Electronic Environments – Support or Burden for the Elderly?

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***Abstract*—The aim of this paper is to present the results of a qualitative study on the comparative assessment of intelligent technologies by elderly persons and their care givers. For trails in home care settings electronic user terminals were applied, allowing to explicate the different functions of the overall system. In short, it appeared that elderly users may take advantages of electronic environments, in spite of skepticism by their care givers.**

I. Introduction

FOR the majority of elderly persons, better housing conditions mean ageing in place, with appropriate changes of living environments supporting independence and enhancement of quality of life. Changes of the living environment are frequently connected with the integration of technical aids. Consequently, intelligent technologies for assisted living are discussed as promising (electronic) environments for the elderly. To what extent and in which context referring technical systems will be in the position to care for human beings and to provide expected results, is still a matter of investigation [1]. Preparatory works have been started in various laboratories but only a few of them deal with this matter in "real environments", i. e. in living arrangements occupied by elderly persons.

The Austrian Research Centers (ARC) have started a pilot project in assisted living environments, applying a sensor network for activity monitoring as well as intelligent care environments. Results from these projects are providing a basis for planning and design of user-specific assistive technologies, considering given environments and requirements of the regarding elderly persons. Dealing with this situation, ARC have been actively involved in a series of projects in the field of Ambient Assisted Living (AAL), in a national as well as in a European context [2]. Two recent projects deal with the acquisition and analysis of user needs and derived system requirements as applied in selected homecare environments. One of these projects put the focus on designing and testing of a stationary user interface (see Fig. 1 "electronic user terminal") for elderly persons, which is to be applicable for various purposes, like communication, alerting, structuring of the day, information etc. [3]

II. Electronic user terminal for Elderly Persons

A. Methods

In the framework of a qualitative study, prospective users were confronted with a prototype of the terminal and other electronic devices, displaying the different functionalities as well as cognitive training software. During and after their active contact with these tools, users were invited to a dialog on their experiences, based on a semi-structured concept of questions. The same experiment, including extended conversation, was carried out together with caregivers and relatives of potential users.

B. User terminal

The user terminal has been designed as a ´virtual partner´, to allow compensation for specific disabilities as well as to increase safety and facilitate independent living. The terminal is intended to serve as the central interface for communication on the one hand and for operation and maintenance of a sensor network on the other hand. For the purpose of user tests at original environments, sensor signals were simulated at the terminal, displaying the major functions of the system (as examples for display options see Fig. 2 to 4). From the main screen the end-user may enter into the diverse functions of the system.

Fig. 1. Prototype of the electronic user terminal, displaying a day planner

This terminal is operated by means of a graphical interface, via touch screen and hands-free speaking system respectively, allowing especially older adults to communicate with the outside world simply and safely. The alerting system has been configured to work in a ´tacit mode´, since no direct user interaction should be required to release alarms, though users may initiate messages intentionally. Summarizing, the following main functions are supported by the system:

a) Information of the user in case of alert situations, ranging from possible in-house security problems to the indication of alarm levels due to health problems

b) Self-contained alarm messages and / or status / history reports to several, predefined addressees

c) Automated connection of the user to prestored telephone numbers (relatives, friends, caregiver etc.)

d) Information on demand (e.g. saved names, photos)

e) Reminding the user, e.g. to take in certain drugs or to observe certain dates (visit of general practitioner, etc.)

C. *Examples for Graphical User Interfaces*

Along with the progress of the project, different layouts of user interfaces have been proven, serving for the analysis of the acceptability of single solutions.

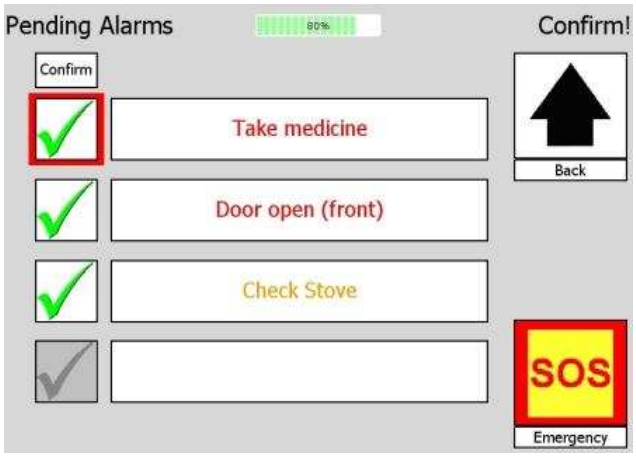

Fig. 2: Variant A of the user terminal's main menu, showing alarm status

Fig. 3: Variant B: user terminal's main menu, showing diverse functions

Fig. 4: Menu for the selection of telephone partners or for dialling numbers

A main requirement to the system was the monitoring of in-house environments of persons, living alone. In order to comply with this demand, the architecture of the solution is based on a network of different types of sensors, which are placed at specific places in the referring rooms / locations. The following sensor units are utilised for monitoring and alerting purposes:

Passive IR-sensors
Overheat / temperature sensors
Contact sensors
Fume sensors
Sensor for humidity detection
Light barriers

D. *User involvement*

Taking into consideration real user needs, elderly people have been involved already from the beginning of the design process. They were interviewed at their homes in order to learn which requirements are essential for the acceptance of new technical solutions, e.g. in which way user interfaces should be adjusted to user needs. The findings of this study were introduced in the design process, resulting in different prototypes of the user-interface (see Fig. 2 – 4); observing the following rules:

The user must be able to operate and to communicate via the system without using a keyboard/or a mouse,

It is helpful for the user to get some graphical and acoustic feedback for every interaction,

Specific sounds added to all important messages,

Pop-up windows should never disappear self-contained,

The minimum size of buttons is to be 15x15mm,

The program is to provide high color contrast.

For people with motor or visual impairments: As soon as a button is touched, its meaning must be explained acoustically.

III. QUALITATIVE STUDY

The main purpose of this study was to evaluate the prototype of the user interface with a number of pilot users in order to get authentic information on usability aspects of the presented technical solutions. Foremost, barriers of participation and research methodologies were discussed in order to achieve specific knowledge of how to overcome these problems.

In most research and development projects in the field of rehabilitation technology user involvement is in some way supported. Users are involved, but these ´anticipated users´ are frequently professionals like engineers, therapists etc. The real end users such as people with disabilities and older people with their special needs are often not included appropriately.

The main aim of the qualitative study was to get specific information on requirements and how elderly people with need of care are able and willing to use technical aids in order to enhance their personal safety and autonomy. Another purpose of the study was to get individual feedback from potential users regarding the usability of the overall technical solution. By means of video- and/or audio recording first steps of the learning process - how to deal with a new technology – could be studied in detail, providing valuable findings for the adjustment of the technical solution as well as for the design process.

All of the elderly people, aged between 75 and 84 years, were living in small villages and occupied a house at this

time. Most of them lived only in parts of the houses or shared them with relatives. They were in need of daily help for shopping, cleaning etc because of their old age afflictions, which are mostly of a physical nature. The caregivers were employees of an Austrian homecare association and looked after an average of 10 elderly people. All of them had training in care giving and were experience in their job.

Several strategies were applied to enhance the validity of findings, including independent coding of the data by the authors, comparing data between the selected thematic groups and reflecting findings back to participants for verification.

As preliminary findings, a thematic structure was developed, allowing the comparison of cases / participant groups and to analyse the distribution of perceptions regarding the implementation of electronic services for the elderly. The following main themes emerged from the data as representatives for the analysis of the implementation process regarding novel electronic devices in elderly peoples´ households:

Influence of the social / family setting
Physical / mental disabilities
Experience with emergency situations
Attitude to new technologies
Ethical Aspects / Need of help
Personal reviews of the prototype

One result of this comparative analysis, which coincides with findings in a preceding study shows that caregivers or relatives frequently hesitate to support the introduction of new electronic devices for their elderly patients / mothers or fathers. Regarding caregivers, in some cases there is a latent fear of loosing portions of their income, mainly due to the anticipation of reduced personal visits in private homes of elderly people. Family carers on the other hand tend to see “modern” techno-logies as potentially obtrusive and not comprehensible for the older generation, especially for their mothers or fathers. By contrast, the elderly people were often willing to test prototypes to appraise it in use. Another finding of the interviews is that elderly people are more willing to use new devices when other elderly people tell them about their (positive) experiences.

IV. Results and Discussion

The findings of this study shed some light on the “hidden” factors that influence how caregivers and family carers / relatives will make decisions when implementing new electronic devices for older people. Results should be treated with some caution as they are based on a small-scale exploratory study. A larger, well designed follow-up study to build on the findings reported in this paper may have implications on the social policy in terms of improving older people’s compliance with supportive electronic devices within proactively created environments. [4]

In the field of technology for older people TVs are commonly the newest electronic medium they use; only a few elderly people are able to work with a computer. As focus groups as well as the study have shown, elderly people generally have a caution with new technologies, as long as they are not supported in a ´age-adjusted´ way but when others of the same age tell them about own, positive experiences their anxiety may decrease. They need time to get to know a new technology and to see how it works; then elderly may be utilizing these aids too. Furthermore face-to-face communication with others is essential for elderly people; this is also true for social contacts with their care givers. That can be one reason for some scepticism to new technologies such as electronic mailing or other aids which might partially replace their vis-à-vis.

In this paper the authors were aiming to demonstrate the importance of broad user involvement in research and development projects, especially in the field of assistive devices. This qualitative study shows that elderly people should be involved in the design and development process already from the very beginning, because it is crucial to the acceptance of new technical solutions. However, it can be derived from the mentioned findings that it is necessary for pilot users to start utilising devices such as user terminals in a ´supervised setting´, allowing to obtain primary information on potentially required adaptations. In this way, participants can experience the practical use of devices, loosing potential dreads of it.

In short, one of the rather surprising results of the trials was that a number of elderly users tended towards a more positive attitude to electronic environments as their caregivers, differentiating between family and professional carers. For the latter group, questions of supervision, fear of failure and suspected financial losses came out as influencing factors for their valuation. This result is supporting the hypothesis that specialised (technological) training and education of caregivers is a major requirement for the successful implementation and acceptance of new technologies in elderly care. In this way, electronic environments might become rather supportive than burdensome for the elderly.

References

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