Accessibility and safety in housing for the elderly

by Bachir Mekibes
and
Birgitta Mekibes

Abstract:
Housing design and IT in housing could, if implemented properly, support independent living. An Electronic Guide supporting accessibility and safety in housing is one of the results from a joint European project for an inclusive society developed by the research group Domotic Lab at KTH in Stockholm (http://www.infra.kth/dom/English).

The Guide is aimed at providing support to the design, modification and adaptation of the dwelling space for persons with motor and cognitive disabilities. The Guide describes problem areas related to dwelling adaptations and, gives references and links to useful web sites, moreover it presents ten individual cases, showing both problem and success stories.

This presentation will focus on the dwelling adaptation tool of the Guide with advice related to different accessibility problems and safety matters in the dwelling and its surrounding. The domestic space and dwelling adaptations are related to various needs. In the Guide five parallel lines are presented related to different user needs: i.e. wheelchair users, walking aids users, users with motor disabilities in upper limbs, users with almost total lack of ability to move, and users with cognitive disabilities such as orientation difficulties, memory difficulties and aphasia. The Guide highlighting an inclusive strategy is a unique Internet appliances that could, if implemented properly, contribute to the independence, and quality of life aspects of an aging population.

Keyword list: architecture, cognitive impairment, environmental control, quality of life, internet

Introduction
The rapid development of information technology around the millennium-change has created an urgent necessity to define theories, methods and concepts in order to analyse and evaluate the interaction between IT, environment and users. The population in the world get older and many persons want to stay in their homes as long as possible. An independent living, a barrier free society, design for all principles, universal design programmes becomes more and more important. Sufficient knowledge is presented in guidelines, cheque-list and research reports but these are not always easy to find. This article presents the results of two European projects.

- firstly some statistics about the aging society
- secondly the definition of the concept "domotics"
- thirdly a presentation of an electronic Handbook about evaluation of "smart homes"?
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Some Trends in Demography

Each country in Europe is concerned by the increasing number of elderly. The majority of countries aim at promoting greater social integration, improving the quality of life and autonomy, increasing the quality of care and technical assistance and enhancing the opportunities for giving to elderly and people with disabilities an independent living.

Currently in Europe, the number of people who are elderly constitute around 80 millions. It is approx. 20 percent out of 376 million inhabitants. By 2010, 100 million (20% of 545 million people including the candidate countries) will be either more than 65 years old or will have some form of disability. Of the elderly, the fastest growing age group is the 'older elderly ' those above 80 years, and the majority is women. Some discrepancies between the European countries and some other countries are shown in the Table 1.

Table 1: Population statistics

<table>
<thead>
<tr>
<th>European Countries and some other countries</th>
<th>Population (millions)* 2000 **</th>
<th>Life expectancy at birth 1999 for women **</th>
<th>Percent of population over 60 years** 2000</th>
<th>Percent of population over 80 years** 2000</th>
<th>Percent of population over 80 years** 2020</th>
<th>Personal computer per 1000 inhabitants 1999 ***</th>
</tr>
</thead>
<tbody>
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<td>Austria</td>
<td>8.1</td>
<td>81.0</td>
<td>20.1</td>
<td>3.3</td>
<td>4.6</td>
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<td>79.0</td>
<td>19.6</td>
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<td>81.0</td>
<td>19.7</td>
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</tr>
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<td>20.5</td>
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<td>-</td>
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<td>361</td>
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<tr>
<td>Japan***</td>
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<td>-</td>
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<td>-</td>
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<tr>
<td>U.S.A.***</td>
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<td>-</td>
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Source: **Recent demographic developments in Europe 2000, Council of Europe, Strasbourg.**
*** World Development Indicators database (http://Sima-Ext.worldbank.org)
Compared to most of the rest of Europe, the Nordic countries have a high volume of public care and service for elderly and disabled. The difference gap between northern and southern Europe is also particularly wide concerning care and service at peoples homes. The number of personal computers per 1000 inhabitants as shown in the table 1 indicate a great variation. The economical crises within the IT companies does not necessarily mean that the IT development has declined. However hi-tech solutions and low-tech solutions to independent living will necessarily be developed in parallel for different regions and in some countries for different segments of the population. It is important to remember that high-tech solutions does not replace the low-tech solutions everywhere.

**Domotics instead of "smart" homes**

The concept of telematics in housing, "smart" homes, or "intelligent" homes is not new. Architects has introduced automation in houses as engineers has developed technology. But we object to the terms, "smart" or "intelligent" in this context. The home can never be "smart" or "intelligent" even if some systems are powerful in a specific domain, they are nevertheless incapable of any type of adaptable or truly intelligent reasoning.

The concept "Domotics" is an anglicised French word of "domotique". Domus in Latin means home and tics is the ending of informatics and telematics. According to the definition domotic is defined more specifically as a system of IT components (products and services) in housing applicable to safety and security, comfort and self-care, communication and property management. (Ad Van Belo 1999, Mekibes Ba. ed. 1996, Mekibes Bi. 1996) They can be classified into the four categories as follows:

- **Safety and security**: e.g. TV monitoring at the entrance door showing who is visiting, burglary alarm, security alarm, fire alarm, alarm when not moving, alarm when falling, alarm when leaving the bed, alarm when leaving the room or the house, cramp alarm, "aids to remember" i.e. for taking medication etc.
- **Comfort and self-care**: Remote control for doors window, curtains, lighting, heating, elevator, stair lift etc. Support for the memory, electronic organiser for personal care, equipment for memory, decision and organising support etc.
- **Communication**: Products and services to support entertainment, distance working, distant education, diagnosis and care at distance etc.
- **Property management**: Service, control and maintenance. Information about efficient energy, and water consumption etc.

The domotic system can be integrated with the dwelling and the building structure and connected to adjacent apartments or within the block, to the work place and to public and private services. Domotics can also become an important assistive technology solution for the inhabitants, their next of kin, the property manager, the personnel of local services and other actors.

There are **general domotic solutions**, that is to be built into the dwelling or the building, and that could be available to all the inhabitants in the building. There can be an **individual domotic solution** possible to adapt to the user's profile or that from
the beginning is adapted to a specific user. A “security alarm” could then, be installed when a tenant needs it. (Mekibes Ba, Mekibes Bi and Thiberg 1994)

**Domotic Lab - KTH**
Domotic Lab, founded in 1993, is a research group at Royal Institute of Technology (KTH) under the Department of Built environment analysis (BBA). The group has the aim of acquiring research on the interaction between people, the built environment, and the use of new technologies. The research of Domotic Lab comprises housing design and accessibility for elderly and people with disabilities and also on evaluation of IT in housing. (http://www.infra.kth/dom/English). The multi-disciplinary work is done in collaboration with international research teams. The countries involved are Sweden, Norway, United Kingdom, Belgium, France and Italy.

**Two European projects**
Since 1997/98 the Domotic Lab - KTH is involved in the two European Commission funded projects within the 4th framework programme e.g. “Telematics applications for the Integration of Disabled and Elderly” (TIDE). In the NJORD-TIDE support action as co-ordinating team and in the FACILE-project as contractor. The first project has resulted in an electronic Handbook about methods for user sensitive evaluations of domotic environment (EAS Handbook) and the second includes an electronic Guide about accessibility.

**The EAS Handbook - How to assess "smart homes"?**
People with disabilities and a steadily growing number of elderly often wish to remain in their own dwellings. Many new domotic products and services for these groups appear without being evaluated concerning the users. Due to the lack of clear evaluation processes, the users are often not offered the best solutions. Presently, evaluations of domotics and other areas are frequently performed throughout the world without regarding systematic evaluation methodology and without necessary scientific knowledge or approach. Even highly skilled experts in different fields of occupation, may lack know how in evaluation matters. This is often also the case when the users themselves and their organisations perform evaluations.

In addition, “home-made” evaluation solutions are being used for some purposes. Further to this, there is an abundance of evaluation methods according to their many different names and terms. But when scrutinising the evaluation flora, several of the methods are similar or next to identical in terms of approaches, techniques and tools.

The Evaluation Approach System (EAS) Handbook is a software dissemination tool to support user-sensitive evaluations of domotic environments, presented in hypertext form on CD-ROM.

The methods presented in the Handbook are not new. They are established and proven to be valid and reliable. The innovative contribution gained by the Handbook is:
- Being a simplified framework in which different types of evaluation methods can be perceived and put in a distinguishable order.
• Bringing order into the abundance of evaluation methods, clearing it from duplicates to give an isolated systematic overview, answering many questions on what when and how, an ABC for evaluations

• Providing a practical manual and guidance for evaluation, to be used by project leaders and evaluators involved in R&D-projects, beginners, students, users, user organisations, social service providers, occupational therapists, nurses, ergonomists, technical service providers, enterprises developing producing and installing domotics, inventors, designers, architects and constructors etc.

• Selecting eight evaluation methods to illustrate the variation of evaluation approaches (methods, techniques, cost, need of expertise, applicability etc.). Each method is in established use, valid, reliable and user sensitive, covering several aspects of domotic systems and environments.

An introductory handbook (a summary) and a demo version are available at the Njord-Tide web site: http://njord-tide.arch.kth.se

The Guide to design - How to cheque accessible in housing?
The Guide to design on CD-ROM provides support to design or modification of living space for motor and cognitive disabled persons with reference to; handbooks and de facto standards, individual cases, telematic products and web sites. The Guide highlights some aspects of good design of the domestic space and dwelling adaptations related to various needs and includes approx. 650 advice to different accessibility problems in the dwelling and its surrounding.

The tool is structured in five parallel guidelines related to different needs:

• Wheelchair users’
• Walking aids users’
• Users’ with motor disabilities in upper limbs
• Users’ with almost total lack of ability to move
• Users’ with cognitive disabilities (orientation difficulties, memory difficulties, aphasia)
The Guide highlighting an inclusive strategy is a unique Internet appliances that could, if implemented properly, contribute to the independence, and quality of life aspects of an aging population. A *demo version* of the Guide is available at the web site of Domotic Lab:
A Guide about accessibility in housing  
http://www.infra.kth.se/dom/GUIDE_TO_DESIGN

Conclusion
A scientific approach to evaluation is essential as the impact of the result may influence the distribution of the telematic applications very rapidly. This may affect the life of people for a long period, sometimes in a positive direction, but many times the users are not offered the best solution

Housing design and IT in housing could, if implemented properly, support independent living. Applying the appropriate evaluation methods from start to end, facilitates the considerate task of matching domotic dwellings, life length 50 years, with the extreme speed of IT-development. With this in mind, it might even be possible to influence the development for future needs, avoiding costly built-in mistakes.

References:
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Mekibes, Bachir, (1999) NJORD-TIDE Homepage (http://njord-tide.arch.kth.se)