

Human Impact Assessment of Robot Implementation in Finnish Elderly Care

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Abstract

This paper is based on empirical research on an implementation process of the care robot “Zora”. Impacts of care robot implementation on users – care personnel and customers – are identified with the Human Impact Assessment (HuIA) approach. The applicability of this approach for robotics is also assessed. The data were collected in a field study in municipal elderly care services in Lahti, Finland. The data consist of ethnographic observation of using the robot for rehabilitation in two care homes; focus group interviews with care workers, and a group interview with customers. According to the preliminary findings, there are multiple impact types associated to robot use in elderly care. The different types often have both positive, negative and neutral dimensions. Reactions differ, and care personnel should know customers well to anticipate how they react. The role of ethics is a key issue. Impacts on the personnel were related especially to need for orientation and its coverage; time use; and pottering about the robot versus “true work”. The customers mainly welcomed the robot positively. For the care workers, the best of the customers was the driver of learning in robotics. The HuIA approach appears to provide a flexible way to assess impacts of care robotics, but additional dimensions need to be considered, as robots assume new tasks and roles.

Keywords

Service robot, elderly care services, human impact assessment, Finland, care robot “Zora”

1 INTRODUCTION

The use of digital technologies, including service robots, is increasing in elderly care. Their influence on customers and care service personnel has implications on the possibilities of rooting technological innovations into care (e.g., Raappana et al. 2007; Goeldner et al. 2015; Roelands et al. 2006). Human impact assessment (HuIA) offers a tool to assess technology use in elderly care. Related methods have been applied earlier to assessing care personnel’s competence and needs for orientation into technology use (Melkas 2011). Technology use is often a major change, but when planned carefully, it may provide a welcome addition at work. It is also recognized that the health of older people could be promoted, sustained and improved by technical aids (e.g. Herstatt et al. 2011), but usable indicators for good gerontechnological solutions are lacking (Taipale 2014). This paper is based on on-going empirical research on an implementation process of the care robot “Zora” in elderly care in Finland. The perspective of HuIA is utilized here to assess the impacts of implementation of care robotics on customers and care personnel.

The term care robotics encompasses “all machines that operate partly or fully autonomously performing care-related activities for people with physical and/or

mental handicaps” that are related to age and/or health-related restrictions (Goeldner et al. 2015, p. 115). Care robots may, for instance, simplify tasks of the daily life for aged and/or handicapped people, increase the quality of life of their users by giving them more autonomy (Herstatt et al., 2011), or protect them or perform certain tasks with a certain quality standard (for example, serving medication, drinks or food). (Goeldner et al. 2015)

HuIA is a concept describing an integrated process including both Health Impact Assessment (HIA) and Social Impact Assessment (SIA). It is a universal, user-oriented (ex-ante) tool that clarifies the impacts of different options and alternative solutions, providing information for decision-making and helps deal with conflicts (Kauppinen and Nelimarkka 2004). According to earlier research, regular human impact assessment of new technologies at individual and community levels may stimulate their adoption by customers and professional carers. HuIA in this context may include, for instance, linkage of technology to social effects such as trust and commitment, time use, information flows and feelings of participation. It has mainly been used to assess the impacts of “traditional” gerontechnology, like safety alarms (Melkas 2011; Raappana et al. 2007).

In this study, both care service personnel and customers are users of the robot “Zora”, in different roles. End user participation in development activities is one of the basic principles of user-centred methods. Early and ongoing user involvement and participatory methods have been recognized as one of the principles that are particularly important in health information technology (Cresswell and Sheikh 2013; Martikainen et al. 2014; see also Pekkarinen et al. 2016).

Service robotics, a rising trend, also has somewhat different characteristics as compared to other technologies in elderly care, such as embodied character, which may provide emotional attachment (Parviainen et al. forthcoming; Komatsu and Takahashi 2013). Studying acceptance of robots may require consideration of other factors not included in the most utilized technology acceptance models (Beer et al. 2011), such as social and hedonic factors (Klamer and Allouch 2010; Heerink et al. 2010).

The aim of this paper is to identify the impacts of care robot implementation on users – care personnel and elderly customers – with the help of the HuIA approach. The applicability of this approach in the context of robotics is also assessed. Does it function in the case of robotics? The data were collected by means of ethnographic observation and interviews in two care homes.

According to the preliminary findings, there are multiple impact types associated to robot use in elderly care, and the different types often have both positive, negative and neutral dimensions. Reactions differ a lot, and it is vital for the care personnel to know the customers well and thus be able to anticipate how they react. The role of ethics is a key issue. Impacts on the care personnel were related especially to need for orientation and its coverage in the unit; issues related to time use; and pottering about the robot versus “true work”. The customers welcomed the robot positively, and for the care workers, the best of the customers was the driver of learning in robotics. The HuIA approach appears to provide a sufficiently flexible way to assess impacts even in the case of service/ care robotics.

2 METHODOLOGY

The data were collected in a field study in municipal elderly care services in Finland in December 2015–April 2016, when the care robot Zora was introduced in the elderly care services in the city of Lahti in Southern Finland. The data for this study consist of (i) ethnographic observation of using the robot for rehabilitation in two round-the-clock serviced care homes, (ii) five focus group interviews with the care personnel, and (iii) a group interview with five customers. Altogether 35 persons were interviewed (30 employees and five customers). The employee interviewees were mainly nurses or assistant nurses.

The topics of the interviews included, for instance, primary reactions, experiences of the implementation and familiarization phase, experienced and expected

benefits and challenges, impacts on work practices, and perceptions concerning suitability and applicability of the robot for the elderly inhabitants. The interview of the customers focused on, for instance, what kind of thoughts came to mind when seeing the robot; was there something nice, surprising, irritating; was the recreation session with the robot different from a session without a robot; and would they like to participate in sessions with robots in the future.

The ethnographic observation consisted of 12 sessions where the robot was either introduced to the customers in a special session or acted as part of the regular group activities (exercise or literature groups) of the care homes. Each session lasted for about an hour, and comprehensive notes and photos were taken.

The robot was introduced and kept for two weeks in the first care home and four weeks in the second. It was technically steered by a group of 2-4 health care students. The robot was re-named as Ilona (a Finnish name containing the word “joy”) by the city of Lahti representatives so that it would be easier for users of the name. The robot instructed exercises, played music, performed dances and played interactive memory and guessing games with the inhabitants. The data were analyzed with the methods of qualitative content analysis. The study concerns implementation and use of robotics particularly as support in rehabilitation that improves and maintains social and cognitive abilities in addition to physical abilities.

The research was conducted according to ethical principles, avoiding any participant harm. Both the care personnel and the customers gave their consent to participate in the sessions and research. If someone expressed a willingness to leave a session before its end, this was permitted. The customers were also assisted if they, for instance, had moving problems. Customer security was assured, as the robot was never left without assistance. Research permission was obtained from the municipal social and health care service authorities responsible for elderly care services in the city of Lahti. The anonymity of the participants was assured by anonymizing the research material. No personal or health-related information can be identified from the material. Health-related information on the customers was neither inquired nor obtained.

3 PRELIMINARY FINDINGS

According to the preliminary findings, the implementation of the robot has many kinds of impacts on the care personnel (Figure 1). Impacts on meaningfulness of work and coping at work were both positive and negative. An occupational therapist noted that the robot could be a useful tool for those care workers who are not so comfortable with exposing themselves to instructing exercises and performing for the public. A supervisor had indeed felt good about the exercise sessions instructed by the

robot: “It doesn’t matter that the machine shows the way, it is great to ‘externalize’ oneself sometimes.”

Part of the employees had a personal or professional interest in “novelties” in care work to enable provision of better services and improve work ethics and thus were positively impacted. On the other hand, for other employees, the robot in the work environment implied meanings of risk, even danger, and led to withdrawal and bypassing the whole issue. This was felt to be meaningful to maintain one’s own balance and sense of control. An occupational therapist pointed that “The care workers said that this is just waste of money and causes additional work when work is already so busy.” Some condemned the robot as “modern nonsense”. Impacts on participation and opportunities were positive, negative or neutral. An important user-oriented point raised by an occupational therapist was as follows: “Is the grass-roots level taken into account when purchasing such robots; is it listened to what is the need of the house?”

Part of the personnel experienced that as the city’s strategy in elderly care services is to be technologically pioneering, they fulfill the spirit of the strategy by agreeing to use the robot. Negative impacts were caused by publicity and city residents’ negative reactions; the personnel had to excuse and justify purchase and use of the robot to their vicinity. Most of the other impacts were also either positive, negative or neutral. With regard to information flows and time use, positive impacts were not mentioned during the pilot stage. More time and orientation was asked for to be able to utilize the robot better; “This daily work is pretty tough, working time should be marked out for us for this” (a supervisor). It is also important to give the whole personnel a true opportunity to try out using the robot; it is not sufficient for one person to show. The orientation should also cover issues related to time use and

division of tasks, as noted by an occupational therapist. Managers did recognize the need for orientation: “I asked the importer to give training when I saw the fear, distress and diffidence about the robot coming here.” (a supervisor). Orientation is a major issue to highlight and deal with increasingly skillfully in these processes.

Impacts on customers as well as their close relatives were also positive, negative or neutral. A supervisor commented on the customers as follows: “I was surprised that the customers had such positive attitudes. They wanted to be engaged and hold the robot. They were open-minded and felt that someone had come here for them. The robot doesn’t get tired but always responds in a friendly way and repeats things. And she doesn’t take it personally if someone doesn’t want to hold her. She can repeat things for days.”

The customers considered the robot as entertaining, funny and interesting. The robot stimulated moving and led to reminiscing because of its child-like character. An occupational therapist noted: “When people were supposed to raise their feet, someone who never does that, did it, because the robot shows exercises in a calm way.” The robot use also created various kind of interaction with the robot or between customers and care personnel. A care worker mentioned: “Interaction was generated, as the operators of the robot could answer questions at the same time. People started to talk to a doll like this quite well.” Examples of negative impacts were irritation, reserve and fear. “Go away, this is silly”, as put by one of the customers. Some were confused when the robot addressed them and they didn’t know what was expected from them. A customer also noted that “This goes too technical. It is human contacts that I miss. Human to human, that is important, and not any toys.”

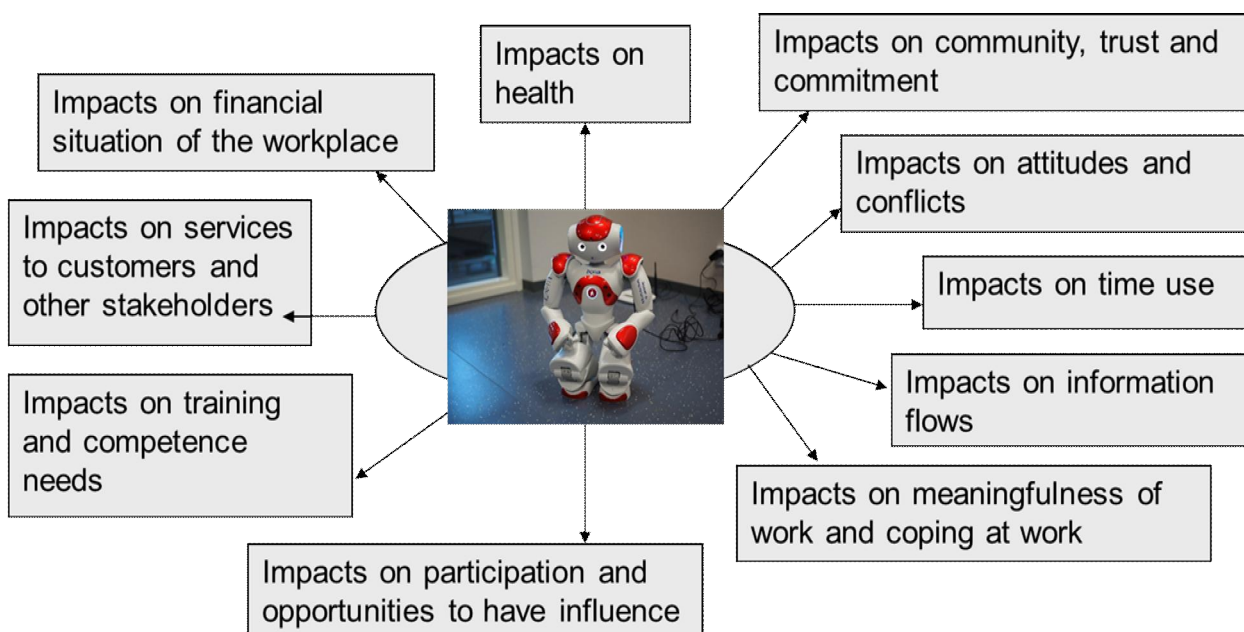


Figure 1: Impacts of robot use on the care personnel.

The care workers brought up ethical concerns as follows: "If it is used as a substitute for humans... and if the robot entertains people all day long." "If a robot is given to a person living alone and she/he has to cope alone." "It is, after all, always a machine, it can malfunction, without saying anything." Again, these issues need to be taken into account in responsible planning and orientation (see also Compagna and Kohlbacher 2015). In general, further research on those issues would be crucial (e.g., Martikainen et al. 2014; Melkas 2011) in the context of service/ care robotics.

4 CONCLUSIONS

The preliminary findings showed that there are multiple impact types associated to robot use in elderly care, and the different types usually contain positive, negative and neutral dimensions. Digging out the impacts properly is vital. It became visible through the various impact types and their contents that reactions differ a lot, and it is vital for the care personnel to know the customers well and thus be able to anticipate how they react. For instance, if the customers are not known by the persons using the robot, some exercises may not suit to the customers at all due to certain illnesses. It was also highlighted that the customers should not be misled; the role of ethics is a key issue. Elderly customers "are grown-ups, even if they suffer from memory diseases, they are not stupid. The user of the robot should tell what is done and why", said an employee.

The issues that became highlighted in the data as impacts were need for orientation and its coverage in the unit; issues related to time use; and pottering about the robot versus "true work". It was surprising how positively the customers welcomed the robot, and how the care workers thought about the best of the customers as the driver of their own learning in robotics. According to a physiotherapist, "Robot use requires supervisors and work input, but do we depart from what we give to customers. I cannot tolerate technology, but still I have a positive attitude if I see that the customer gains something good out of it. You have to reach behind your own attitude." As put by a customer, talking to the robot (using its name): "How nice you, Ilona, are".

The research concerned relatively brief pilots, and care personnel's learning about the robot occurred in practical situations with customers, by means of "trial and error", concerning mainly basic functions that were already programmed. At this phase the robot remained mainly as recreation for the customers; it was pastime and a breaker of routines as well as, to a certain extent, a stimulator of social abilities of the customers. It was this rather than, in a professional sense, a raiser of physical and cognitive abilities or a rehabilitator.

After the first steps of robot use, there is potential for true rehabilitative work and activities with the help of the robot, if its use is well planned. In light of our research, the usefulness of the robot varies – in the beginning, full potential may not be realized.

Depending on, for example, net usage time, motives, interests and resources, management and leadership, benefits may increase for the customers and the personnel in the establishment phase (for example, from the point of view of meaningfulness of work). If planning is not focused on, benefits may remain negligible.

As to the HuIA approach, because of its flexibility, it appears to provide a useful way to assess impacts even in the case of service/ care robotics. HuIA is not culture- or context-bound, but it may flexibly take those issues into consideration, so it seems usable also in other countries with an ageing society. Comparative studies would be beneficial. Some issues that have not been observed in earlier studies were recognized; for instance, impacts on ethics as well as the role of publicity and impacts of negative reactions from the public. New dimensions might thus need to be considered for inclusion in the approach especially as robots develop and assume new tasks and roles.

The study brought up two apparently interesting and potentially useful avenues for future research. Firstly, through comparative research, it could be investigated if there are differences across countries and different cultural environments in impacts of implementation of service robotics. Secondly, it could be studied if there are differences when service robotics are implemented in completely new surroundings, for instance, in a new care home where the service culture and other characteristics are only taking shape, as compared to a care home that has been operating for, say, 10 years and thus has a longer history of producing services for customers.

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