

## Home automation for persons with dementia and their carers

The ageing society calls for adequate housing for the ever increasing group of older adults with dementia. The Leo Polak nursing home<sup>1</sup> (Leo Polakhuis) in Amsterdam provides state-of-the-art familiar and home-like housing for people with dementia in the Netherlands. The housing facility includes small scale group accommodation for a total of 72 psychogeriatric residents, who are divided over 12 separate group units of 6 occupants each. Residents share sanitary facilities, a living room combined with kitchen and a sun-room, and are distributed over the units without regard of their cognitive status. The project was initiated in 2002 and is characterised by the use of various home automation functionalities for older adults with dementia. However, the carers, who are part of the daily lives of the residents, are the ones in control of the supportive home automation systems.

Systems installed include: (i) dynamic ambient lighting and automatic switching (with additional manual control) in residential and shared spaces based on a digital resident profile, (ii) orientation lighting on the route to the toilet, (iii) automatic 'lengthening' of the day in winter by increasing lighting levels, (iv) automatic and manual control of solar blinds, (v) automatic 'living space' control of the residents (living zones to which residents have free access), which can be monitored and altered by the staff on-screen and via handsets, (vi) acoustical monitoring at night (vii) detection of (in)activity and movement at night as a means of supporting staff, based on a digital resident profile, (viii) fire alarms via smoke detectors (ix) remote access control by staff, (x) automatic switch-off on cooker tops when not used, and (xi) handsets allowing for communication and alarms between staff. Most of these systems are optional, and operational only if desired by users.

Specific goals of the home automation system were threefold: (i) offering better quality of life (increasing living space without risk of wandering or getting lost, improving ambient lighting, and supporting the autonomy of the residents), (ii) supporting caregivers, for instance, by guaranteeing safety and offering options for minimally invasive acoustical monitoring, and (iii) increasing efficiency of caregiving, especially during night shifts. Important prerequisites of the technology installed would be the central role of the individual resident and one's independence, the adage 'technology follows function' instead of the other way around, as well as the possibility for manual control. Moreover, the systems should be supplementary to the care given, and not a substitute.

User interaction with the home automation system of the Leo Polak nursing home takes place via visualisations on computer screens and DECT-handsets (Digital Enhanced Cordless Telecommunications), which are operated by the staff. To monitor the whereabouts of the residents and to operate the automatic doors and ambient lighting levels, both residents and staff are equipped with a RFID-chip (Radio Frequency Identification) tag. This chip is in-



*The Leo Polak nursing home in Amsterdam. The psychogeriatric wards are located on the two upper floors of this brightly coloured building*

tegrated into wristbands, and even in other pieces of clothing. A central server judges if a certain person is allowed to pass through a door. In case of unwanted 'double' exits, i.e., one of the two people passing through a door is not allowed to leave, an alarm is given. In case double exits include one member of staff, passage is allowed. The RFID-chip is essential for effectuating personal profiles in door movement and control of the indoor environment. The chip system is essential in achieving all three main goals of the home automation system. Besides the RFID-chip, the system also uses infra red movement detectors, door contacts and acoustical sensors, which are an integral part of the shared and private rooms. The system was designed and installed by a single system integrator, and is based on TCP/IP (Transmission Control Protocol / Internet Protocol) for communications and uses wired solutions.

The total investments in the home automation system were €737,000; this is about €10,000 per resident. This is far more than ever was possible in similar projects in the Netherlands. However, because of the flexibility of the system, which is largely based on ICT and (re)programmable functions, extra subsidies were given to this project. Therefore, the project will be monitored intensively by several audits in order to learn for future modifications and wider roll-outs. It is yet unknown to what extent the home automation systems contribute to the three main goals, although instant benefits to both residents and staff are unequivocal.

The system, however, does serve the third goal by allowing a reduction in costs for

caregiving by increasing efficiency. During the night, only two instead of three carers are required for the 72 residents due to the assistance the systems offer. On the other hand, the success of the system has led to the substitution of carers by technology. Therefore, we see a conflict with one of the prerequisites.

The system in the Leo Polak nursing home meets most of the ethical criteria for the implementation of technology for older adults with dementia as stated by Van Berlo<sup>2</sup>. It allows for 'freer' movement than when being locked behind closed doors, and offers relatively unobtrusive acoustical monitoring that disturbs the occupant to a lesser extent than a periodical interruption by a visiting person, or video monitoring<sup>2</sup>. Questions remain on whether the residents can fully consent to the technology, and on who benefits most from the systems: the staff or the residents? If the psychogeriatric residents do not fully understand the impact of the systems, or do not want to make use of the functionalities, they can choose to have the systems turned off. To what extent this personal control is respected needs further investigation. When in operation, it appears that the systems are beneficial to both the residents and the staff, albeit on a different level. The systems allow the staff to have increased control over the residents, but this control can also be an expression of care. In the end, it is the residents who receive better care because of the technology. It is therefore that the Leo Polak nursing home is a best practice in the implementation of home automation technology for older adults with dementia.

## References

1. Nouws H, Sanders L, Heuvelink J. Domotica voor dementerenden. De eerste ervaringen in het Leo Polakhuis te Amsterdam en het Molenkwartier te Maassluis. Amersfoort: De Vijfde Dimensie; 2006
2. van Berlo A. Ethics in domotics. *Gerontechnology* 2005;3(3):170

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