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Practical Evaluation of Robots for Elderly in Denmark - an Overview

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***Abstract*—Robots for elderly have drawn a great deal of attention as it is a controversial topic being pushed forward by the fact that there will be a dramatic increase of elderly in most western countries. Within the field of HRI, much research has been conducted on robots interacting with elderly and also a number of commercial products have been introduced to the market. Since 2006, a number of projects have been launched in Denmark in order to evaluate robot technology in practice in elder care. This paper gives an brief overview of a selected number of projects and outlines the characteristics and results. Finally it is discussed how HRI can benefit from these.**

***Keywords*-commercial robots, evaluation; elderly;**

I. Introduction

Based on the demographic development in most western countries, it has been predicted that the number of people with mental and/or physical disabilities will increase while the amount of people to take care of them will decrease [10], [1]. At the same time, an increasing number of commercial robots have been applied for non-industrial purposes such as cleaning (e.g. the iRobot Roomba or Electrolux vacuum cleaners), entertainment (e.g. Pleo, AIBO) for assisted therapy or social interaction (Paro, iCat and ifBot). These factors have fostered the idea of using robot technology in elder care in order to reduce the workload of assisting personnel and secure life quality and self sustainability. Although the use of robots in elder care was a very controversial topic in Denmark only three years ago, a number of national funded projects have been launched in order to evaluate different commercial robots in this sector. The projects are typically not organized as scientific experiments, but often as semi-structered subjective evaluation. Nevertheless they do reveal some relevant information which can be used in HRI research. This paper briefly outlines the structure of the Danish elder care system, analyzes the implementation and results of different projects and concludes what can be learned from these.

II. The Danish Care system

In Denmark (as for all Nordic countries), health care and elder care is mainly a public responsibility funded by taxes and levies. The health care sector is organized in 5 regions which primary responsibilities are the hospitals, while the 98 municipalities have the responsibility of elder care and handicap assistance. As in other countries, the demographic development in Denmark will cause an increased burden for the public sector due to a decrease in tax income, increased expenses in service costs, but also recruitment problems as more than 38% of the employees in the elder care sector are more than 50 years old and are expected to retire within the next 10-15 years [7]. Currently 106.000 people are employed in elder care in Denmark, and it is predicted that 7.000 more people are needed in 2015 and 12.000 people are needed in 2020 [6]. This forces the municipalities to look for alternative solutions and as a consequence, a number projects have been initiated to evaluate the advantages and disadvantages of the practical use of robots in nursing homes.

III. Projects

In the project 'Robot Technology In Elder Care' the purpose was to evaluate robot technology for cleaning and nursing tasks in a nursing home. The target was primarily staff (39 people) and residents (37 people) although relatives were also involved. Evaluation was done using qualitative interview in 10 consecutive meetings and the project was finalized in a small seminar. The project was concluded in December 2008 and results were summarized using subjective statements and disseminated in an evaluation report recently published [5]. An interesting result from this project was that the robot vacuum cleaners seemed to add an entertainment value - the elderly simply liked to watch them move around and also liked to give them names. Another unexpected result was that the level of noise caused by the equipment seemed to be very important, even though the same residents claimed they had severe hearing loss.

The Danish Paro Project examines the practical utility of Paro within the range of elderly and persons with brain damages in Northern Europe. Currently more than 65 Paro seals are distributed on 20 municipalities in Denmark as a part of the project. The project focuses on the therapeutic effect of the seal robot and the goal is to document impact to project participants, public bodies and other stakeholders. In the Paro project, it is the institutions, entities and project participants subscribed in the project that decide and run the implementation, testing, experimentation and professional development of the use of the seal robot. The project participants keep different types of self-selected records, run evaluations and measurements which they consider relevant

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and appropriate. In this way, the Paro project collects practical experience from a number of users, based on techniques used in dementia therapy and elder care [4]. Results have so far been disseminated through newsletters and media but no evaluation report has been published yet.

Rasmussen [9] describes the results of a pilot study where four municipalities evaluated four different robot vacuum cleaners in 9 different nursing homes. The evaluation was based on questionnaires measuring user satisfaction and attitude towards the robots among employees and residents and laboratory tests measuring noise and efficiency. The results of the pilot study was used to develop a performance specification for robot developers. In 2008, the municipality of Odense evaluated three types of robot vacuum cleaners in two nursing homes and the goal was to measure improvement of care quality and reduced use of resources. The analysis was based on qualitative interview of cleaning staff, and concludes that the robots 'have been a very effective help in the nursing homes' [8]. A cost/benefit analysis of the benefit of using robot vacuum cleaners in the public sector has been presented in [2] based on the evaluation results of 6 municipalities. This rapport estimates that approximate 1000 cleaning jobs could be saved in the public sector using current technology. The Be Safe-project (2006-2008) evaluated different types of technological equipment including 12 Paro seals in one nursing homes [3]. The evaluation was based on qualitative interview of people with dementia, questionnaires and focus group interview of nursing staff and analysis of patient journals. Around 137 senior citizen, 47 relatives and 130 members of nursing staff was involved in the evaluation. A comprehensive report was recently published, recommending to keep using Paro as a tool in dementia therapy.

IV. Project characteristics

Between 2006-2008, there was little coordination between different projects in Denmark. Effort was not organized and knowledge was not disseminated between municipalities. As a consequence, many municipalities have done similar or overlapping evaluation projects. From 2007, several organizations (CareNet, SundhedsNet) have been established to try to mitigate this. Some characteristic of the projects are outlined below:

- Scope. The initial goal of many projects is to investigate robot technology as such, but since the list of commercial available robot products is still limited, many projects have focused on evaluating different robot vacuum cleaners and/or the Paro seal. Sometimes a very broad definition of the term robot is used, including products with mechanical and/or computational systems. Sometimes the term 'welfare technology' and 'robot technology' is used interchangeably.
- Evaluation - Evaluation is often based on qualitative interviews, subjective observations and questionnaires while empirical, structured experiments are not frequently used. Often projects do not only involve the residents but also relatives and employees in the nursing home and at different administrative levels in the municipality.
- Dissemination and documentation. Often the documentation consists in an evaluation report and/or newspaper articles mostly in Danish. Due to political considerations, sometimes the evaluation reports are not public available or get published with delay.

V. Discussion and conclusion

The mentioned projects are very practical oriented, and basically have the goal to evaluate whether specific products are usable in elder care or not. Evaluation reports are often based on high-level subjective statements which can be difficult to use directly in HRI research. Another basic problem is that most reports are in Danish only. Nevertheless, the overall contribution from these projects is that very little resistance towards robot technology in elder care has been reported. Although the general attitude towards introducing robot technology in nursing homes is positive, nursing staff have high requirements and products which are considered unstable or complicated to use are not tolerated. As a consequence, most evaluation reports are positive but vague about concluding clear benefits from using robot technology. Another contribution is that projects sometimes leads to research questions, e.g. the relation between the entertaining, social and practical effect of using e.g. robot vacuum cleaners or how equipment noise (being visual or auditive) affect personal and elderly. Additionally it is an open question whether the positive results from these projects are caused by the novelty effect of introducing robots and if longterm use will give the same results.

References

[1] Alzheimer's Disease International. The prevalence of dementia worldwide. The International Federation of Alzheimers Disease and Related Disorders Societies, Inc., 2008.

[2] K. N. Andersen and R. Medaglia. Robotstoevsugning i den offentlige sektor: Effekter og udfordringer. CAICT COMMUNICATIONS 2009/3, 2009.

[3] L. Gaedt. Vaer tryg projektet - teknologiske hjaelpemidler og hjaelpesystemer til borgere med demens. The municipality of Copenhagen, 2009.

[4] L. Gaedt and K. Khaled. Effects of and perspectives on the use of seal robot Paro, Danish Technological Institute, 2008.

[5] C. Lotz and S. Tranberg. Robotteknologi i aeldreplejen. Danish Technological Institute, 2008.

[6] R. Management. Omsorgsteknologi kan give mere tid til pleje i aeldresektoren. IDA and Ramboll Management, 2008.

[7] R. Management. Rekruttering og fastholdelse af medarbejdere i aeldresektoren. Ramboll Management, 2008.

[8] O. K. A. Odense Kommune, Aeldre-og Handicapforvaltningen. Robotstoevsugere - rapport om velfaerdsteknologi i anvendelse. The municipality of Odense, 2009.

[9] M. Rasmussen and Y. Jasemian. Pilotprojekt undersoegelse af robotstoevsugere til brug i ldreplejen. Aarhus School of Engineering, the municipality of Aarhus, Hoje Taastrup, Naestved and Horsens, 2009.

[10] H. Zlotnik, editor. World Population Prospects - The 2004 Revision, Highlights. United Nations, Population Division/DESA at www.unpopulation.org., 2005.