The Living Lab in Schwechat
for Involving Older Persons in the Innovation Process of Assisted Living Technologies

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1 ABSTRACT

ICT and Assistive Technology can significantly assist older persons to be more mobile and to live more independently and safely. Additionally, innovative technical aids and services are able to empower elderly persons to stay in their own home as long as possible. During the innovation process the involvement of future users is of crucial importance. This paper presents selected examples of successful user involvement in recently completed and still running Research and Technological Development (RTD) projects carried out at Vienna University of Technology and at the research institute Ceit Raltec. The paper outlines the emerging Living Lab methodology which is deployed by CEIT in the city of Schwechat, initially in the centre for senior citizens. Based on this approach first successful RTD projects in close cooperation with elderly persons and care persons are carried out successfully.

2 INTRODUCTION

When developing Assistive Technology (AT) products and services the deep and early involvement of users is of highest importance to ensure that the intended future products will be able to meet the actual needs of the users in their daily life. The importance of user involvement in AT projects was recognised and described by numerous authors (Buehler, 2000), (Bühler; Christian, 2001), (Hypponen, 1999), (Poulson et al., 1996), (Jönsson et al., 2004), (Jönsson, 2006). Nevertheless, there is a need to further improving the concept and the daily practise of implementation of user involvement and user participation. A report of the Joint Research Centre in Brussels states with regard to user needs in ICT research for independent living (Gerald Comyn et al., 2006, on p. 17): *„In short, the central role that user needs and priorities ought to play all along the innovation chain from research and development to implementation is well established, but actual implementation lags behind. User needs are ill-understood, existing mechanisms for their articulation and integration into the technology development process are insufficiently mapped, and new strategies for more user involvement have barely been elaborated.*“ (Comyn et al., 2006),p.17.

3 EXAMPLES OF USER CENTRED INNOVATION PROJECTS FOR ASSISTED LIVING

Ambient Assisted Living (AAL) is a new approach to support elderly citizens. AAL is partly based on existing work in AT but extends the area with a larger vision (Edelmayer et al., 2006), (Kryspin-Exner & Oppenauer, 2006). "*AAL aims to prolongate the time people can live in a decent way in their own home by increasing their autonomy and self-confidence, the discharge of monotonously every day activities, to monitor and care for the elderly or ill person, to enhance the security and to save resources*." ((Steg et al., 2006), p.28).

3.1 MOVEMENT - A new Approach to Support Mobility

As mobility is a challenging key factor for personal independence and self determination and because it is inseparably linked to our quality of life, MOVEMENT stands for the transfer from the existing state of the art to a user oriented, modular as well as market compatible system approach to enhance societal mobility.

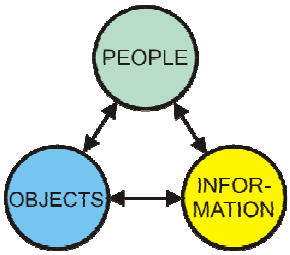

Fig. 1: Mobility in the information society: The MOVEMENT Interaction Triangle

Mobility can be described in three dimensions:

- MOVEMENT of PEOPLE: Transfer of persons to locations they want to access.
- MOVEMENT of OBJECTS: Transferring objects to facilitate an interaction with the person.
- MOVEMENT of INFORMATION: Access to and transport of information in the "Information Society".

The MOVEMENT (Modular Versatile Mobility Enhancement Technology) project (2004-2007, FP6) addressed all three dimensions of mobility by research into and development of realistic and practical modules for moving people, objects and information ((Kronreif et al., 2007)). Present state-of-the-art solutions such as conventional wheelchairs and stationary terminals or fixtures can be replaced by an expandable system of intelligent and interacting modules, which supports the personal mobility of old and disabled people.

Fig. 2: The MOVEMENT modular prototype consists of a semi-autonomous robotic platform able to dock to various application modules like chairs, tables, ICT terminals and thus can provide mobility of persons, objects and information (left: robotic mobility platform moving a chair, middle: platform fetching a table with ICT terminal, right: touch screen and joystick for assisted driving mode.

3.2 User Involvement to Develop a More User Friendly Rest Room

Between 2002 and 2005 a partly EU funded consortium (2002-2005, FP5) has realised more than 200 test runs in laboratory environment and a 2 months real life test in a day care centre (Egger de Campo et al., 2006), (Dayé et al., 2006) in order to develop and evaluate new methods and tools to enhance the autonomy and safety of primary and secondary users in the rest room. Various research, design, development and evaluation activities were carried out following a strongly user centred approach.

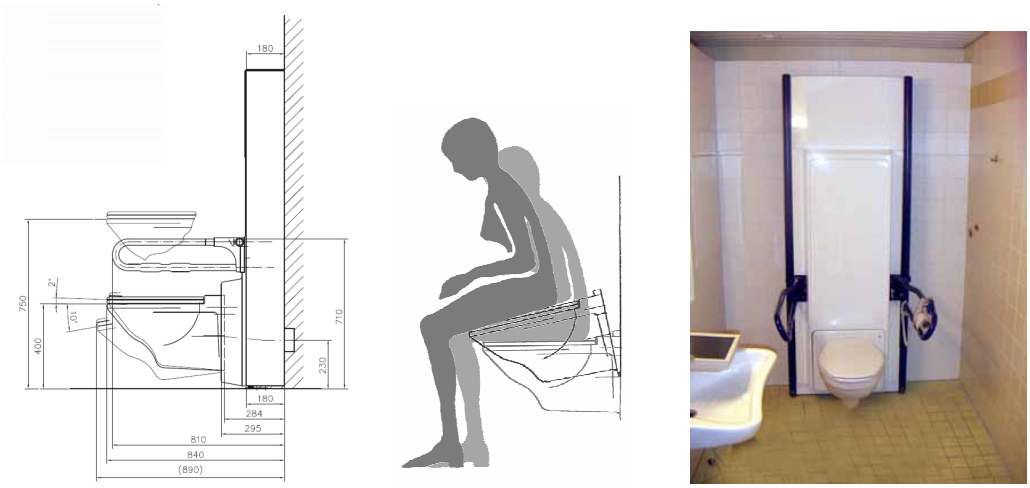

Fig. 3: Technical drawing (left) and principle (middle) of a height and tilt adjustable toilet system, right: a rest room at a day care centre for Multiple Sclerosis patients equipped with an adjustable toilet system evaluated in daily life

The rest room prototype system consists of the following main parts:

- Toilet seat, the toilet bowl and grab bars that can be adjusted in height and tilt. This is controlled by the control unit and/or manually according to the users' individual preferences.

- Sensors for measuring positions, to recognise falls, to estimate intention of the user (e.g. his / her intention to stand up - in this case the toilet can assist by moving into a higher position).
- Voice control: e.g. acting as "third" hand of carer. This is of particular usefulness when all hands are busy (e.g. during manual transfer process).
- Voice output: This feature enables the toilet to inform the user about current status of system, about activities which will just start or which have been completed recently.
- Smart cards based on RFID (Radio Frequency Identification) technology for saving and recalling personal preferences – e.g. the toilet is able to move into the preferred position automatically while the persons is entering the toilet room. The user does not need to manipulate the smart card; he / she just need to have it in the purse or pocket.

4 THE LIVING LAB IN SCHWECHAT - INITIAL PROJECTS INVOLVING SENIOR CITIZENS

"Living Lab" stands for an emerging research methodology which includes "sensing, validating and refining complex solutions in multiple and evolving real life contexts" (Schumacher & Feurstein, 2007). One very important aspect to be considered is that "the real challenge may lie in involving users in a sociological sense, that is to say, by taking into account the micro-context of their everyday lives" (N.N., 2004) cited in (Niitamo et al., 2006), (Eriksson et al., 2006).

The Austrian city of Schwechat has about 16,000 inhabitants, thereof about 2,000 above the age of 70. Schwechat is running a so-called eSchwechat.at programme (2005-2009) to create new ICT business opportunities (Paugger, 2007a), (Schrenk & Paugger, 2007). In 2006, the Central European Institute of Technology (CEIT) was founded with currently two departments: CEIT RALTEC carries out research in the area of eHealthcare and eHomecare, rehabilitation and Assisted Living Technologies and CEIT ALANOVA develops modern planning technologies for towns and regions linked with Information Society Technologies while emphasizing sustainability and protection of the environment.

The eSchwechat initiative considers the whole town of Schwechat as a "living laboratory", where new ICT devices and services can be tried out under real life conditions in an ethical sound way (Paugger, 2007b). One part of the living lab is focusing on the area of Assistive Technology (AT) and Ambient Assisted Living (AAL) (Panek et al., 2007), (Panek & Zagler Wolfgang L., 2008). Initially, main emphasis was given to the establishing of working cooperation between first main partners: senior citizens, local centre for senior citizens, research institute Ceit Raltec, city authorities, and companies.

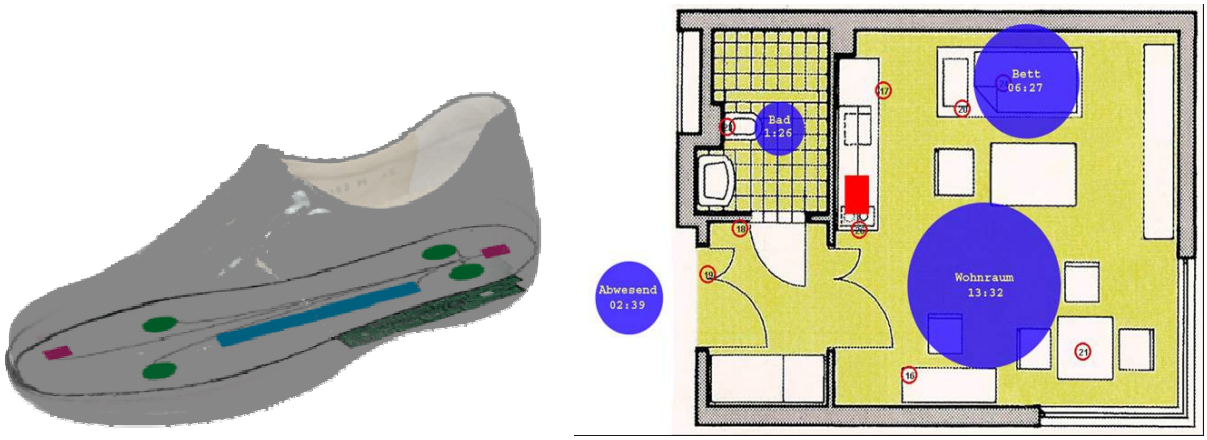

Fig. 4: Research projects in the Living Lab Schwechat: eShoe (left) a wearable embedded system for fall prevention and recognition, eHome (right) a wireless sensor network for assisted living of older persons including support in case of an emergency.

Three RTD projects currently are being carried out:

- user-centred development of a minimally intrusive wireless monitoring and guidance system based on distributed sensor modules connected via the ZigBee protocol (Diermaier et al., 2007);
- development of an instrumented shoe sole equipped with sensors in order to recognise and prevent falls of old persons (Jagos & Oberzaucher, 2007) and
- development of an interactive touch screen based phone system for older persons.

All 3 research and technological development projects are still ongoing work. Several workshops in the living lab, two real life evaluations in the flat of two senior citizens and several focus groups have been organised. In parallel, the working cooperation between RTD partners, senior citizens and the centre for senior citizens and the advisory board of senior citizens has been extended and consolidated.

Information could be gained which most likely would not be available without the living lab based user involvement approach. The feedback from the senior citizens and care persons is very positive. It obviously is not only the research itself but also the general possibility to be involved in a future oriented endeavour which makes the own participation attractive for many senior citizens.

Fig. 5: Research Activity in the Living Lab: participative development and evaluation of a touch screen based intuitive telephone system for and together with senior citizens.

Main principles used in the living lab are among others: meeting the users and carers in their daily living situation, having regular monthly meetings with the user representatives, considering the many stakeholders (not only primary and secondary users but also financing institutions, e.g. the city administration). Involving elderly users as early as possible, preferable already during brainstorming phase when new project ideas are generated and discussed.

RALTEC applies a multidisciplinary approach to ensure that the innovation process results in new and useful prototypes. For the development of successful systems a mixture of technological and non-technological know-how is required. The technology should never replace personal contact but should augment and support the social contacts of elderly persons and their professional and family carers. Technology must ensure an appropriate level of privacy and it should be user centered.

Another main aspect is the importance of ethics (Rauhala & Topo, 2003) in the Living Lab. Informed consent procedure and information kits were taken over from previous projects (Egger de Campo et al., 2006), (Rauhala et al., 2005), (Rauhala & Topo, 2003), (Rauhala, 2007).

5 CONCLUSION

The Living Lab approach in Schwechat shows new ways of implementing solid involvement and participation of users during the innovation process. Looking back to the initial phase of the Living Lab in Schwechat the chosen approach turned out to be of high value. The deep involvement of elderly users and carers is bringing significant additional information. Especially in the mid-term and long-term perspective this is very promising. In the emerging area of Ambient Assisted Living (AAL) technologies the approach allows to cooperatively discuss and develop solutions in the crucial areas of ethics, data protection and balancing users' wishes for privacy with their wishes to benefit from new technical aids making their life at home safer and more comfortable even in the old age (Zagler et al., 2007). Based on the positive preliminary findings in the AAL Living Lab in Schwechat the current activities are extended from the centre for senior citizens also to mobile service providers in the municipality. As part of the Living Lab activities new approaches for distributing the knowledge about and training on assisted living technologies and products are set up. Additionally, the living lab in Schwechat has become member of the European Network of Living Labs (ENoLL).

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