Ambient Assisted Living Systems - The Conflicts between Technology, Acceptance, Ethics and Privacy

Wolfgang L. Zagler[1], Paul Panek[2], Marjo Rauhala[1]

[1]Vienna University of Technology
Institute "integrated study"
Favoritenstrasse 11/029, A-1040 Vienna, Austria
zw@fortec.tuwien.ac.at
[2]CEIT-Central European Institute of Technology
RALTEC-Institute of Rehabilitation and Assisted Living Technology
Am Concorde Park 2, A-2320 Schwechat, Austria
p.panek@ceit.at

Abstract. Installing and using AAL Smart Home-systems in the homes of older people not only offers a tremendous potential for increasing safety and quality of life but may also evoke reluctance and anxiety. Will such a system become a "Big Brother" watching the steps and the behaviour of the inhabitants and betray them to their outside world? In several field-trials of an AAL Smart Home-system with inhabitants of senior residences we were able to learn about the issues concerning acceptance, ethics and privacy when senior citizens and their care persons are confronted with this kind of technology for the first time.

Keywords: AAL, Ambient Assisted Living, Smart Homes, field trials, acceptance, ethics, privacy protection, data protection.

1 Help me – but stay away!

Late in summer 2007 we set out to draw-up the concept for two prototype AAL-oriented apartments for senior citizens for the administration of a town in Austria. First of all we informed about all the possibilities the AAL-approach and modern technology could offer. We talked about Smart-Home technology, about sensors and actuators, we described the possibilities and benefits of context awareness, of ambient intelligence and behavioural monitoring. We also informed about fall detection, the possibility of automatic reaction to obvious cases of emergency and how even social contacts could be improved by intelligent communication systems.

After this presentation of the technological possibilities a group of experts in the field of sociology, care and ethics took a fortnight for internal discussion and evaluation and then came back to us with their findings.

What they finally wanted us to realize for them was, as they called it, a home with can act as a *"guardian angel"*. There shall be optimum protection of the inhabitants against as many risks as possible like setting the kitchen on fire by forgetting the pan

Dagstuhl Seminar Proceedings 07462
Assisted Living Systems - Models, Architectures and Engineering Approaches
http://drops.dagstuhl.de/opus/volltexte/2008/1454

on the stove or flooding the bathroom by forgetting to close the tap. They wanted an automatic alarming if a fall occurs or if any other medical condition becomes serious.

There was only one thing they did not want at all: Sensors and any kind of surveillance of the inhabitants.

The home should be able to do a lot of good things, but it must not be allowed to collect any data. We should give maximum support and safety but respect privacy in a way that will not allow the use of sensors.

Sure, it soon became clear that this could not be done, but this first (maybe uncritical) reaction tells a lot about the fears and the scepticism when it comes to using new technology in the private environment in general and in home monitoring in particular.

This seems to be symptomatic: The benefits of technology are recognized for a short moment, but a few minutes later the subconscious anxiety to invite a "Big Brother" takes over. The technology could soon become a demon which knows too much about me, which makes me a slave of the system. It will start to decide for me. It will show me my deficits. It will soon betray me and give me away to the doctors, the psychiatrist, the insurance or the heirs who can make their plans according to my mental condition detected by the spy-ware in my home.

W. Kearns and L. Normie in Gerontechnology vol.6, no.3 write: "The reluctance of older adults and policymakers to adopt technological change may be described by the ancient proverb: 'Better a known devil than an unknown god.' New technologies may promise great savings to policymakers, but in lean economic times their unproven status is seen as an unacceptable risk. Likewise, older adults may view the technological option as 'gilding the lily', replacing a perfectly good and well-known alternative (for instance a lever switch) with an unnecessarily complicated one (for instance, a menu), which offers slight or no advantage."

2 Prerequisites for privacy protection and acceptance

2.1 Use non-invasive sensors

One of the first questions always seems to be: "Are there any hidden cameras, are there microphones, is there a bug in my home?"

The SmartHouse Code of Practise issued in the CENELEC Workshop Agreement CWA 50487 (November 2005) holds a chapter on "Privacy protection" which reads:

"An important implication of the definition of privacy as an interest is that it has to be balanced against many other, often competing, interests. At the level of an individual, it may be necessary to sacrifice some privacy, in order to satisfy another interest. The privacy interest of one person may conflict with that of another person, or groups of

people, an organisation, or society as a whole. It is impossible to ensure total privacy whilst at the same time monitoring the safety of vulnerable individuals. Hence: Privacy Protection is a process of finding appropriate balances between privacy and multiple competing interests.

Privacy must on occasions be compromised in order to sustain other important interests such as law and order, and reasonably fair distribution of social benefits and costs. For psychological, social and political reasons, however, it is essential that privacy be highly valued and not subjugated to other social considerations, or to the demands of economic efficiency."

For this reason, in all our trials we were very careful in selecting our sensors to be used in monitoring. Any type of camera and image capturing device and all kinds of microphones able to eavesdrop on the inhabitant were banished from the beginning. We, therefore, opted for simple switches on doors and other appliances, sensors for illumination levels and temperature and finally accelerometers for detecting vibrations. The later type of sensor proved to be very useful not only for the detection of falls (or any other severe impact on the floor) but also to monitor steps and other activities like preparing a meal or turning around in bed.

2.2 Offer sustainability

In most cases the environment where an AAL Smart Home solution is to be installed is an already existing home. Only in few cases there is a chance to plan for such a system *before* the apartment will be designed and built. Thus, it will be mandatory to rely on technologies which will not require putting new wires into the walls or make other complex and costly modifications.

Modular solutions running with low power wireless technologies which can be operated by batteries or even without batteries by using energy harvesting strategies (micro-generators, photovoltaic cells, thermo-generators etc.) should be the first choice.

It should also be considered that the demands and such the specifications for the system will change with time. Modularity on the one hand and the possibility of flexible configuration or automatic adaptation of the software will save costs and time when changes become necessary.

2.3 Keep the data at home

Every system built and programmed to monitor and learn the daily behaviour of the inhabitants in order to perform context analysis and to detect suspicious deviations from what can be considered to be normal will collect vast amounts of data. It is hard to tell what could happen if these data come into the wrong hands and are misused.

So the general rule will always have to be not to opt for processing such data in a central location to which they will have to be transferred for decision making. Even if this demand will possibly increase the equipment costs at the customer's premises, all

data collection and processing should be done on a local level. No raw data shall leave the home. Only when a critical situation is detected and only if the resulting alarm-flag is not cancelled in due time, information shall go to the outside for summoning appropriate help.

3 Lessons learned from our field-trials

3.1 Offer perfect transparency

Make it clear from the beginning what the system can do and what happens. Show the functionality in an understandable way. This means to use ways and language which can be easily understood by the end user and the persons concerned with care like family members and medical and nursing professionals – and also those who will have to pay for the system. For example explain the functions by scenarios, video demonstrations or even by using drama or stories.

In addition, take care that the technology to be installed not only is pervasive but also persuasive and self explaining. Make the benefits clear.

3.2 Make the user the master

Allow the disabling of the system or of single functions in a reasonable way and for an adequate time. Find the proper balance between guaranteeing safety and offering perfect privacy whenever requested.

Also find a good balance between unobtrusive and completely hidden technology. Of course, nobody will be happy with too much visible monitoring technology in his/her home. However, a completely hidden system, where the user cannot see anything of the components and their functioning could become eerie and threatening.

3.3 Fight laziness

Of course, an AAL Smart Home-system shall offer safety and comfort. However, it will have to be considered if by offering a perfect solution the users will not by and by leave all responsibility to the system and become more and more careless and inactive. Everyone but especially older people should be encouraged to keep their body and mind agile by performing all activities which they are able to by themselves – and not leaving them to others, be it a person or a machine.

The design of an AAL Smart Home-system should never promote idleness but instead encourage activities, social contacts and personal responsibility.