Assistive Technology Development and User Needs
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The most important—and yet the most difficult—challenge in the research and development of lifestyle assistive technologies is to properly understand users’ needs. We technicians are prone to give priority to technology, and to forcibly impose the wonders of technology onto users. Devices developed from this kind of perspective might be used briefly in the beginning, partly because of their novelty, but it is not unusual to come across cases where a device stops being used at all after a while, and ends up gathering dust. There needs to be careful deliberation in relation to the following kinds of questions. What does the target user really want? What role will the device under development play in their daily lives? Will the people around the user understand and cooperate? Has the economic viability been properly taken into account?

For this reason, it is important for us to step away from our position as engineers, so that we can have relationships with the elderly and people with disabilities, based on our identities as ordinary people. There is a tendency for this kind of attitude to be misunderstood as “out of character for an engineer.” However, without these kinds of efforts, the true needs of users will never become apparent.

Bo Klasson, renowned as a pioneer in developing externally powered prosthetic arms for people born with birth defects cause by thalidomide, has stated that, “People involved in developing devices for people with disabilities should come into contact with at least one patient (user) per day.” [1]

Doubt then arises as to whether it is sufficient to simply make a series of individual responses, and whether general-purpose devices will ever emerge from this process. My thoughts in response to this doubt are as follows. No matter what, let’s tackle the problems faced by a person with a disability who is right in front of us. Then let’s make that project succeed. As we build up this kind of experience again and again, the problems that users face in common will gradually become apparent. We will discover commonalities, which will provide the clues leading to greater generality.

Bo Klasson has also stated that, “From the perspective of rehabilitation, if a patient can find a better way of solving a problem without using a device, then this is success, not failure. Ironically, people with an interest in developing devices often see this kind of result as a failure.” [1] As this statement says, in order to achieve an objective, it is necessary to be able to propose multiple different ideas and combinations of these ideas (including human support as well), rather than just proposing that a device be used.

Needs are said to include three factors, namely desire, demand and need. [2] For example, suppose a certain person must use a wheelchair, because they have difficulty walking for some reason. The feeling that this person experiences when faced with a staircase leading up to the second floor and thinking “I wish I could climb a staircase again” is desire. Suppose that this person then makes this feeling apparent by asking a researcher for help, saying “I want you to develop a wheelchair that can climb stairs.” This is a demand. Suppose then that the researcher invests time, money, and effort in an attempt to respond to answer this demand, and eventually succeeds in developing a prototype for a wheelchair that can climb stairs. Suppose, however, that this wheelchair is significantly different from what the person making the request had in mind, and that it has various problems, such as being heavy and noisy during operation, and rapidly draining the battery. At this point, what the person making the request might say, “This is not what I was looking for.” So what was the person looking for? The answer is not “climbing stairs” so much as “freely going back and forth between the first and second floors.” This is the precise articulation of the true need. As for a specific solution, a ramp or an elevator could be constructed.
It is not unusual to come across cases where a researcher has embarked on development after accepting a demand at face value. To ascertain the true need, it is necessary to take sufficient time to analyze the content of the demand from the person making the request, and to gradually approach the true need by presenting a range of plans for solving the problem that are as diverse as possible; what isn’t necessary is immediately embarking on developing a device. For device development at the product level, it is best to proceed by setting up a group that includes multiple users with different situations and circumstances, or other participants with a clear understanding of users’ needs, and to maintain close cooperation with the group, right from the concept design stage.

For future device development, and for the devices that will be used by the elderly and people with disabilities in particular, human-centric development is essential. Kurosu et al. (1999) have stated that, “There is a need for the people who make devices to give up the mindset of ‘doing something for others,’ and to adopt an attitude of learning about users and the user environment through a process of usability assessments.” Similarly, Tsuchiya et al (1986) have stated that, “In order to design the kind of hardware that will make people want to use it, it is necessary to escape from a machine-oriented mindset and adopt a human-oriented mindset.”

Tsuchiya et al. conclude by saying, “We want [designers] to take a long hard look at human beings with fresh eyes, and to work at designing hardware that has ‘heart’.”

I often feel that people in a position of providing support to people with disabilities need to have the following three perspectives. The first perspective is that of an observer. When we first meet someone with a disability, we take in all kinds of information. This perspective is extremely important in terms of getting the overall picture of the user. Even after adopting the other two perspectives described below, it is still important to come back to this perspective from time to time.

The second perspective is that of an interlocutor. With this perspective, we approach users at their level, and talk to them to listen carefully to their wishes and demands. I think that for a long time, I worked based on these first two perspectives—observer and interlocutor. However, by meeting certain people with disabilities, I came to learn that there is yet another perspective beyond these first two perspectives.

This third perspective is that of an empathizer. There is a significant issue in relation to the question as to just how far someone providing support can perceive the world of the user. People providing support need to exercise their imaginations, asking themselves, questions such as “If I were in a position where I had to use the device, would I really want to use it?” and “If not, what kind of device would I like to have?” To be frank, there have been times that have made me feel as if I can see the world of a user with a disability.

The late Toshihide Todoroki, while hospitalized at the National Sanatorium Minami Kyushu Hospital (as the Minami Kyushu Hospital was known at the time), once said to me, “Why don’t you try lying down in my bed?” At the time, he was forced to spend every waking hour looking up at the ceiling while attached to an artificial respirator. What he wanted to say was, “Why don’t you try lying down in my bed?” At the time, he was forced to spend every waking hour looking up at the ceiling while attached to an artificial respirator. What he wanted to say was, “Can you really see the world as I see it?”

References and citations