

Technologically Mature but with Limited Capabilities

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Abstract. A growing population of elderly people with an extensive knowledge of ICT is to be expected – a generation that has several decades of daily experience from using computers, cell phones and other devices at work situations and in their spare time. Today the discussion of elderly people and technology is dominated by the perception that the elderly are comparatively inexperienced with regard to digital technology. The challenge for the future is, however, to overcome the gradual loss of the senses with the help of technical devices that fulfill the needs of older technologically mature users.

Keywords: Users · Categorization · Design thinking · Phenomenology

1 Introduction

Interaction Design, Ergonomic Design and Information Design are only a few examples of fields that claim they use a human-centered perspective in order to take the users' needs into consideration while designing e.g. interfaces, work spaces or information that support people's ability to access information, and to support communication between artifacts and individuals. Even though the human-centered perspective is crucial for these areas and for putting the user in focus, it is necessary to problematize the concept of user. The ISO standards for users (ISO 134 07) and usability (ISO 9241-11) reflect the complexity when it comes to human-centered design and user-centered design in relation to usability [1]. In order to avoid a too limited perspective on users and situations, it is necessary to take both cognitive and sociocultural aspects into consideration.

The lack of a definition of user has been discussed by some scholars [2], but there is no discussion regarding the categorizations of users in terms of factors such as age, sex, and ethnicity. While conducting research where users are involved in different ways, one has to start by identifying the context and the situation before identifying the user. Sometimes the group of users is more limited than it appears at first glance. Websites showing train timetable will be visited by very few categories of users if only the situations are taken into consideration: people that travel often and want to make sure that the timetable has remained the same, the ones traveling only now and then, and the very infrequent travellers. What they all have in common, no matter their age, sex, ethnicity or disability, is their wish to find out when the train is leaving. This trivial example will work as an introduction to a discussion about the problem of categorizing

users without adopting a holistic perspective. In some cases it is obvious who the users are, especially if the research is done in collaboration with an organization, but still the users' needs have to be identified.

Even though the concept of user is not defined, user- and human-centered perspectives claim that they focus on users' needs [3, 4]. Since a definition of user and a deeper analysis of user is missing in most cases, there is a tendency to group people into several categories such as sex, age, sexuality, ethnicity or with regard to disabilities. Users are often chosen ad hoc and rarely problematized in relation to categories such as those just mentioned [3, 4]. These categories make sense for some situations but not for most. When taking a theoretical and interdisciplinary perspective on human- and user-centered design, it is easy to find the pitfalls, especially if this is combined with design thinking where the purpose is to create new value, with no prior assumption as to what and how an artifact should be created [5]. This requires a focus on a specific situation or system rather than fixed categories of users.

From a theoretical perspective, this paper will discuss the problem of categorizing users in general and in relation to age and ICT. Age is a very vague category and based on the mapping of both visible characteristics and behavior. Age means ageing, but how this is experienced is individual and could be explained from a phenomenological perspective [6]. By bringing up some aspects of how the understanding of gender, age, sexuality, and ethnicity or disabilities have an impact not only on how we perceive a group but also the self image, this paper will problematize how well-intention can contribute to stigmatization of groups.

2 Categorization and Mapping

Getting older is not only to reach a new age; it is connected to the experience of the environment and of limitations of various kinds. How such limitations will affect people is dependent on individual bodily changes, which have an emotional impact on individuals since they will affect daily life, but also behavior. The changes take different forms and do not necessarily involve intellectual capacity, but also aspects such as hearing, eyesight and fine motor skills. It is a continuous oscillation between the experience of bodily limitations and environmental expectations. It also includes self-reflection [7] and the ability to live up to the environment's expectations. When defining a group and then involving them in the design process or in a testing situation, they will know that they belong among the intended users of the product or service. The people that are addressed will either do their best to fulfill the environment's expectations based on the category they are selected for, or try to perform as well as possible, or disqualify the product or service. It could also be a combination of these behaviors, but the classification based on age, sex or ethnicity will have an impact on their self-reception as well as the designers' or researchers' understanding of the individuals in the categorized group. While selecting criteria for users, one relates to a historical tradition of grouping and categorization.

Mapping and categorizing is a way to understand the environment, in a systematic way that facilitates learning about different phenomena and identifying criteria for research. There has been an interest in the meaning of the concept of mapping and its

impact on our way of thinking and how it influences understanding and behavior. Denis Cosgrove wrote: To map is in one way or another to take the measure of a world, and more than merely take it to figure the measure so taken in such a way that it may be communicated between people, places or time. The measure of mapping is not restricted to the mathematical; it may equally be spiritual, political or moral. By the same token, the mapping's record is not confined to archival; it includes the remembered, the imagined, the contemplated [8]. By systematic categorization of users (e.g. within ICT, Ergonomics, Information Design) into predefined categories that rest on stereotypic preconceptions, the user that designers or design researchers are looking for could easily be missed or left out.

Mapping and categorization have been a powerful and influential tool for the organization of knowledge, thinking, planning and conducting research. To understand the impact of categorization one has to adopt a historical perspective. In the 17th century, while the need to understand the environment grew, and science with it, categorization and mapping became tools to organize and define important historical phenomena as well as species and objects vital for S&T. This took place in universities and in cabinets for collections (Peter the Great's cabinet in St Petersburg is one example) and the very first science museums. According to the French philosopher Michel Foucault, categorization was a way to control the field of knowledge and by extension science and thinking [9]. In order to map and categorize living species and objects, the single parts or artifacts needed to be defined beforehand. The species or parts that did not fulfill the criteria were either left out or given a description that fit a specific criterion [9]. On the basis of description, depiction and placing in a specific category the species or object would then be perceived as belonging to that category [9]. The artifacts/species that did not fit into a specific category tended to become 'non-existing' and were forgotten [10]. This is very typical when it comes to historical events or objects, especially when it comes to artifacts created by groups with less influence in society, like women and people from non-western countries [10]. Leaving out artifacts made by groups with less status in society is a kind of stigmatization. By keeping this in memory one can ask what happens when we define users in terms of age and assign certain qualities to an age group. From history we can learn about the risks of using definitions of users that are too strict and stereotypical. While loosening the categories the mapping system will become more complex and several mappings of groups and phenomena are required.

3 Defining Users

When a designer or a design researcher defines an intended user for his or her product they need to narrow down the group of users, e.g. to one defined in terms of sex or special needs caused by disabilities. The needs or requirements for the defined group could be found in previous research made in other areas such as cognitive psychology or behavior psychology where average living conditions and needs are defined. It should be kept in mind, however, that the intentions with this kind of research are different from those in design situation. Since the description of different groups

is widely flowering, even the groups themselves adapt the understanding of their needs or limitations. It is a part of the internalization of external expectations.

Pre-understanding and assumptions about people affect not only how we understand other groups but also how we understand ourselves. Claims such as “young people do not read manuals but look for instructions on YouTube” imply that the elderly do it differently. This in turn raises questions about the definition of “young people” and until what age someone is young and when one becomes elderly. These are concepts that are used with a considerable confidence but based on old definitions. In some contexts, e.g. advertising, life will start after retirement, or at least retirees are assumed to be active consumer of travels, exclusive dinners etc., but when it comes to ICT the same age group is often defined as an immature user of such technology.

If you can't make it, fake it. The saying is about more than pretending that you are better than you are; it also says something about how we create our identity. To create an identity takes time; it is something one grows into, step by step, but it also changes over time. Every age, profession, civil status, living area etc. affects an individual's identity. This could be explained by the fact that we interact with our environment and the tools that surround us; everything we do is cognitively situated. But it takes time: we do not adopt to an identity by going from one age to another, or by moving or changing job; the new role has to be internalized in the interaction between the individual and the environment, but also with the expectations that come from a specific age, position or social status – expectations that are often based on fixed categories and specifications. To internalize an age in the sense that one gets a deeper understanding of other needs than earlier in life takes time. It is not for sure that one recognizes a hearing problem or even bad eyesight, for example, until it causes other problems.

3.1 Categorization and Expected Behavior

Categorization is not exclusively related to static characteristics such as, appearance but also very much to behavior and expected behavior. Grouping people in terms of age, sex or ethnicity often implies that a specific behavior is expected. When an individual accepts to be involved in a design process or testing situation, they also agree to the classification and will often act as a representative for the group. This can be expressed in different ways, e.g. this is not something I care for but I am sure that others in my age/situation etc. do. This could also be explained by that they are taking a role as. When Goffman brought up the idea about the performative self, he was focusing on people's need to perform well and to play a role to impress or please people they meet [11] doing so he brought the meaning of roles in daily life, and this includes a testing situation or when individuals take part in a design process. In many situations people protect themselves against failure by telling from the very beginning that they are not interested or capable. The excuses they give are often based on preconceptions regarding aspects such as age or sex. Since different categories are associated with specific behavior, such excuses are accepted and will not affect the interpretation/understanding of the concrete individual. This also entails the opposite: if, for example, a young person tells that (s)he is not familiar with ICT, this will not be accepted as a natural statement.

3.2 Individuals vs. Groups

The relationships between a group of users and individuals are complex. Interestingly, in discussions of groups of users, it is often brought up that every single individual has different needs, yet at the same time users are categorized in groups. In that context it is often pointed out that a person may have a disability but is not disabled because of that. Such a statement is often regarded as politically correct, but not necessarily taken seriously. In research with a focus on human interaction or human- or user-centered design, it is important to take such a statement seriously, however. Otherwise there is a risk of users being regarded as the other, to use a term from gender and post-colonial studies [10] i.e. someone with supposedly fixed characteristics that will be looked at from an outside position. Instead, it is necessary to find new ways to define users and to group people in other ways than earlier. Consider sex and gender, where sex is biological while gender is a social construction based on expectations of specific behavior in relation to biological sex (though later research indicates that it is problematic even to define sex on biological grounds) [12]. If the elderly could be defined as more experienced in a specific area, we will have groups of users with different ages but more or less the same user history, and other criteria will become more crucial, such as what talent is needed for a specific activity. The user group will in such cases be more heterogeneous in terms of, for example, biological age, gender, ethnicity and disabilities. The focus will be on how to facilitate for the users and make an interface for ICT, an artifact or a service useable.

4 Phenomenology and Situated Experience

From a phenomenological perspective, we perceive and orient ourselves in the environment by using our body; in that sense the condition of the body affects how we understand the environment [6]. That means that getting older also changes the way that we experience life in terms of what we perceive and how we interact with the environment. What we perceive and how depends on an interaction between physiological conditions, previous knowledge, culture and context. This will have consequences for users' involvement, if tests and studies are carried out in a lab. By bringing users out of their natural contexts, they will experience a given design or product in a different way [14].

The difference between a test situation and a daily context/situation will have impact on the users' experiences of a product. The relation between test or design situations and a future implementation will have an effect on e.g. digital factory layout and planning (on going project). The experience of the environment is a bodily one. By combining a phenomenological perspective with working memory, episodic memory and semantic memory, it is obvious that a person that has long experience of something is also more mature in many respects. We learn to see and interpret visuals, but the adequate interpretation of visual representations of milieus requires experience. To be a skilled computer game player does not automatically create visual interpretation skills outside of the game. It is something that one learns over time. A mature user of ICT or one familiar with a specific kind of visuals could feel uncomfortable in new contexts,

which could negatively affect the desire or ability to change behavior. Since all memory is not stored intellectually but in the body, it is sometimes hard to change a physical behavior [13].

Experience from real environments and work situations is required, as it visual literacy, i.e. the ability to relate a visual representation/presentation to a planned reality. Sizes, relations, level of noise or lightning are often hard to transpose from the screen into reality with the help of the imagination. The theory of situated cognition maintains that human thoughts and actions are adapted to the environment. It is situated because what people perceive and how they perform is affected by the context and the situation [14]. That is to be taken into consideration when using age as a category in connection with ICT usage: there are those who lack experience and those who don't.

4.1 Ageing

If ageing is regarded as a phenomenological process, it is something that individuals grow into. Emotionally, most people do not feel that they become older, but at the same time they experience changes such as physical limitations and altered appearance. The change in appearance is not something that individuals recognize daily while looking in the mirror; what most people see when they meet their face in the mirror is the mental image of themselves. Often they recognize ageing only when looking at pictures of themselves that provide them with an external perspective. That means that the self-image does not always agree with how the environment perceives an individual, and there can also be a mismatch between self-expectations and expectations from the environment.

Ageing is a slow process for most people. Single individuals do not necessarily realize that they have bad eyesight or limited hearing. What they experience is annoyance when using ICT, for example. The interface is badly designed and the sound is not clear enough. That leads to frustration in many cases and less interest in using different devices, but also in watching television or listening to the radio. What we are dealing with here is challenges with regard to loss in sensorial capabilities.

The share of the population that is over 65 years old increases in Western countries. This is caused by the baby boom after the Second World War and because of an improved standard of living: people live longer and have an active life after retirement. The average education level of the generation born during the 1940s is high, and they also belong to the first generation that was introduced to and used computers. They have experience from the first Internet connections made by phone, and later from broadband and now Wi-Fi. Upon turning 65, they suddenly belong to a group that is looked upon as digitally immature. They had previously also been introduced to television and have experience of many generations of telephones from rotary phones to smartphones, so the number of technical innovations they have been through during their lifetime is considerable. How come, then, that they are regarded as digitally immature after turning 65? Note that the opposite also applies, i.e. the expectation that all young people are technically mature since they are assumed to play computer games.

It has recently been stated that the elderly are typically defined as those 65 years old or older and that they are the fastest growing segment of the population [15]. Their share is expected to increase over the next 25 years: in the USA alone they will increase by 80 % [15]. If this trend continues, a digitally mature population over 65 years is to be expected, including people that have used digital devices of different kinds since they were children. In addition, we will probably have growing numbers of elderly people that are still active and even work full time. Therefore, the challenge for the future is not to develop devices for technologically immature elderly ICT users but for mature ones.

5 Intended Users and Actual Users

How can we know that the intended users will be the actual users? Is it because they believe so themselves? Or do the users live up to the designer's expectation of the users' needs for the redesign of a product or a new one? Research indicates that people are not aware of why they make decisions and especially not when they are put into situations where they are asked to make choices [16]. In design situations where users are involved either as part of a reference group or in the design process, they are often told why they are chosen. The challenge is to identify the actual needs and the usability of a product or service. Since most people are aware of conventional expectations of specific groups they will probably live up to the expectation by giving voice to the group and putting their own experience aside.

As early as 1985, Harker and Eason [17] brought up the problem with user involvement when it comes to identifying their needs. They identified three areas, which are critical:

- The extent of task uncertainty or task entropy, enabling an assessment of variability in the task on different occasions. This variability may be due to stimulation conditions, goals, users' discretion or task environment.
- The openness of the task, which, apart from other considerations, will mean that the user can continue to provide opportunities for the task performer to learn no matter how skilled he may become.
- Task discretion as reflection by the level and extent of choice available to the performer of the task.

They found that a much broader view of user requirements must be taken if usable and acceptable systems are to result [17]. ISO 13407 was established in 1999 and provides guidance for human-centered design processes for interactive systems [1]. It describes use abilities at the level of principles rather than in detail, as compared to the literature on methodology [1]. The relationship between human-centered and user-centered design and usability is complex. In addition, usability is also connected to motivations among users; this is often crucial when introducing new devices or systems for people that are satisfied with a current product or system. This is often mixed up with the ability to learn and use new devices or systems. The standard definition of usability is effectiveness, efficiency and satisfaction, aspects that have to be evaluated in the situation where the system is used. Effectiveness is considered the accuracy and

completeness with which users achieve specified goals, while efficiency can be defined as the resources expended in relation to the accuracy and completeness with which users achieve goals. Satisfaction, finally, is understood to be freedom from discomfort and a positive attitude to using the product [1]. Also important are the context and the situation of use; this is often defined as the characteristics of the user in relation to the organizational and physical environment [1]. Following the analysis of ISO 13407 and ISO 9241-11 by Jokela et al. [1] which problematize the vague definition of user, usability and human-centered and user-centered design, it becomes obvious that age is a non-accurate way to characterize users, but also that a holistic perspective is missing.

5.1 Design Thinking and User Involvement

Design thinking strives for a holistic perspective. It is an iterative process making use of prototyping and mock-ups. It includes the user in the process, and sometimes the users themselves can come up with design suggestions, where the designer's role will be to fulfill the users' ideas. What is crucial for design thinking is the desired value. It could be inclusive accessible ICT. What does inclusive mean? It means that everyone can use software or devices or have access to a webpage since the interface is possible to navigate independent of sight problems, dyslexia or motoric limitations, for example.

The first step using a design thinking perspective is to define the problem. This could also be described as framing, which is considered unique for design theory. There exist two ways of defining a frame in a design context: as a product of mental knowledge and meaning structures or as a product of social symbolic structures [5]. Why are people not satisfied with a product or situation? What is the problem? It is not always what one thinks. Do the pay channels have a complicated interface or is it the remote control that has too small buttons and unreadable text on the buttons that make the pay channels inaccessible for people of advanced age? The next step is to identify many options or ideas for how to solve the problem, while a third step includes refining the solutions or ideas. It is a cycle that involves the ideation and refinement of solutions, which adds to the problem content, and refining or re-framing the understanding of the problem. The last part is to execute the best solution for the problem [5, 18]. This is an iterative process and requires openness from the very beginning while formulating the problem. If one gets stuck in categorizations, e.g. if a user group is defined in terms of age, it is easy to explain the problem from the perspective that they are digitally immature and therefore have problems with accessing the pay channels; yet it could easily be the design of the remote control that causes the problem.

6 Conclusions

With good intentions, human-centered design and user-centered design focus on different groups of users, often with the idea to include and involve larger groups of people as users of ICT. The result is less successful since categorizations build on stereotypic ideas about what could be expected from people of different age or with some kind of disability. By focusing on the situation instead of the context the user

situation will be narrowed down and using a design thinking perspective will provide a more holistic perspective where the problem is the first to be identified, as well as the desired value, rather than trying to solve what is expected to be the problem. When developing digital devices and creating interfaces with a focus on elderly people, it is necessary to take a holistic perspective and realize that the challenge for the future is to overcome the loss of senses capacity and the need of technical devices that fully fill the needs among older technical mature users.

By bringing together different perspectives on users and users' expected needs in relation to the categorization and mapping of different target groups, this paper has brought up a range of problems that need to be taken into consideration. Human- and user-centered design need to broaden their concepts and involve a design thinking perspective that involves framing of the problem: a holistic perspective that combines the cognitive and perceptual aspects involved in the interpretation and use of artifacts or systems with phenomenological and socio-cultural perspectives. By adopting a holistic perspective and problematizing defined categories we avoid ending up in stigmatizing groups by describing them with characteristics built on presumptions. In addition, we will have groups of users that can contribute to an inclusive ICT design that will be accessible for elderly people with great knowledge in the area as well as immature ICT users of young age. To avoid falling into a stereotypic classification it is necessary to define a product or service use, but also what is required of users to use a product or service, but especially in what situations. By focusing on situations where e.g. an ICT platform is expected to be used, it is possible to redefine the intended user. The group of users may not be age homogenous it could be the level of technology maturity that is needed for the situation. While the circumstances for the use in the specific situation requires keyboard with large keys, large screen and text to speech to fulfill the needs for an elderly person. This will not bother a young person with no perception limitations but will help elderly people who are technology experienced with some supporting needs.

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