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# Improving the Quality of Life for the European Citizen

Technology for Inclusive Design and Equality

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## HOME NETWORKS FOR INDEPENDENT LIVING, SUPPORT AND CARE SERVICES: ISSUES IMPINGING ON THE SUCCESSFUL INTRODUCTION OF PRODUCTS AND SERVICES

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### Summary

Home Networks ("Smart Houses") will potentially enable disabled and elderly people to live independently and support various services delivered to their homes. Although this has been demonstrated in a number of projects, this paper outlines key challenges to be met if this potential is to be realised widely.

### 1 Introduction

Home Networks (alternatively known as: Smart Houses, Intelligent Homes, Home Automation) is an emerging field of technology that holds significant promise for enhancing the quality of life for disabled and elderly people. Further, it will potentially support efficient and enhanced services delivered to their homes. There has been much work across Europe, in TIDE and various other European and National programmes, developing prototype applications and demonstrators to explore this. Although many of these have been successful in demonstrating the potential of the technology there are diverse and significant challenges to be met if this potential is to be realised widely. This paper outlines these challenges and suggests ways they may be addressed.

### 2 User Issues

Introducing technology into the home is often a complex matter, as the home is a unique environment that has strongly symbolic as well as functional value to its occupants. Work in past projects (see Literature listed at end of paper), has enabled a variety of human factors to be identified, that remain a challenge for further developments in this area.

#### 2.1 Individual Nature of Need

It is not possible to devise a simple prescriptive method for determining what combination of technology will provide the best solution for a person with a give set of disabilities. This is frequently requested by those involved with service delivery who have to make such selections but who may lack confidence in choosing the best technological solutions. However such a vision is utopian and shows no respect for human nature. Key points of note here are:

- The needs of disabled and elderly people in the home are essentially the same as the needs of anyone else - the way those needs are best met may be determined by their disability
- Perceived need is very individual in nature
- People want to be in control of their home and not controlled by it
- Individuals have personal preferences, likes and dislikes, that would impinge on choices of assistive technology but are not linked to any functional ability

- For some, technology is likely to be perceived as unwelcome, for others technology may be seen as enabling

This all leads to the need for detailed consultation with the end users and their professional and informal carers in determining need on a case by case basis. Further all these users must be fully involved in the specification of any system to be installed in their home. This is not necessarily a simple exercise, as many of the users will have no experience of the types of system in question, and will find it hard to visualise the implications of choices to be made in devising the system.

### 2.2 Technology in Context

Technology does not operate in isolation; it is important to consider its social impact during the devising of systems for individual disabled or elderly people. The attitudes of end users to technology are also important, as the users need to feel "in control". In some cases this can mean not introducing an optimal technological solution, but rather accepting a user's decision not to adopt a particular product or device.

Concerns are often raised that the elderly, in particular, are likely to reject the use of new technology outright. However there is little evidence for this in the experience of the authors or in the literature. What is the case is that elderly people will be more likely to successfully adopt technical solutions if they are assured that the appropriate levels of support in the use of them is available over a period of time. A one off training session is not sufficient. Elderly people are likely to have positive attitudes to technology if its real value to them can be adequately demonstrated.

Our homes are expressions of identity and usually full of life's accumulation of artefacts and memorabilia. The home is not like a hospital or office environment, which may have a design predominantly determined by function. Thus systems for the home need to be devised and installed accepting any constraints due to the existence and location within the home of the inhabitants' possessions.

## 3 Commercial Considerations and Potential Markets

Who will be the important potential purchasers of home network systems for disabled and elderly people and what are their requirements?

### 3.1 Health / Social Services

Home networks are traditionally seen as related to the various specialist systems offering the disabled person control of their home – environmental control systems. Throughout Europe the statutory supply of environmental control systems, through either the Health or Social Services, has dominated the sales of such systems. For example, more than 95% of Possum Control's sales of environmental control systems in the UK has been to the Health Service. The total UK Health Service budget for this is now approximately £ 6 million p.a. with an estimated 1,200 to 1,400 systems being supplied p.a. at a typical cost of between £ 3,000 and £ 3,500. The Health Service in the UK is still the core market for environmental control systems with to a much lesser extent Social Services and the Voluntary Agencies being purchasers.

- A key point to note is that such statutory provision of technology solutions is only made available to those with a severe impairment of their abilities although many

people with moderate degrees of disability could benefit significantly from such technology.

### 3.2 Other Markets

The Health Service market, in the UK in particular, but also through many EU Countries, offers little or no opportunity for growth in the overall market for environmental controls. However other markets are ripe for development. Key to identifying these is understanding the housing providers and types of homes of the potential users.

#### 3.2.1 Housing Providers to Disabled and Elderly People

A survey of the number of housing units for elderly people provided by the major UK housing associations has been conducted. This showed that the top 30 UK Housing Associations, managing more than 5,000 homes each, have about 140,000 properties in total for elderly people. Housing association properties specifically for disabled people under 65 are almost exclusively provided by small specialist associations, so are not included with these figures.

#### 3.2.2 Nursing and Care Homes

There has been a rapid growth in nursing or residential care homes for elderly people since 1980 and there is a strong trend toward private, for profit, companies providing these. It is expected that, provided the general home systems market becomes established, the quality end of private nursing home sector would be a prime target for market development for home network based solutions for care services. It will be desirable to provide some key features in addition to environmental control when addressing this market. These would include: nurse call; advanced security and safety features; and in some cases possibly behavioural monitoring systems.

#### 3.2.3 Private Purchases

Significant numbers of potential users of the home network systems live in private accommodation. The key challenge in developing a market for direct sales to the end users, (assuming the product definition and price are right), is establishing an appropriate marketing, sales, supply and support chain. However this is unlikely to be the market most likely to yield the rapid growth sought in the initial years of the product's life and the marketing effort required for a given sales volume is likely to be high.

In summary particular challenges to the supply chain include:

- Diverse types of purchasing organisation
- The purchaser is rarely the end user
- The purchasing organisations would not usually have a high degree of technical skills in the relevant areas among their staff
- Systems will often be put together with equipment from several manufacturers
- Purchasers require a high degree of support at all stages of specification, installation and on going maintenance of the systems

### 3.3 Outline Solution to Commercial Issues

A potential business model, capable of meeting the needs of the purchasers, would be for the establishment of regionally based companies that act as systems integrators and key technical experts, supporting the client for the whole process of specification installation and operation of the systems. The issue here is whether it is possible to provide such a service at a price

that the market will bear. To achieve this these systems integrators would need in turn to be able to access a wide range of expertise that may not be available in their region. This would need to be in the fields of: User needs analysis; Care systems / service delivery; Systems engineering; Product support; Architecture; and Building Engineering.

It is suggested that such a network of expertise could be constituted as an industrial association and the efficient interchange between the experts and the systems integrators be facilitated with appropriate networked software tools implementing shared workspaces. Both the organisational and technical work suggested here was the subject of the TIDE proposal CUSTODIAN (Nr. 3213) which is currently on the top of reserve list for funding.

#### **4 Service Delivery**

The linking of home network installations in the homes of disabled and elderly people to remote service centres could potentially yield substantial savings in service delivery costs while also offering enhanced services. However, the successful adoption of the technology in this area presents particular challenges and may lead to significant changes for service delivery organisation and practice. The situation is complex as most disabled and elderly people receive services from multiple agencies.

The prime challenge here is an organisational one rather than a technical one. It will demand political will at a high level and across different government departments and agencies if the potential of the technology is to be realised.

#### **5 The Built Environment and the need for Retro-fit Solutions**

Cost and ease of installation is an issue for home network systems in general. It is relatively easy to design a new home or apartment block to accommodate the necessary network infrastructure however most people do not live in new homes. The average lifetime of a home across Europe is in excess of 100 years. Hence a market strategy that depended on installation in new-build properties only is likely to fail. Therefore easy retrofit of home networks is vital to the market success of the technology. The use of mains-born communications has been heralded as the solution here but this is not suitable for safety critical applications. Therefore, for success in the care markets the low cost but tidy installation of twisted pair cables and the use of radio-frequency and/or infrared communications for the home network needs to be further developed.

#### **6 Technology Issues**

Home network technology is now available, however the failure of the formal standardisation process in the early 1990s has resulted in a high state of uncertainty as to which technology will be the European leader. This has significantly contributed to delay home networks' market acceptance. Standardisation is a key issue because of the high desirability of interoperability between products from different suppliers. However, major industrial players are now committing significant effort to resolve the situation. The 3 leading European Technologies: EI-Bus, EHS, and BATIBUS have been undergoing a convergence process through 1997/8, with the aim of arriving at a common European Standard for home networks. This exercise is near completion but it is as yet unclear whether the arrived at solution will stimulate the availability of key components and applications with real market appeal. There is a further technology, Echelon's LONWorks, from the USA, which is being actively marketed in this area throughout Europe and has gained some commercial success.

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A further development to note is the introduction of SIEMENS' Home Electronic System (HES) based on the EI-Bus (Siemen's response for this product range to home network convergence is not known at the time of writing). Although the HES is still at the demonstration stage, it clearly has the potential to lead to the first major-industry multiple-supplier home system and to overcome the key issues still impinging on the successful application of home networks for independent living, support and care systems.

It is important to consider that the Telematics Applications Sector in Europe is growing at an exponential rate, partly in result of the large investment being made in R&D support programmes in this area. Applications and services already available will in the very near future extend the potential of home networks to integrate support and care services delivered by global telecommunication infrastructures, including education and training, electronic commerce, health care, etc. This could lead to a rapid introduction of the basic technology into homes stimulated by application areas other than care services, thus creating a more widespread infrastructure for such services.

### 7 Conclusion

Home Networks hold great enabling potential for disabled and elderly people themselves and for those providing services for them. The technology is now beginning to be available in products with properly defined supply chains. However the business organisation necessary to determine the requirement for a particular installation and then integrate the technology and supply and support it on an ongoing basis, is yet to emerge. Although commercially a good case for establishing such a business could be made for many countries throughout Europe, there is a key challenge. Such a business needs to incorporate the full range of skills needed to address the issues outlined above. Currently this expertise is widely distributed both geographically and from an organisational point of view.

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