanding of how the system actually works. [↑](#endnote-ref-4)
5. We are aware of other discussions of use and users; Lloyd (2002) presents a discursive critique of participative design, Agre (1994) discusses the institutional forces underlying managerial and technical conceptsions of the user, and Cooper and Bowers (1994) analyse the disciplinary rhetoric of the user. The targets of these discussions are rather distant from our own foci here, however. [↑](#endnote-ref-5)
6. This project was run as a participatory innovation (Buur & Matthews 2008) project out of the SPIRE Centre in Sønderborg, Denmark; a tenet of these projects has been to broaden the range of stakeholders involved in innovation and to pilot new formats of participation in design. [↑](#endnote-ref-6)
7. Ear, nose and throat (ENT) specialists can diagnose hearing loss, and can refer patients to an audiologist to be fitted for a hearing aid. It is the audiologist however who calibrates and fits the device to the patient. [↑](#endnote-ref-7)