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SAFETY AT HOME FOR PEOPLE WITH COGNITIVE DISORDER. THE INSTALLATION PROCESS

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Abstract

Assistive technology is expected to facilitate life at home for people with various kinds of cognitive disorder. To study the applicability and adaptation of a number of aids for this group in their daily living at home a three-year project was launched in Sweden 2004. It consists of undertakings in three municipalities, each planned to comprise some twenty participants, sixty years of age and older, suffering either from dementia or from some other acquired brain injury. In the second phase of the project, now under way, the complexity of the installation process of assistive technology in ordinary homes has emerged as a crucial issue. If the project will be successful and able to offer a model for other similar undertakings in the future, efficient and reliable installation procedures will become indispensable. The very moment of installation is considered and concern is paid to the functionality of the equipment over a long period of time. Assistive technologies applied for the sake of security for this target group comprise, i.a., automatic or manual alarms, smart sensors, automatic switch off systems, reminders and illuminated night paths to the bathrooms. Typical examples are security systems like the "go-away" lock and the reminder-panel. People with some cognitive dysfunction, still living in their own homes, are prone to forget to switch off the stove, the iron or other equipment inducing a potential risk of fire. The paper describes the installation process of a reminder system and some important findings from the study.

Introduction

In the year 2004 a project was launched with focus on people with cognitive disorder living in their own homes. Assistive technology will be applied in order to offer these people a safer and a more supportive life to the benefit of themselves, their care givers and their relatives.

The project is initiated by the Swedish Ministry of Social Affairs and directed by the Swedish Handicap Institute (HI). The Smart Homes Group at the Architectural School, Royal Institute of Technology (KTH) has been engaged as the evaluator of the entire undertaking. One evaluation report has been published and the next one will be submitted in May 2006. The project is also monitored by the Smart Homes

Group in order to gain experiences from the installation process of assistive technology in a complex context and to relate them to people's ordinary homes.

Three site projects are linked together in a framework together with accompanying projects. The Swedish Handicap Institute is the co-ordinator of the whole undertaking, however with the local projects fully responsible for their realisations, respectively. The framework project is called *At home with IT*, which is to be interpreted as *to create the possibility for people with cognitive disabilities to stay longer at home while maintaining their independence*.

Cognitive disability relates in the project to acquired brain dysfunctions of people of 60 years of age and older. People suffering from dementia form a large group, but others, e.g. people hit by stroke are included. One of the demanding aspects is to create a safe and secure environment for these people staying in their ordinary homes.

The three site projects – in Stockholm, Tierp and Hudiksvall (the two latter small towns some hundred kilometres north of the Swedish capital of Stockholm) are implemented by different local administrations and with the municipalities' caring and housing organisations in charge.

The stated goals for the project is to collect evidence based knowledge about products, services and activities that can provide a more secure and easy way of life for older persons with acquired cognitive dysfunction, while still living in their ordinary homes. Another is to promote a more efficient co-operation between involved parties, i.e. the individual in need of care at home, the technology and service providers, and the housing companies.

1 BACKGROUND

A large and increasing group of citizens in need of care and rehabilitation form a current objective in many countries of the western hemisphere. More diseases can be treated, however, often to higher costs. Care and habitation are often interlinked and more interest is paid to the possibility to offer home care to older people living in their own homes (Cooper, et al, 1995). When compiling demographic world trends on ageing, it is revealed that similar trends prevail in many industrial countries, Fig 1.

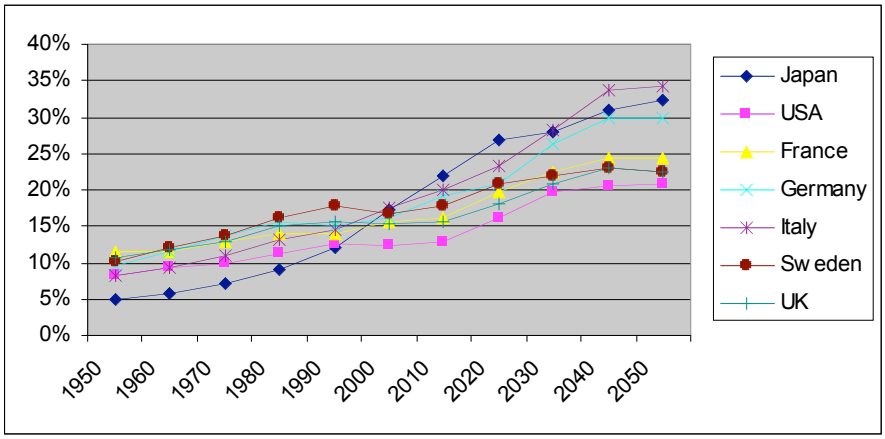

Figure 1. Population trends in different countries. Age 65 and over in percent of total population. After Prof. Kose, Japan

Presently the situation is reasonably manageable; however, from about year 2010 it will get more precarious.

Many large European projects have focused on independent living in one's own home (Lansley, 2001). A multitude of technical aids of different kinds has been developed, i.e. safety alarms and smart sensors (Hagen, et al, 2005), (Sixsmith, 2000), remotely monitored devices (Aldred, et al, 2005), reminders, and such items as the go-away-lock and the good-night-button. Much work is initiated from a medical perspective (McCreadie, et al, 2001).

2 ASSISTIVE TECHNOLOGY AND SERVICE DELIVERY

Not only technology and care matter; an equally important question is how well the dwellings are adapted to care, aided by this new technology (Tang, Venables, 2000). In addition, it is important to understand how the service delivery chain can be organised in order to meet the requirements satisfying quality criteria. It is a relatively spread opinion that IT has the potential to compensate the lack of resources of the caring professions without inferring a lower quality of the care itself. Albeit a number of interesting show cases have verified this hypothesis, on a general level it remains to be proven. The complexity of change has to be considered; there are many obstacles (Karlsson, 2000). A problem is to address and overcome that the organisations involved in IT care and telemedicine have to be profoundly committed; otherwise decisive steps forward will not materialise (Venkatesh, 2004).

The decision to install a specific assistive technology – corresponding to a specific service – in the home of a person in need of help in some respect must be supported

by a careful design in detail. A complete installation must include all actors involved in the service delivery, Fig 2.

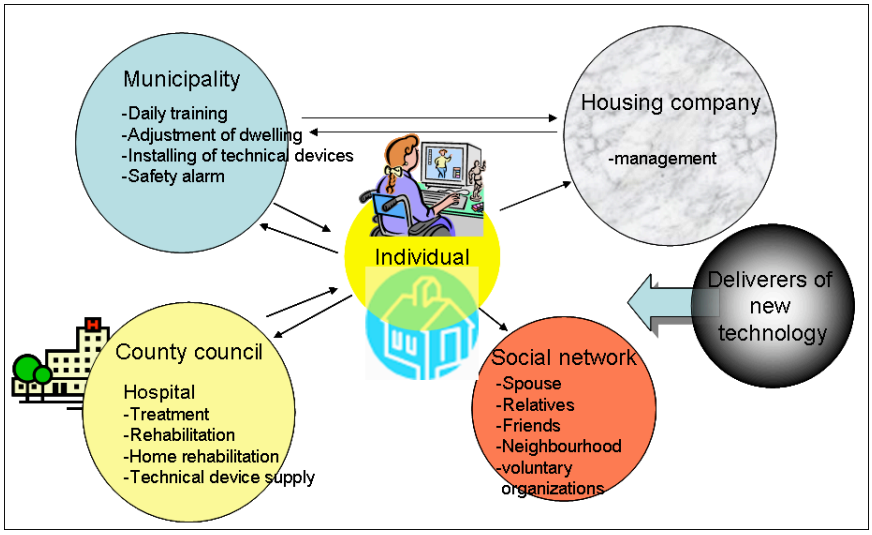

Figure 2. Several different actors are required for the service delivery chain, including the delivery of new technology.

The design, installation and use of the assistive technology in question must be carried out step-by-step. The design process is starting with a person's need and some sort of a prescription, i.e. a specification of requirements, and ending up with the demounting of the installed equipment. Between the start and the end, a considerable period-of-time can elapse and may involve many different actors. Many of these actors will not have the slightest acquaintance with the original considerations which motivated the acquisition of the equipment in the first place.

The system must be functional during the time of operation; this requires support and maintenance. From the beginning, it must be clear who is in charge for repair and maintenance of the technology. The use of the technology, i.e. fulfilling the intended service related to user, is equally important. Often, this is a task of the service organisation, and should be fulfilled accordingly. If the system is transferred to another home after some period of time, reconditioning has to take place before it is to be used again. New products appear on the market in an ever increasing pace, too. Thus, he product cycle has to be taken into account. These fundamental conditions have to be envisaged from the very beginning.

3 AN ILLUSTRATIVE EXAMPLE

To illustrate this many-facetted process a small part of it will be further discussed here applied to a special case. It concerns the installation and implementation part of a so-called reminder and its associated function and service. The main objective dealt

with in this paper is the importance of the installation process, in order to create a safe and secure situation when a person with cognitive dysfunction leaves home. This can be done in different ways, but two basic schemes can be observed. One is to switch off all inside hazardous-prone devices when the front door is locked from the outside. Another idea is just to remind the person in the act of leaving his or her home about the status of different checkpoints, e.g. the stove, another outer door, the outlet to the iron or to a coffee machine. The latter equipment is a reminder while the former is ago-away lock.
They both have their shortcomings and must therefore be offered or prescribed according to individual medical conditions.

The reminder requires the individual to react appropriately to the information signalled by the reminder. Other systems act more direct on such information.

4 PROBLEMS TO BE ADDRESSED RELATED TO THE INSTALLATION PROCESS

This study tries to expose how the installation process, as being one aspect of a much broader context. It is related to a house owner's facility management, and to the over all objectives. It also tries to point out what kind of problems the installation could be expected to relate to. The installation is only one of several different elements that have to be designed in a thorough way. It is the outcome of the identification process which must be done by medical experts and occupational therapists. A certain kind of cognition problem in a certain kind of living context gives one specific treatment scheme and sometimes an installation of assistive technology, while in another context it would give a different treatment. When the remedy has been described, the installation process takes place. It is often done under the supervision of an occupational therapist.
In the two "worlds", care and technique the approach is basically dissimilar. The occupational therapists concentrate on the individual and the individuals needs. Sometimes personnel in the caring profession have a tendency to hesitate when applying new technique and prefer to avoid it. There is a fear of exchanging human care with robots. The technician on the other hand is most concentrated on how the gadget actually is working. Not necessarily on how well it fulfils its task for the person to be helped.

Some of the questions that have to be answered are:
- What kind of scouting in the customer's home must be done before the installation?
- By whom?
- What kind of documentation is needed for a successful home installation?

- How much preparation can be done in advance, before the installation has begun in the customer's home?
- How can the process be monitored in all parts?

5 THE INSTALLATION PROCESS

The technology in focus here is one that can assist mentally disabled persons, and stop them from leaving the home or go to bed with their home in a state of risk.
Initially an occupational therapist makes the analyses of the graveness of the dysfunction. The result is a prescription of assistive technique (if it is applicable). The occupational therapist sends information to the caring organisation to which the household belongs.

5.1 A case study

In Vällingby a suburb to Stockholm a reminder was installed at the home of an 80-years old man with mild dementia. The disease was in progress and his surrounding was now forced to check his apartment whenever his was leaving the flat. In this situation an installation of a reminder was decided.

Before the installation a technician visited the customer to check out all installation details. All parts needed for the installation were enumerated and for most of them their serial number at the manufactory was given. An installation plan was made and an installation firm contracted. That firm in its turn had to have a subcontractor for the power-installation. The occupational therapist got a preferable day for the installation from the customer, and could match it with the installation firm.

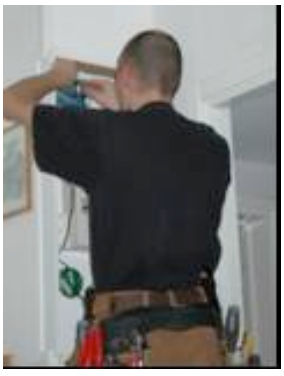

Figure 3. The installation engineer attaching cables and magnetic switches.

The morning of that day two installation engineers showed up together with the occupational therapist. One of them quickly started to attach cables and magnetic switches to the windows and the balcony door, Fig 3 (The customer was living on the ground floor and had recently been visited by burglars because his balcony door was left open when he left his house). At each window or door the magnetic switch was

connected to a radio transmitter, providing a signal if the contact was broken. That signal was received at the electrical central of the apartment and then transferred to a lamp panel where a lamp was lit up to show the status of windows and doors.

The other technician sat down on the floor to read the instruction manual that followed the heart of the system (the receiver and integrator). It had not been used for a long time by the firm so he was a bit insecure about how to program the unit.
After an hour he was exhausted and called the supplier and got on-phone support which solved the problem. Then he pre-programmed each unit before it was actually attached to the walls.

When this was done the mobile phone of one of the technicians started to beep. After a short conversation he declared that he had to leave for a couple of hours but would be back again just after lunch.

Meanwhile the cabling and attaching of units was carrying on by his colleague. The occupational therapist, during this time, was occupied with small talk with the customer stopping him from getting worried and from taking part in the installation. One important featured concept in the project is to keep technique and customers apart. Too much interference can make the customer either too worried or too interested. It is important that the service is in focus for the customer and not the means by which it is done.
After lunch the technician who was to return called and asked his colleague if it was okay if he didn't come, because "something had showed up". They agreed upon this but it meant that the installation at the customer's home would take more time.

The subcontractor who was engaged to connect the equipment to the power supply did not show up at all. Neither did he call to say he would not come. This meant that the system could not be finished.

The first day the installation took about eight hours. The occupational therapist had to make a new appointment with both the customer and the subcontractor. After another week the subcontractor had not yet been there; it took almost two weeks to finish the installation.
After the installation was done and the system was up and running, the occupational therapist sent all the material to the housing company so they would made a note in their apartment register. Thereby the installation could be further managed by the housing company. The installation has now passed to the second stage where the management of the installation has to take place.

5.2 Problems in the installation process

Several problems were illustrated by this, from a technically point of view, quiet simple installation. Here is a list over the different kind of problems that occurred:

- The installation engineers were not enough prepared. It takes time and does not give a professional impression when the technician is sitting on the floor trying to understand the instruction manual. (Especially if he doesn't.) His learning should have been done at the office.
- All programming of units etc. must be done in advance. The time spent in the customer's home must be minimized.
- The installation preplanning was not sufficient enough. Although the preparation had been done in advance by a special technician some technical problems had to be solved on site. This takes time. (The lock-contactor didn't fit into the door frame, it was too big.)
- All parts involved in the installation must be very precisely defined. The installation firm did choose some parts by them selves for the installation. In one case it didn't work and a lot of extra work had to be done. (The lock-contactor above.)
- Some parts of the installation must be studied in detail in advance. It took time for the installation engineer to discover how to insert a cable through a certain part of the wall.
- It must be confirmed by all persons involved, that they will appear on installation day. The whole installation depends on every one doing his job. The customer must be able to trust the system. If it is not up and running the same day as it is installed the costumers confidence will not be as strong as it should.
- The installation must not be too complicated. This alludes to the installation process. If it is complicated it takes more time and increases the risk that the customer gets annoyed and worried.
- Installed products must be possible to repair. There must be some kind of guaranty that all products can be replaced by the same product (or similar) during a reasonable period of time. (10 years for example.)
- The installation must be carefully documented. Every part that has been installed must be documented. The document must be archived in such a way that it is possible to maintain the function and give support to the system. (In this case the idea was to give the document to the housing company and its management.)

6 DISCUSSION

This example addresses a special group of users, persons suffering from mild to moderate dementia or acquired brain injury, demanding special considerations. First of all, technical equipment will be installed in the care-takers own home; obviously some kind of disarrangement of the established environment is at risk. Further, long and complicated installations must be avoided. The handling of the equipment by the care-taker (and the staff) must be easy and unambiguous. The documentation has to

be adapted to the real ability of the users. There are two different kinds of documentations: one for the customers, and one for the maintenance organisation.

A couple of weeks after the installation introduced here was finished, it was checked out whether the document had been taken care of by the facility management organisation, but it had not. It is obvious that the cooperation between the organisation who will be responsible for the maintenance (in this case the housing company) and the organisation responsible for the installation of assistive technique have to be very close and active. It is also important to follow a routine for this. If assistive technology will be an important part of the care program for elderly people then it is tremendously important that the installation process works smooth and easy. It is not acceptable that the installation engineers suddenly leave the installation because "something came up", or that subcontractors do not come at all. The firm chosen for this kind of enterprise must be carefully chosen. The installation process is the most intensive part in the life cycle of the system, and the quality of performance will depend on it.

The purpose of this paper has been to demonstrate the complexity of the assistive technology when it comes to practice. It takes planning to make it a success, both for the individual, e.g. the customer, and for the society.

7 ACKNOWLEDGMENT

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