The Role of Culture and Gender in the Robotic Design Process*

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***Abstract*— Technical aids and assistive technologies are not widespread due to a variety of factors. Acceptance is low because often the design is judged as stigmatizing, not fashionable enough or does not fit into individual, culturally shaped life styles. In the HORIZON 2020 I-Support project design thinking is utilized in order to analyze cultural impact factors for developing a robotic shower system for frail and disabled people.**

I. Introduction

Acceptance of technical aids and assistive technologies is influenced by a variety of factors. It is widely acknowledged that the ease of use and perceived usefulness are essential key parameters [1]. However, they do not explain why for example personal alarm systems are not widely accepted although they are easy to use and contribute to more safety for independent living. A recent study on acceptance showed that gender culturally shaped life styles influence acceptance and usage of these technologies [2]. The very often found belief that a person is willing to use assistive devices in order to enable or enhance independence and quality of life, is not mirrored in the actual practice of individuals (Klein et al).

Designing assistive service robotic devices has to take into account culture, gender and age. In the European I-SUPPORT project a robotic shower system for (very) frail and disabled people will be developed from 2015 till 2018.

Utilizing design thinking can be a means to explore needs and possibly overcome gender and cultural issues such as objections to technology, especially robots.

II. Methods

A. Design Thinking in the Robotic Design Process

Design Thinking can be viewed as an attitude which enables a successful approach for the development of innovative products. Developing according to design thinking requires an empathic understanding of user needs and early product ideas, mockups, prototypes which are evaluated with users in several iterative processes [3, 4].

In the European I-SUPPORT project design thinking is implemented as it is seen as necessary in order to understand the complexity and the level of intimacy of the showering process. Objective of I-SUPPORT is to develop an intelligent robotic shower system in order to support primarily users who are very frail or suffer from functional loss in their personal hygiene. Alternatively, it might be also used in inpatient healthcare institutions. Developing such a system implies an empathic understanding of the needs and requirements of the primary user, i.e. the person who is (very) frail and/ or is suffering from functional loss. Also, it is critical to understand the tasks, needs and requirements from the perspective of the secondary user, i.e. care staff and professionals in the healthcare sector as well as the interests of relevant stakeholders. Therefore, a range of methods is utilized:

- Qualitative interviews with primary users (e.g. frail persons) and 15 secondary users (formal and informal cares) in order to understand the showering process with its pitfalls and in consideration of different perspectives (culture, gender, age, etc.). Also, they will be asked for feedback on first drafts and materials of the I-Support system
- Exchange and workshops with stakeholders and potential producers in order to get a feedback on the next developmental stage
- Focus groups with primary and secondary users as well as stakeholders and potential producers to get an early feedback on the first and second prototype
- Pilot studies with potential users in geriatric clinical environments to evaluate usability and acceptance .

B. Health, Age and Gender

Anthropometric research shows that in the North of Europe people are taller than in Central Europe, also in South Europe people are smaller compared to Central Europe. This concerns men and women. In general women are smaller than men [5]. In the last decades the average body length increased with each new generation. Today, also the girth increases as a consequence of changed movement habits [6].

The transition from persons aged 65 – 80 years to the age group of over 80ies is characterized by an increase of health problems, functional loss and chronic diseases [7]. The risk increases for people with low educational background and fewer resources to compensate health problems [7]. Sensory (hearing, vision) and mobility impairments (climb stairways, walking a longer distance) are influenced by age. The percentage of persons needing a cane or walking frame increases exponential from 4% of the age groups 65-69 old, to 8% of 70-74, 15% of 75-79, and 34 of 80-85 year old [7].

"Gender refers to the socially constructed characteristics of women and men – such as norms, roles and relationships of and between groups of women and men. It varies from society to society and can be changed." [8]

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The following is an intermediate analysis of the interviews with 23 users and 12 experts at an early stage of the project. 13 of the users are female and 10 are male. Average mean of age is 69.8 years (SD= 11.1; range 49 to 90). Countries they originated were Germany, Turkey, Japan, Serbia, Czechoslovakia, Afghanistan. Religions they belonged to were Protestantism, Catholicism, Orthodoxism, Islam and Buddhism.

III. First Results

Showering is a process which can be divided into 3 major steps:

1 Preparation for showering, which entails activities such as fetching the necessary utensils e.g. towel, clothes, soap, and shampoo etc. preparing the room: heating, chair etc. and moving/entering into the shower cabin.

2 Showering process which entails wetting with water, soaping and rinsing hair and body, as well as leaving the shower cabin

3 Follow-up phase which entails drying with towel and/or hair dryer, lotioning the body, dressing, cleaning the shower cabin and tidy up bathroom.

However, the different steps can be influenced by a variety of factors.

A. *Personal Preferences*

Personal preferences do not develop independently but are also influenced by gender, age or culture. Most men (70%) take up to max. 10 minutes for their shower; more than 50% of women need 10 minutes and more. Putting on some lotion on the body after showering is mostly done by women.

In Japan, showering is a part of an enlarged cleaning process. Traditionally, Japanese persons clean themselves before taking the daily hot bath. Private showers often consist of a hose. In India, people might shower up to ten times due to climatic conditions. All persons with Islamic belief use kese for washing themselves.

B. *Organizational and structural requirements*

From the view of the professional experts also other factors play a key issue in personal hygiene. Persons with Islamic beliefs prefer their family members to support personal hygiene. If they are willing to be supported by a carer, it has to be somebody with the same gender. For healthcare institutions it is sometimes difficult to fulfill these requirements due to the fact that approx. 80-85% of the healthcare workforce is women.

Following pictures demonstrate typical German bathroom showers. Often there is a bathtub equipped with a shower valve or alternatively the “typical” shower cabin which can be characterized by a high step into the shower and relatively narrowness so that it might be difficult to implement a robotic shower system.

Figure 1 Typical bath with shower valve and shower environment

IV. Discussion

First results demonstrate that a variety of factors have to be considered in the robotic design process. The Design Thinking method offers a variety of methods and tools, especially the participatory design and the inclusion of users and stakeholders in order to define requirements of the robotic artefact might contribute to innovative ideas to overcome structural hindrances and traditional ways and personal preferences.

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