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The Liquid Drop
Exposing and Utilising Difference in the Design Process

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When a group of researchers from physics, engineering and social science met to discuss ageing and the involvement of older users in design innovation, the idea of the sphere arose in the discussion and became the focus for understanding user-driven innovations. Due to its minimal exterior surface, the sphere is one of the most common naturally occurring shapes. As the spheres' surface area physically strives to shrink as much as possible, it yields surface tension and surface energy.

Now, let's consider the sphere in the shape of a liquid drop as a way of understanding the role of users in design processes. The future end users are inside the drop and the designers and manufacturers outside. The end users' relevant world of conceptions is projected on the inside wall of the sphere, clearly visible from both sides due to transparency. Designers and manufacturers are usually employed in organisations with the task of making products for the users who reside inside the drop. One can argue that the outside, the inside and the border between the two constitute an entire system. The designers are, by occupation and training, the most qualified in the system

in designing products, while the users are the most qualified in describing their experiences with products and, in the process, providing knowledge about future needs. The overall system thus represents sets of human activities that are related to each other, either directly or indirectly.[1] The impediment with indirect relations is that the designer considers him or herself as having the right to interpret the needs of the users, and then designs products based on these interpretations without directly relating to the user.

A general experience shared by researchers and engineers trying to implement a user-driven innovation process is lack of awareness of why product innovations fail. While historians of technology in the last decades have taught us that consumers and users of technology have long been actively involved in a process of defining themselves through the acquisition and display of goods, there is still a widespread image that modern society is created by a technology push in which consumers and users are anonymous.[2] Basically, the attitude that technological development is separated from the development of society is still widespread in industry. The consequences are that users are not regarded as necessary for innovations. On the contrary, they are seen as passive receivers of products or, in the worst case, as rejecters of new technology. In contrast to the masterminds – the makers of technology – consumers are considered to be faceless and passive bystanders.[3]

Studies on the diffusion of technology have early on identified marketing as a process of mutual orientation, a mediating process of interactive learning.[4] Studies of usability trials before entering the marketing phase have pointed out how preconceptions interfere in configuring the user in design and production processes.[5]

Ageing and Design

The implementation area of this paper is ageing and design. 'Ageing' is a good example of a world that is not always accessible using prevalent methods by researchers who, in addition, have not yet reached this phase of life. The discourse of ageing is known to be highly normative as it is associated with policies on retirement funding, care and housing for the elderly. Before modern society, it was merely a question of poor people and a small group of people that grew very old. Even though both life expectancy and the number of older persons have increased, old people today tend to be categorised into one group and ascribed similar needs. One consequence is that their needs are evaluated using 'representative' users, i.e. users that can speak for the whole group, such as someone working for an organisation for retired persons. Both the normative discourse and the categorisations themselves create a gap between older and younger generations and might very well be the most important obstacle to design that attracts old people in the future.

In most countries today about a fifth of the population is retired, and in Europe half of the population is over 50. However, this is not only a matter of quantity, of adding more years to life. It is also a matter of quality in terms of the content of life. Older generations today have different experiences and expectations than their counterparts of just a few decades ago. They want to be more actively involved in decisions that affect them now and in the future. They also have greater demands for a well-functioning life, even when they grow quite old and are in need of health care and social services. This development places new demands on design and prompts the need for methods that involve old people and offer them opportunities to make their voices heard.[6] Because of the deeply rooted attitudes towards old people as being only care recipients, along with their exclusion from design processes, the gaps between their views and designers' views are often possible to define. This provides us with opportunities to increase our awareness of these gaps.

As general awareness increases of the growing number of old people and that this development can result in innovations and new markets, it is the task of policy makers, authorities and related businesses to set the necessary priorities. One of these is making the business world aware of this new opportunity. But what is being conveyed? Is it really the needs and preferences of old people or is it the standardised normative concept of old age that is behind it all? The normative concept tells us that any increase in the segment of old people creates an increased demand for rollators and other aids. Rollators can be improved with rubber wheels that provide more stability; other aids, like pill boxes, can be made automatic and be exported. When old people themselves are allowed to voice their opinions of what they need, though, it is often other types of products and services they request, ones that provide them with continued control over their lives rather than being associated with helplessness and disabilities. But what is it then that we export? Swedish design? Or Swedish inability to come up with customer-centred designed processes?

Besides using 'representative users', there are very few examples of old people interacting with designers. A concept coined to describe this gap is 'implicated users'.[7] Implicated users are 'those silent or not present but affected by the action'. Clarke defines two kinds of implicated users. Those not physically present but discursively constructed and those present but made silent by those in power. Thus, planning and products for old people run the risk of reproducing our expectations of old people rather than trying to investigate their needs and meet their desires. In other words, old people are discursively constructed when we, for example, design grey alarm bracelets or light brown covers for chairs in case they get wet or stained. Old people are definitely present, not in the laboratory or design studio, but in their own lives and in their own

contexts with these products. They may want an elegant bracelet and a dotted red cover in a material that hides wetness but does not signal helplessness.

Another aspect is the difference between non-users and implicated users. While implicated users are excluded from the innovation process by those in power over this process, non-users are excluded by their own choice.[8] It might be for good reasons that the user prioritises something else, but it can also be a kind of protest, such as not learning how to use computers as a protest against their dominance.

Tension with Potential

The challenge for designers today is not so much to add another description of excluded users but to apply this knowledge and improve design and innovation processes. The tension and the energy between the designer and the user, illustrated by the surface of the liquid drop, is as we see it, a source of invaluable information. The tension between these differences is considered to be a part the *potential* for mutual *learning* which benefits future design processes involving the same communities of practice.

The aim of this paper is for readers to become aware of the gaps when they appear in practical design processes. The paper goes on to discuss how to explore and use these tensions. The aim is not to present an alternative model to existing methods but to increase the awareness and the way that users can contribute by interfering in the design process. This will be exemplified by four cases that in one way or another point out gaps and lessons learnt from what first appeared to be failures but later proved to be discoveries. The unintended consequences of technologies in the hands of the users pushed the design process further.

Action Research, a Methodology for Enhanced User Involvement

The behaviour and needs of individuals cannot be understood without reference to the meaning and purposes of their activities.[9] Therefore, when a designer or researcher wants to study problems or phenomena in the real life situations of individuals, action research is a suitable method since it involves the individuals of the system studied.[10] The aim of action research is further to impose change in the system studied. In relation to the elderly and design, an action research approach can become instrumental for creating a change in the design system, i.e. utilising the tension of the liquid drop model in a way so that the users become the focal point in the design process. Contrary to other research approaches, action research involves the user in the reflections and analysis phase which for this particular case means that the user is involved in the interpretations and reflections of their own needs. Thus, the needs are not identified and interpreted in isolation from the potential user.

Although this might sound self-evident, there are problems with actions research, such as: limits on the possibility of involving all potential users; the time required for deep involvement with users; and problems of translating needs into technical specifications. Some examples are presented below where methods other than action research are used in order to bridge the gap between the user 'on the inside' and designer or manufacturer 'on the outside'. Two of them show different degrees of the gaps and tensions between 'the inside' and 'the outside'.

TV Viewing: Can We Bridge Gaps by Letting Users Steer Methodology?

To take on the liquid drop model requires a reflexivity for the designer, that begins with the analysis of his or her own preunderstanding. One example of how hard this can be, is the established view that an old person left alone to watch television is a sign of abandonment and involuntary loneliness. A study of elderly TV viewers revealed that this was definitely not the case and was a blind spot deeply rooted in the culture and norms of what is valued in modern society. It also revealed that the discovery was independent of the given methodology, but was more the case of the researcher following her intuition that there was something more behind the phenomenon that the most frequent TV viewers are old people.[11]

The aim of this study was to examine the relationship between being isolated in one's home and the level of understanding of what was going on in the community and in the world outside of one's home. The hours of watching TV and programme selections were unproblematic to map, until the day when the old persons spontaneously started to relate that they were not really interested in what they watched. When asked why they then spent so much time in front of the television, their answers revealed that their television usage was about something completely different. It had nothing to do with the content of the programmes. It rather related to the ageing process and disengagement between the individual and society. In this example, TV viewing had become an accepted way of satisfying their needs to feel socially integrated, to have company but at a comfortable distance, as well as to be alone and contemplate. This last need can be quite difficult to satisfy in a society where activity is more valued than passivity, especially in old age.

Mobile Phones: Can We Bridge the Gap by Mutual Learning?

Learning takes place among individuals in a system. Learning is defined in many ways but can be argued to be a process where new knowledge is acquired and present conceptions are changed. Such change is a process oriented type of learning, sometimes described as transformational learning. It starts with an individual who begins to critically reflect on his/her preconceived perspectives

and how they have constrained the understanding of current experiences. Thereafter, gradually or suddenly, the individual begins to modify his or her preconceptions to make them better reflect the current situation.[12] This type of transformational learning can be connected to action research in the way it involves the user in the stages of reflection. However, when the designer's organisation requires a quick response to user needs and does not allow time for critical reflection, there is a risk that a designer will rely on the same perspectives and conceptions over and over again, and will interpret the needs of users without involving them in the reflection. In such cases, the liquid drop model would be a way for designers to emphasise critical reflection on a constraining preconception and learn about the users on the inside of the drop.

One example of such constrained perceptions can be observed in a recent study carried out with a mobile phone manufacturer in Sweden. Users were interviewed about their experience with the products. The users were concerned about the person at the other end being able to hear them and expressed it as 'the hearing ability at the receiving end'. The mobile phone designer, on the outside of the drop, interpreted the expression 'the receiving end' as referring to the telephone itself and not the person who was receiving the call. In this situation, it was obvious that the designers in the manufacturing company were focused on their product to the extent that the comments of the users were misunderstood or dismissed, and therefore not reflected on from a user perspective.

Home Shopping Terminals: Can We Bridge the Gap by Convincing?

Another risk of missing the point is when a designer is so focused on the product that she puts herself in the position of convincing a resistant user to test and use an application. With the best of intentions, the designer may want to ensure that old users are not excluded from opportunities to try new technology. In such a situation, the user experiences hardly come into question. The tensions this creates can be illustrated by the following interchange between an old person (L) and a representative (P) for a local government-run project to test shopping terminals in the homes of old people.[13]

L: But I think my grocery shopping works fine the way it is, so we can forget about using this grocery shopping computer, can't we?
P: No, I'm afraid not.
L: But why?
P: We are going to do the shopping this way instead so that we home helpers can serve you better. Now when Lena comes, she takes your list and goes out to do the shopping. She's gone about an hour. When she comes back, you have been sitting here all alone instead of the two of you spending time together.

L: But that's no problem, is it?
P: I had planned to type in your order here today so you would get the groceries tomorrow and you two can do something else together.
L: But you can't force a person to do this, can you? How can you tell me what to do?
P: No, I can't. But the fact of the matter is that you'll get better service this way. And it's also a political decision. That affects you too, you know.
L: Yes, but I'm content with how things are now. Why change something that is working so well?
P: You should have the same right as everyone else to have your groceries delivered to your door, which means that you will have more time with your home helper.
L: But surely that costs!
P: Not for you because you are already receiving home help.
L: But I mean for the municipality.
P: Yes, but just take advantage of it.
L: But am I the only one who doesn't want it?
P: No, no. My grandmother who is 80 wouldn't even have a coffeemaker in the house until last Christmas. It's the same with this machine – there is a general resistance.
L: Yes, but a coffeemaker isn't the same thing.
P: Wouldn't it be fun to try?
L: No. Don't I get twice as much help then if two home helpers are going to come?
P: Yes, but the one just types in the order and then she leaves.
L: Yes, but it's still double up? Isn't that a waste of resources?
P: Yes, in the end it's double up.
L: And sometimes I need to buy a few things in between.
P: But this will teach you to plan.
L: If I try it but don't want it, can I then go back to the way things were?
P: Yes, we'll change it back . . .
L: I'll test it once, but then you can take it back.
P: OK, then I'll come back and remove it . . . Is there anything you want to order now?
L: I can't say. Lena and I usually go through it together. She knows what I need.
P: OK, but you ought to be able to think of something!
L: Yes, but she has to buy it at different shops.
P: Hmmm.

'Keeping up with Technology': Can We Get under the Skin of Old Users?

As already stated, the tension between old users and designers arises in part because the notion of being old is discursively constructed. But there are also differences in perspective and

in experience that are very hard to grasp. This in turn requires methods to make this articulation possible. Before entering the One way is to try to understand old users and their acceptance or rejection of communication technologies, as an example, by trying to understand their life situation as they articulate it arena of old people, several methodological dilemmas have to be evaluated. Is it, for example, possible to perform participative observations disguised as an old person trying to live that person's life and access that person's needs and other people's attitudes and behaviours? Is it possible for a disguised, undercover researcher to really claim to understand the life situation of old people? If not, how far can you go by interviewing? Even if one can raise doubts about the disguise, there is something else that is more interesting, which is the fact that researchers might improve their understanding the older they get. An older researcher is, in this sense, more qualified to do the job.

Another thing to be aware of is listening. Participatory observations combined with recurrent interviews and retrospective interviews over a long time have proven to be fruitful because they offer possibilities to listen. Participatory observations have proven to reveal several prejudices, daily routines and habits in a way that limited interviews never can. One discovery concerned the interest in keeping up with developments among persons 83 and older. They felt that they were often misjudged as being technophobic or technically illiterate. Instead, their lack of interest was a result of their lifelong experience of technological change and of becoming more pragmatic with age. In other words, they had a better basis for making decisions about technology now in their older years, but were still well aware of the fact that the world was changing; they were just less interested in this change for their own sake. What is the point of taking part in a new system that you will not be around to use in the future? You will not have 'time to see it through' as one retired engineer expressed it.[14]

However, listening and participatory observations are most often time-consuming. Another way to listen is to allow the user to make contributions which might mean that the designer or the researcher put methodological principles aside for a while, be a bit less rigid and a bit more pragmatic. This may appear to be a prosaic conclusion, but in the light of the theoretical foundation of understanding the way in which technology interplays with designers, engineers and users, it affords a means to follow the path of the user for a while.

Discussion

Design processes are living material. The four examples presented point out that no matter how hard we plan, if we are not open to what users are trying to tell us by their actions or non-actions, we tend to miss the point, i.e. the knowledge we are trying to grasp.

The idea of involving users not only in interviews or observations but in our own reflections about their needs might be one way of bridging this gap.

We have aimed, in this paper, at increasing the awareness of the gaps that exist between users and designers involved in design research and innovation. We have argued that the tension between these gaps generates energy that can be very productive, providing an excellent starting point for mutual reflections of needs. The joint reflections of the user and the designer about the user's needs and the designer's perceived view of the user's needs could increase the knowledge of what the user really means. Although this requires the designer not only to be a good listener but also to move outside of his or her preconceived perceptions.

In the first example (TV viewing) it is the unintended and unexpected that is emphasised. Such unexpected findings are not only embarrassing for the researcher trying to get published by following methodological principles, but also confusing because it might question the choice of method or strategy. Perhaps we should allow more room for unexpected results in design sciences and reflect on the unexpected together with the user. That might put new and unexpected products or services on the market, but they might very well be products that survive since they are needed or wanted.

The second example (mobile phones) illustrates the product or manufacturing perspective rather than the user perspective in the needs identification. When the users explained their concerns about the receiving end, they meant a person, while the manufacturer designer was so preoccupied with the product and the next step in development that he interpreted it from the perspective of the object itself. Even if the users had been involved in the needs identification, the translation into technical specifications was carried out from a manufacturing perspective. The results of such translations would benefit from a period of reflection together with the user before the product development starts. This iteration of including yet another reflection with the user might be perceived as time consuming, but the time spent on an extra iteration in the needs identification phase might save considerable time and money in the more resource demanding product development process.

The third example (home shopping terminals) illustrates both a normative view of old people not keeping up with developments and a deterministic view of technology. Once again this example points out the importance of a theoretical foundation where the designer understands technology in context and can interpret the comments from the user as a part of an innovation process. This is also an example of how needs are articulated, not in a direct demand-supply relationship with the designer but as problems that surface in dialogue.

In the fourth example ('keeping up with technology') it is the understanding of being old that is highlighted. It emphasises old age as a potential for innovations. In other words, what products will come out of older designers? For the rest of us, not yet old, we have to play the role of the second best. We run the risk of yielding to normative statements and categorisations of old people. For these reasons listening and taking time to listen can be worthwhile. This is not just about users in general, but a large group of users and a potential market of consumers that have two or more decades to live their lives before becoming dependent on the help of others.

These four examples point to the fact that we can go much further if users are involved. If we are open to the unintended and if we include time for users' experiences and reflections we can make the design process more effective and enhance the quality of products. The examples emphasise the importance of understanding the design process as a learning process both for users and designers. Making products for older users includes an element of questioning our images of older users and of ageing, as well as of how the use of technology develops. This approach will also strengthen action research since this methodology strives to change reality with users involved.

Conclusions

The liquid drop has been used as a way to become aware of the gaps between users and designers in design processes in action. It can serve as a complementary design approach, its potential being based on the learning opportunities associated with revealed, recognised and exhibited differences between the assumptions and views of end users and of designers, rather than striving for consensus.

We risk failure if we pretend to be the user, if we trust established norms, if we focus only on the product or regard the user as a passive producer of test results.

Instead, the relationship must build on increased reflexivity, a shared interest and learning. In this way, the tensions between designers and users will create the necessary energy required to achieve good results. Since ageing is one of the most profound socioeconomic force shaping the future of business and public policy, the gaps between our images of ageing and old people's own views deserves special attention.

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