

Smart Home Technology; Technology supporting independent living - does it have an impact on health?

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Abstract

Smart home technology has proved to contribute to increased independence and safety. Two surveys has been conducted in Norway to collate experience on smart home technology as part of home care services. We found that the technology is installed in newly built residential flats, aiming at old residents in need of care. The findings inspired us to further investigate the implications of installing smart home technology in existing houses and flats.

The paper presents the findings from all three projects, and will discuss the technologies impact on health and some financial aspects.

Definition

Smart Home Technology is a collective term for information and communication-technology in homes, where the components are communicating through a local network. The technology may be used for monitoring, alarming and executing actions, according to the programmed criteria.

The local network communicates with the external world by telephone or through the Internet, sending messages or alarms to one or more recipients. These may be the resident of the house, his family, a private security-company or the community-team. This communication makes it possible to program the smart home from inside or outside the house.

In a smart home one may integrate:

- Safety (for example alarms)
- Environmental control systems (for example remote control or programmed control of doors, windows and lights)
- Communication (linked to the telephone or the Internet)
- Energy-control-systems (for example adjusting the heating at all hours)
- Entertainment (for example television, film and music)

None of these devices are new inventions; they have all been available for a long time. The smart aspect is the integrated communication between the devices, and the possibility to generate automatic actions. An automatic action often used is the generation of alarms when something abnormal occurs, or when a normal action fails to appear.

State of the art in Norway

Norway has 10 years of experience using smart home technology as part of home care services. It all started with the BESTA-project in 1994, a project focusing on the use of smart home technology for elderly people. As part of the project, smart home technology was installed in residential flats, aiming at residents with dementia.

We have, along with most of the European countries, a long history of building institutions for people in need of medical, practical or emotional care. The trend changed during the 1990's, supported by political incentives like grants and cheap loans to the local authorities. This plan of action led to a massive increase in the building of residential flats, thereby enabling people to stay in private homes, instead of having to move to an institution when their need for care increased.

There was some 20 000 flats built, but we have no exact register as to how many of them are installed with smart home technology. We do know that several local authorities made advantage of modern technology as part of the community services, when planning and building the new residential homes. In our study, we excluded institutions and focused only on homes.

Some flats are served by staff dedicated to the flats only, while others are served by the community-team serving all residents in the community. Often there is a combination of the two; due to the use of smart home technology; a set group of staff during daytime, and the community team to respond to alarms at night.

The flats are homes, not institutions. This is an important distinction, as laws and regulations controlling the economic and public goods depends on the type of ownership to your dwelling. In a flat, the resident pays the rent and is for example entitled to technical aids from the state. In an institution the clients pay for "bed and breakfast", and the owner of the institution supplies the necessary technical aids.

The ownership may make a big difference, not only to the resident and his family, but also to the staff, which I will return to later. In my opinion, it makes a difference to a persons self-esteem and dignity too, whether you have the role of a premise provider or a client or patient. I could even argue that it might have an influence upon health, providing we define health as wider than absence of illness.

In our survey we found the technology merely in the newly built residential flats. We searched for smart home technology installed in a single unit, in a separate flat or house, without succeeding. Young disabled persons are in general not attracted by the thought of moving to a residential flat when their need of assistance increases. In most cases they are settled in a home adapted to their needs.

This encouraged us to perform an installation in the flat of a disabled man, following the ordinary, formal procedures, applying for financial support for assistive technology, in order to test out the following topics:

1. Available and suitable technology for retrofitting
2. The cost and available financial support
3. The functionality of smart home technology versus environmental control systems

The project is documented in a film called "Smarthus". (The film is free, lasts 22 minutes and has English subtitles).

Experiences

The focus when applying smart home technology has been on safe and independent living for the residents. Safety is the biggest advantage of smart home technology. The resident, their family or their carers can feel safe due to the versatility of the alarm systems. There are a number of ways to operate the alarm system, having programmed it to the individuals needs. The alarm may be triggered by the user, like an ordinary call alarm. It may also be activated by the system, without the user being aware of it, so-called 'passive alarms'. The alarm may be activated when something irregular occurs, or when an normal action fails to happen.

The first and foremost impact on independent living is the principal opportunity to live in your own home, and not in an institution. "Independent living" requires a suitable home in accessible surroundings, access to appropriate personal assistance, technical aids, medical care, a secure financial position, transport, constructive leisure activities and family and friends providing support and enrichment. Smart home technology can contribute to increased safety and independence for the user.

A typical example of increased independence is the automation of several actions, for example by using a day-switch, a night-switch and a not-at-home-switch. These switches are programmed so that, at the touch of one switch, the house is set in the desired state. The automation may give increased independence to a person with reduced mobility, as he does not have to move around the whole house in order to turn off several appliances - lamps, computers, coffee-machines - check doors or activate alarms. For a person who tends to forget important tasks, like turning gadgets off or locking doors, the automation may serve as a memory jogger.

Impact on health

As far as we know, there is no systematic research on the use of smart home technology and the impact on health. To bring focus to the subject, I would like to quote what the users say: The disabled man who had smart home technology retrofitted:

"The technology has made my flat more modern. It is not full of technical aids, and still it has become more convenient to me. It does not make me feel disabled!"

"I sleep better at nights due to the automatic drawing of the curtains and the possibility to open the window."

"I have less pain in the neck and shoulders, because many of my routine activities, like turning off several lamps and open the balcony door has become automatic."

The staff has told us that the biggest profit is on the qualities of the services they produce.

"The alarm systems make me more relaxed when I am assisting a person. I know that if something irregular happens with another resident, I will receive a SMS (Short Message Sender) on the cellular phone."

"The smart home technology results in more quiet and peaceful surroundings, no bells, no checking in on the residents from time to time. This tranquillity makes the demented residents more calm, too. They can be quite agitated if the surroundings are noisy and busy."

Staff also reports on the difference of working in a persons home and in an institution. As the disabled or elderly person is entitled to assistive technology at home, it will also make the care and assistance more efficient and less physical demanding. Typical examples are electric beds, hoists and of course smart technology, whereby the resident is made more independent from the start.

The next of kin of the residents have reported that they feel confident because of the safety. They are often involved in decisions regarding the use of passive alarms.

Good health is good economy, so these two aspects are interlinked.

The economic aspects

The economic aspects has to a very little extend been investigated. There will be several ethical issues raised in such a study, and some will claim the theme to be controversial. The discussions of economy are closely connected to the quality of the services, and perhaps we are not mature or brave enough to discuss how technology may give economic advantages.

So far, smart home technology has been introduced as a support to safe and independent living, not as a compensation to the caring human hands.

To highlight the economic aspect, I will give you a few figures from Norway. The first residential home set up with smart home technology was built for 5 persons with dementia, in Tønsberg in 1995. They planned to staff the flats with 2 awake staff at night, based on the experience from other lodgings. On opening the place, they realised that 1 awake staff was sufficient, due to the smart home technology. The suppliers of the technologies estimates the cost of the technology per flat to € 2 000 when installed in several flats during building.

In Norway, the yearly cost of running a place in a nursing home is between € 60 000 and € 100 000 per person. A study carried out by R.O. (Resource Centre for readjustment within local councils) documents that the price of giving care in a nursing home is twice the price of assisting people in their own home. The study compared a nursing home (which is an institution) with a residential home (which is a home) with residents with equal score on an ADL-index. (activities of daily living)

The retrofitting of smart home technology we carried out, amounted to € 30 000. Some half of the sum, the resident was granted from the state, as disabled persons have a right to obtain assistive technology to increase their personal independence, free-of-charge. The National Insurance administration will finance the cheapest usable solution for the individual. We are not confident that the laws and regulations are fit to meet the new technologies so that disabled persons can make full benefit of for example smart home technology.

Smart home technology may support independent living out of institution, and it seems that this might be good economy for the society. The person who had the technology retrofitted, may continue to live in his own flat, it makes him more independent for a longer time, and he and his relatives feel confident. Should his need for smart functions change or increase, he already has the network installed, and can add more executing devices, or alter the programming of the installations.

With the rapid growth of elderly citizens it is unethical not to discuss how new technology may support the helping, caring human hands. By 2020 50% of the population in Europe will be 50+, and in Norway we do not have enough people to take care of the elderly in the way we do today. We have for example already seen how smart home technology may cause fewer general routine visits of the community-based team. Some persons may welcome having fewer visits, whilst others may find it isolating.

Conclusion

The use of modern technology is adding to a safe and comfortable living environment for everybody. For the disabled person, the benefits are even greater. Smart home technology has proved to contribute to increased independence and safety for lots of end-users, their families and carers. Smart home technology may be used to minimize disabling obstacles.

There are very few studies on the economic and the health aspects on using smart home technology as part of the community services. We have however, gained quite some experience from practical use of the technology. So far we have not come across experienced communities regretting the installations.

Smart home technology is becoming increasingly more common to ordinary consumers, and the owner of many new building projects are proud to announce it, if the flats are fitted with "new, intelligent technology". There is a responsibility resting on governmental bodies and

professionals to involve in the future planning of community care, to ensure that technology are used to assist the human helpers that always will be the basis in all care.

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