

## **The Use of Information and Communication Technology (ICT) to Support Independent Living for Older and Disabled People**

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## Abstract

The use of technology to support independent living for older and disabled people is mentioned explicitly in many recent Government policy documents. The main purpose of this report is to make the reader aware of the range of Information and Communication Technology (ICT) based activities which can promote the independence of older and disabled people and help them live in their own homes. This is achieved by reporting on activities across a wide range of fields including policy, industry, research, housing, health and social care. The report develops the concept of “building blocks” of ICT-based activity. From an analysis of this current activity and particularly on how it has developed since a previous report, a number of lessons emerge. This information is used to make suggestions for a national infrastructure for service delivery and to provide guidance on local implementation. The report concludes by making recommendations for the development of the use of ICT, telecare and new electronic assistive technologies to support independent living.

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## 1. Report Contents

### 1.1 Terminology

The following terms are used in this report:

“Assistive technology” - equipment or systems that can assist people who have difficulties, due to age or disability, in carrying out everyday activities

“Telecare” – care provided at a distance using ICT, generally to people in their own homes

“Smart Homes” – homes in which ICT has been installed to help control a variety of functions and provide communication with the outside world

### 1.2 Scope of the Report

The main focus of this report is current activity in the UK in the use of Information and Communication Technology (ICT) to help older and disabled people live safely and independently in their own homes, with a particular emphasis on developments in telecare. The report also includes some limited information about the use of ICT in other settings such as intermediate care facilities, sheltered housing and care homes. While most current activity is in support of older people, the report captures some use of ICT to support younger people with physical disabilities or cognitive impairments. ICT-based applications to support independent living, such as telecare, are treated as a form of assistive technology and the report describes developments in electronic assistive technologies as well as in the built environment and smart homes.

The use of technology to support independent living and promote independence is mentioned explicitly in many recent Government policy documents. These are reviewed to set this report in context, alongside technological developments. The report also summarises other Government initiatives which, although not specifically targeted at supporting independent living, could contribute towards helping an individual achieve that goal. Similarly, activity in the academic or research sector funded both by UK Research Councils and EU with the same aim is also reviewed.

The report is restricted to the UK. There is similar work in progress in other countries, particularly in Spain, Scandinavia and Australia. Despite the different health and social care funding mechanisms in these countries we believe that there is much to be learnt from international comparisons in this field. Many countries have ageing populations like the UK and similar policy aims in relation to supporting independent living.

### 1.3 Study Methodology

This report is an update of a previous report completed two years ago for Social Care Group of the Department of Health. As before, activity across a wide range of sectors has been reviewed with particular emphasis on following up the pilot and demonstrator project activity in the UK reported then and identifying projects that have started recently. The information has been obtained from peer-reviewed journals, conference proceedings, direct contact with projects identified in the previous report and official publications. The data collected on the projects is presented in a standardised way in the appendix to this report and summarised in the text of the report. We were particularly interested in collecting data on the lessons learnt during the projects. The results have been analysed to draw out some general observations and draw attention to the lessons learnt across this wide range of activity.

The list is probably not exhaustive as projects often start and then do not report formally. The authors would be grateful if anyone with knowledge of work not included would contact Dr. R. G. Curry.

### 1.4 Structure of the Report

The main purpose of the report is to make the reader aware of the range of ICT-based activities that can and could contribute to supporting independent living by older and disabled people. ICT in conjunction with other assistive technology is currently being used to support independent living and we report on established services such as the community alarms services in the first part of section 3. Next we report on new and developing activity with the same aim, particularly demonstration projects in telecare, and then other relevant ICT-based activity such as Government initiatives to increase Internet access and develop “wired communities”. We refer to these three areas as the building blocks upon which an enhanced service will be built. Section 4 reports on the relevant uses of ICT in the built environment and on developments in smart homes.

These “building blocks” taken together form the basis for a national infrastructure to facilitate ICT-based support for independent living and this is discussed in section 5. The infrastructure needed is not only technical but organisational. Section 5 also discusses and describes current developments in education and training and research and development.

The lessons learnt so far are discussed in section 6 together with suggestions for implementation at local level. Overall findings are summarised in section 7 and a number of recommendations for policy makers are made in section 8.

The report opens with a restatement of the objectives and Section 2 provides a description of the policy and technical and industrial context in which all this activity is situated.

The reference (A1, A2, etc) given after some project titles corresponds to the page number in Appendix 1.

## 1.5 Objectives of the Report

The objectives of this report are to:

- describe activity within particular areas or building blocks (by including an overview and by providing examples of specific activity and projects)
- show the linkages between the building blocks
- derive any relevant messages from the activity
- demonstrate how these could build to provide an integrated infrastructure to support independent living. (In this context infrastructure refers to both physical and organisational infrastructure)
- describe and discuss the lessons learnt so far
- make recommendations for the co-ordinated development of this area

## 2. Context

This section reviews the policy and technological context within which ICT to support independent living is developing.

### 2.1 Policy

The UK has an ageing population and over seven million people with some form of disability.<sup>1,2</sup> Government policies for older and disabled people aim to<sup>3</sup>:

- promote health and independence
- provide person-centred services which meet individual needs
- help people live in the community as far as possible
- support carers
- modernise and integrate services and deliver value for money

Using ICT to help older and disabled people live independently and safely at home is in line with Government policy aims and can contribute to a wide range of Government initiatives, particularly in the fields of health care, social care and housing.

Information for Health,<sup>4</sup> published by the NHS Executive in 1998, recognised that "telecare technology will be used to provide reliable but unobtrusive supervision of vulnerable people who want to sustain an independent life in their own home". The development of telecare and monitoring services is also included in the recently published national strategic programme for IT in the NHS<sup>4A</sup>. There has been development between times (see section 3) but it has been small scale and uncoordinated.

The report of the Royal Commission on Long Term Care highlighted the importance of disability equipment and housing adaptations and the potential contribution of future developments in assistive technology<sup>5</sup>.

The Audit Commission in its report “Fully Equipped” published in 2000, estimated that nearly a million people need equipment to help them live independently in the community. It pointed out that equipment for older or disabled people can provide the gateway to their independence, dignity and self-esteem and recommended that equipment services be given a higher priority.<sup>6</sup> In an updated version of this report, Fully Equipped 2002<sup>6A</sup> published in June 2002, the commission identified patchy progress in improving equipment services and called for urgent action to make equipment services an important component of strategies designed to promote independence.

In July 2000 the Government announced in the NHS Plan<sup>7</sup> the development of services for older people which would minimise admissions to hospital or residential care, support early hospital discharge, and reduce bed-blocking. A new tier of ‘intermediate care’ services between hospital and home was to be developed to ensure active recovery and rehabilitation and prevent unnecessary loss of independence, including rapid response schemes, hospital at home and supported discharge<sup>8</sup>.

Other related services were also to be modernised and expanded, including local “community equipment services (assistive technology) ranging from simple care equipment and adaptations, like grab rails and pressure relief mattresses, to more sophisticated equipment such as fall alarms and remote sensor devices”. Under the Integrating Community Equipment Services (ICES) initiative<sup>9</sup>, service providers have to:

- combine health and social care provision into single, integrated community equipment services by 2004
- increase the number of individuals who benefit from these services and improve the quality and range of equipment on offer
- increase efficiency by modernising purchasing, supply and recall systems
- extend the use of new telecare technologies in supporting frail and vulnerable people

A national implementation team has been set up to support the ICES initiative<sup>10</sup>.

While the development of local telecare services is included in the ICES initiative, the commissioning of specialised telecare and electronic assistive technology for people with complex physical disabilities falls within the NHS arrangements for national specialised services<sup>11</sup>.

The Scottish Executive has also set up an initiative to modernise equipment and adaptation services, following the report of the Joint Future Group<sup>12</sup>. Further information can be found on the website of the Joint Future Unit<sup>13</sup>.



The National Service Framework for Older People<sup>14</sup> published in March 2001 stated that identifying the need for equipment should be an integral part of any assessment, treatment or care plan. Effective equipment provision is likely to slow down deterioration in function, prevent falls and other accidents, and protect the health of carers. The NSF also endorsed the wider application of new technologies to support the safety and security of older and disabled people. It reaffirmed the need for an integrated approach by the NHS and local authorities towards older peoples' services, including:

- joint commissioning arrangements
- a single assessment process

The White Paper "Valuing People: A New Strategy for Learning Disability for the 21<sup>st</sup> Century"<sup>15</sup> also pointed out that assistive technology can increase "control, choice and independence" for people with learning disabilities.

The joint DETR/DH publication "Quality and Choice for Older People's Housing – A Strategic Framework"<sup>16</sup> stated that "housing, care and support policies need to focus on enabling older people to live as part of the community in their own homes, in comfort and safety and in the best possible health, for as long as they wish to do so", while recognising that some will want to move to housing earmarked for older people, to sheltered housing or to care homes. It endorsed the use of new technologies such as telecare and Smart Homes to help older people live safely at home and widen the housing options available to them. It recognised the benefits of community alarms services and the potential to graft passive alarms and movement sensors on to these services.

Policy guidance for the Supporting People initiative,<sup>17,18</sup> which will provide housing-related support for vulnerable people from April 2003, develops this vision further:

"The growth of this exciting range of remote communication and support services will continue unabated, and the Supporting People regime needs to take account of the opportunities it presents for cost effective and high quality support to be provided (...) these services will increasingly be part of a wider package of linked authority and other services, dealing not only with housing related support but also such areas as repairs reporting, community safety and victim protection, information services and access to wider web services."

There were two important developments in July 2002. Health Secretary, Alan Milburn, announced extra funding for social services for older people between 2003/04 and 2005/06, including further investment in community equipment services<sup>18a</sup>. The House of Commons Health Committee, in its report "Delayed Discharges"<sup>18b</sup>, stressed the "vital role of equipment services in contributing to the wider strategies to promote independence" and highlighted the potential contribution of telemedicine and telecare:

"We believe that telecare solutions have a major contribution to make as part of the strategy for developing alternatives to hospitalisation. This is an area in which health, social services, and other local authority services all have an interest, and where there is scope for pooling budgets to develop strategies. We recommend that the Department should establish a national strategy to promote the systematic

development of telecare solutions as part of the spectrum of care at home  
....Telecare has the potential not only to achieve cost savings ...but also to be a key component in the drive to allow people the choice of staying longer in their own homes.”

## 2.2 Technological and Industrial Developments

ICT-based applications to support independent living take advantage of the developments in computing and telecommunications that have taken place over the past decade. These are enabling technologies and the challenge is to use them in ways that complement and extend existing service delivery.

The most obvious developments in the public arena have been in mobile telecommunications and the use of the Internet. These applications are built on a hardware infrastructure of powerful computers and wide bandwidth telecommunications. There have also been other developments such as Digital Interactive Television (DiTV)<sup>60</sup> and Smart Homes. The development of the infrastructure and the applications has not been targeted at health and social care but at bigger mass markets where there are financial returns available to offset the development costs.

Product development in the computer and telecommunications sectors is still rapid. Hand held devices that combine the capabilities of electronic notepad and mobile phone are just being introduced. These could be invaluable to mobile health and social care professionals. The end of 2002 should also see the introduction of third generation (3G) telecommunications with its much larger bandwidth and its continuous availability.

There are several multinational companies and small and medium enterprises (SMEs) in the UK that are active in the development of telecare through involvement with the telecare development projects. However, there are no companies in the UK that have the full range of capabilities that appear to be necessary to service this market. The required capabilities range from sensor development and supply, to installation and telecommunications. In addition, because what is required is a care service then the private sector supplier (or suppliers) will have to work closely with the statutory care services.

## 3. Current Activity

Any new services to support independent living for older and disabled people will be built from a mixture of established uses of ICT and assistive technology to support independent living (established activity), new and developing activity with the same aim, and other relevant activity. This section reviews these three categories and summarises our findings. Where specific demonstration projects are mentioned further information on them can be found in the appendix to this report.

### 3.1 Established Activity

This section describes three established areas of activity to support independent living for older and disabled people, assistive technology, electronic assistive technology provided by the NHS and the community alarms services.

### 3.1.1 Assistive Technology

Assistive technology is defined in this report as any equipment or system that assists people who have difficulties, due to age or disability, in carrying out everyday activities. The Foundation for Assistive Technology (FAST)<sup>19</sup> uses a similar definition: “a product or service that enables independence for older or disabled people”.

Assistive technology is coming to be the preferred term for all such devices rather than “disability equipment” or “technical aids”. It covers simple items such as walking sticks, bath seats and grab rails, as well as electro-mechanical equipment (e.g. powered wheelchairs), electronic aids (e.g. digital hearing aids and environmental controls), or equipment used by carers such as lifting aids. There is a fuller discussion of the scope of assistive technology in the Astrid report<sup>33</sup> and in a research paper prepared for the Royal Commission on Long Term Care<sup>20</sup>. Given the above definition, telecare products and services, which support independent living, are treated in this report as a form of assistive technology.

Some types of assistive technology are provided by the NHS and by social services, through local community equipment services, NHS wheelchair services or specialist NHS services such as orthotics and prosthetics. Major housing adaptations are provided through housing departments. Occupational therapists play a key role in assessment for assistive technology, particularly within social services. Equipment is also provided by education and employment services.

Information about assistive devices and products is available in literature from charities such as the Disabled Living Foundation,<sup>21</sup> Ricability,<sup>22</sup> and FAST.<sup>19</sup> Examples of assistive technology are on demonstration to public and professionals alike in demonstration facilities under the aegis of the DLCC (Disabled Living Centres Council).<sup>23</sup> Further information can be found in the report “Research and Development Work Relating to Assistive Technology 2001”<sup>64</sup> published in July 2002. This document, outlines a selection of the research and development activity funded by the government in 2001 and includes new developments in research funding and a comprehensive section on the different types of existing aids being developed to assist disabled and elderly people.

It is Government policy that the potential contribution of assistive technology to support independent living should be considered when putting together any package of care, which might also include home care or home nursing.

### 3.1.2. Electronic Assistive Technology Provided by the NHS<sup>24</sup>

The NHS provides electronic assistive equipment for use in the home by people who have such severe physical disabilities that their needs cannot be met by conventional home adaptations. An assessment is made at the person’s home to identify the residual motor function that can be used to operate the equipment and

any sensory or cognitive problems that may necessitate a special control interface. The process leads to the specification of a system, known as an environmental control system (ECS), which provides a range of functions that afford the user safety and security in the home as well as enhancing independence and participation in society.

A system will typically be operated by means of a single switch and a scanning selection unit or with a sensitive programmable keypad or by voice control. The types of functions that can be provided include:

- Home security and control of visitor access
- Door opening and closing for the wheelchair-mobile user
- Personal alarm functions both within the home and further afield including access to social and community alarm systems
- Use of hands-free, remote-control telephone
- Control of electric riser/recliner chairs and electric profiling beds
- Control of the ambient environment – such as lighting, heating, curtains and windows
- Operation of home entertainment equipment including digital interactive systems
- Access to information and communication technology such as electronic mail and the World Wide Web.

Some functions such as electrically powered door opening, curtain control and window opening can be achieved only in conjunction with home adaptations. NHS providers work closely with local authorities and housing providers to deliver seamless solutions. The staff involved include occupational therapists, clinical scientists and rehabilitation consultants.

There are currently some 4,000 users of environmental control systems in England. Approximately 1,000 new systems are installed each year while only some 600 are withdrawn. Estimates of the need for these systems range between 100 and 200 per million population.

The NHS also provides electronic communication aids for persons who have speech and/or language disorders, working through local speech and language therapy services and eight specialist Communication Aids Centres. Such devices may provide spoken output using a speech synthesiser or provide an alternate mode of communication such as a text display. Students with significant communication difficulties may receive assessment and funding for equipment through the Communication Aids Project (CAP) administered by the British Educational Communications and Technology Agency (BECTA).<sup>25</sup>

The NHS Purchasing and Supply Agency<sup>26</sup> periodically invites tenders for the supply, installation and maintenance of electronic assistive technology. The Agency maintains framework agreements with a number of equipment suppliers some of which also install and maintain ECS. New equipment is evaluated prior to inclusion on the agreement. These processes have considerably increased the range and functionality of the equipment that can be provided by the NHS.

For persons with complex physical disabilities an environmental control system and a voice-output communication aid may need to be integrated with special wheelchair controls so that for instance a single voluntary movement can be used to control all of these functions without intervention by carers. The benefits of an integrated, holistic approach to the assessment and provision of electronic equipment are now being recognised. There is a move towards establishing specialist Electronic Assistive Technology Services within the NHS as part of centres at the tertiary level for other specialist assistive technology services such as prosthetics and orthotics.

The National Specialised Service Definitions for the assessment and provision of equipment for people with complex physical disabilities (all ages) recently published by the Department of Health encourage this process of service integration.<sup>11</sup> It is expected that the resources for the more complex and specialist aspects of telecare provision will be developed within existing electronic assistive technology services using the expertise of clinical scientists and technologists and specialist therapists to support the development of local telecare services and programmes for their evaluation.

The British Society of Rehabilitation Medicine published a report on electronic assistive technology in 2000.<sup>27</sup> A recent qualitative study evaluating the experience of a small group of adults in acquiring and using environmental control systems also contains a good deal of background information about provision in this field.<sup>28</sup>

### 3.1.3 Community Alarms Services

The UK has had for many years a well-developed infrastructure of community alarms services providing what is in effect a telecare service in response to alarms triggered by users. There are currently over 300 services serving over one million people. These are mainly provided by local authority housing but also by social services departments or by the voluntary and private sectors. Most are members of the Association of Social and Community Alarms Providers<sup>29</sup> Alarms are installed in the home or worn by the user and linked to a call-centre by means of a specialist telephone. They are activated by the user in case of need, for example following a fall, and elicit a response by the alarm service, involving informal carers or mobile staff as appropriate.

Some alarms services are already developing close links with related services in health and social care. The Night Owls (A1) scheme is a collaboration between the Colchester Borough Council Helpline service and Essex County Council Social Services Department to mutually support the provision of overnight services. The scheme has been running successfully for six years and there are plans to develop similar services in other parts of Essex.

It is a logical next step for community alarms services to develop more proactive forms of telecare by incorporating passive alarms and sensors which can alert the call centre automatically when hazards arise. This process is being facilitated by the development of a range of smart sensors which can be deployed in appropriate packages, by the evolution of the specialist telephones into intelligent home units, and by improvements in call centre monitoring systems.

Many Scottish local authority alarms services already include a passive infra-red sensor (PIR) as a standard part of their installation to monitor lack of activity. Other services are testing or deploying a range of devices including fall detectors, smoke detectors, CO and CH4 detectors, flood detectors, temperature sensors, pressure pads, and door switches.

The Falkirk Mobile Emergency Care Service (MECS) (A2) is operated by the Housing and Social Work Service. It has included a Passive Alarm Service since 1992, serving around 80 clients, mainly older people with dementia, but also people with learning disabilities, memory problems and other cognitive impairments. The technology employed comprises smoke, gas, hypothermia, heat detectors, door switches and pressure pads connected to MECS and other equipment which registers internally, including door reminder devices and flood detectors. A survey in 2000 revealed 84% of carers thought the service had prevented a fire or other major incident. Since 2001 MECS has also included: 1) the Epilepsy Monitoring Project using body-worn tilt detectors and in-bed seizure monitors and 2) the Falls Management Project, which is a pilot project linked to falls management clinics and using automatic fall detection equipment.

### 3.2 New Activity

The rapid development of ICT has created two new means of supporting independent living by older and disabled people – the remote delivery of health and social care to the home (telecare) and easier access to information. These are described in this section but first a distinction is made between telemedicine and telecare.

#### 3.2.1 Telemedicine and Telecare<sup>30</sup>

There is a degree of overlap between telecare (care provided at a distance using ICT, generally to people in their own homes) and telemedicine (the practice of medicine at a distance using ICT), as telecare may include health care, social care and housing support.

The main focus of this section is the use of telecare to enable older and disabled people to remain in their own homes by providing increased safety and reassurance to them and their carers. Telecare can also be used to provide information and reminders, to reduce social isolation, and to support treatment, rehabilitation and intermediate care.

The range of telecare equipment available includes:

- passive devices to detect falls, wandering and other hazards such as fire or gas and trigger a human response or shutdown of equipment
- electronic prompts and memory aids
- lifestyle and physiological monitoring systems
- specialised telephones and videoconferencing

The report does not cover telemedicine involving the exchange of information between medical facilities and only incidentally includes some projects that incorporate physiological monitoring.

Another distinction between telecare and telemedicine services is in the technology used. Generally telecare services operate over standard telephone lines whereas telemedicine requires a more sophisticated telecommunications connection.

However, as service users gain experience and confidence with telecare systems and new products are introduced, we are seeing the extension of the services to the home to provide hospital at home facilities such as physiological monitoring and rehabilitation. The likelihood is that telecare services will expand incorporating aspects of telemedicine.

A list of telemedicine projects in the UK can be found in the Telemedicine Information Service<sup>31</sup>.

### 3.2.2 Telecare Demonstration and Pilot Projects

There are currently a number of large-scale telecare demonstration projects, which are intended to develop into mainstream services. Many incorporate evaluations of outcomes, which are already producing positive findings. These projects typically involve partners from social care, health care, housing, community alarms services and industry. There are also smaller-scale pilot projects, product evaluations, and product development projects.

The projects are presented in tabular form for ease of reading and then below the table in more detail. Fuller information on the projects can be found in Appendix 1.

<b>Project Title</b>	<b>Organisation</b>	<b>Description</b>
Opening Doors for Older People	West Lothian Council Community Services	Developing housing-based alternatives to traditional residential care for frail elderly
People at Home and in Touch	Durham County Council Social Services	Prevention Pilot to establish whether telecare can be part of a preventative strategy. MIDAS Pilot to determine usefulness of intelligent telecare system for lifestyle monitoring
Cheshire MIDAS Pilot	Cheshire County Council Social Services	Use of a MIDAS system within a social services residential short stay setting for older people undergoing rehabilitation
Safe at Home	Northamptonshire County Council Social Care and Health Directorate	Exploring the use of assistive technologies to help people with dementia remain in their own homes and to support their carers.

New Technology in Elderly Care (NTEC)	Hammersmith Hospitals' Trust	Evaluating how new technology can benefit older people living in the community and help them remain in their own homes
Going Home, Staying Home	Fold Housing Association	Assistive technology/ telecare packages in their own homes linked to Fold's alarms service
Columba	Surrey Social Services	Alternative to residential home placement or need for complex care packages for older people
Home Comforts Project	South Ayrshire Council	Evaluating "plug and play" technology to support independent living at home
Guildford Falls Project	Guildford Borough Council Emergency Communications Service	old people at risk of falling in their own homes
<b>Project Title</b>	<b>Organisation</b>	<b>Description</b>
Thistle	Thistle Foundation	Trialing telecare equipment linked to the Hanover Careline
Anchor	Anchor Trust	Trial with individual tenants to explore the technical and care/response elements of a telecare service.
NeuroPage Service	Oliver Zangwill Centre	Use of pagers to send individually tailored reminders to people who have memory difficulties primarily associated with brain injury.

(The reference (A1, A2, etc) given after the project title corresponds to the page number in Appendix 1).

The Opening Doors for Older People (A5) initiative, led by West Lothian Council Community Services, is developing housing-based alternatives to traditional residential care, using multi-skilled staff teams and a range of new smart technologies, based on a core package plus additional items to meet individual needs. There are two elements: 1) New Build Housing with Care and 2) Smart Support at Home. The former will build up to around 140 tenancies by 2003. The latter currently involves over 70 service users. The project has focused on frail older people in its developmental stage but is now moving to other groups of people. Partners include the NHS, housing associations, Tunstall Telecom Ltd, Possum Controls Ltd and Motion Media Technology Ltd. The traditional community alarms service has now merged with the Smart Support at Home service to create a new Health and Care Support Service as a mainstream service. An evaluation by the University of Dundee<sup>32</sup>(see Appendix 2) found that the technology had made clients feel more confident and safer and that they believed it had given them the opportunity to live at home longer. An evaluation by the University of Stirling will be published at the end of the project.



The People at Home and in Touch Project (A7), led by Durham County Council Social Services Department, investigates the feasibility of ICT and other assistive technologies to help older people remain in their own homes, live more independently and improve their quality of life. The two main current projects are the Prevention Pilot and the MIDAS Pilot. The Prevention Pilot aims to establish whether new technologies can play a significant role in monitoring people in their own homes as part of a preventative strategy. It involves six alarm service control centres and five NHS rapid response schemes including, for example, the Sedgefield Home Assessment Rehabilitation Partnership (SHARP). Sensors being used are bed sensors, fall detectors, collapse detectors, heat sensors, bath/shower sensors, flood sensors, and automatic bedside lights. The smaller-scale MIDAS Pilot involves further collaboration with Tunstall Telecom to develop and evaluate in clients' homes the MIDAS intelligent telecare system for lifestyle monitoring. Around 100 clients will be involved in all the projects by June 2002. Future plans include developing an inter-agency strategy to integrate telecare in County Durham into mainstream services with appropriate funding and continuing with small-scale pilot projects.

The Cheshire MIDAS Pilot (A9) led by Cheshire County Council Social Services, will evaluate the use of the MIDAS system within a social services residential short stay setting for older people undergoing rehabilitation as part of an intermediate care service. Social Services are also testing other sensors for use in the home.

The Safe at Home (A30) project, led by Northamptonshire County Council Social Care and Health Directorate, is a multi-agency project exploring the use of assistive technologies to help people with dementia remain in their own homes and to support their carers. The project puts into practice some of the lessons learnt from the ASTRID project, which produced a guide to using technology within dementia care and discussed the ethical issues involved.<sup>33</sup> The project uses stand-alone equipment, such as alerting devices for resident carers or calendar clocks to help with time orientation, as well as equipment linked to the alarms service, such as an automatic gas detector which temporarily disconnects the supply and activates a response. The evaluation has found that the technology used was generally reliable and straightforward to install, reduced anxiety among carers, and maintained existing levels of independence. In comparison with a matched group of people with dementia who did not use technology, Safe at Home users tended to remain longer, on average, in their own homes. The scheme appeared to be very cost-effective: community care package costs for Safe at Home users rose less quickly than for the comparator group, and the costs of hospital, nursing, and residential care for the comparator group were significantly higher. A comprehensive report that includes the results of the project evaluation has been published recently<sup>63</sup>. Future plans are to roll out the project across the county and achieve a transition from project to service by 2004.

The New Technology in Elderly Care (NTEC) project (A10), which involves the London Boroughs of Ealing and Hammersmith and Fulham, the Hammersmith Hospitals' Trust and Ealing Family Housing Association, is evaluating how new technology can benefit older people living in the community and help them remain in their own homes. Five items of equipment were initially selected for testing:

- video-monitors linked to relatives

- fall detectors worn on the belt and linked to the alarms service
- pressure mats under the mattress monitored by residential home staff
- wrist-worn health monitor linked to alarms service
- hip protectors (test not proceeded with because of design defects)

The first year of the project has revealed that the types of equipment tested need to be evaluated more fully before they are automatically recommended for use by older people. Video-monitoring and pressure mats have been very effective in specific circumstances and now need testing for a longer period of time and with a wider client group. The fall detectors and health monitors have shown promise and require further evaluation. User feed back has been very encouraging. The project will run for another year from April 2002 to March 2003 to carry out further testing (including of chair monitors, timed pressure mats, and wandering systems), to involve other service providers and other client groups, to explore ethical issues, to develop a strategy for the use of technology, and to publicise findings.

The Going Home, Staying Home project (A12), which has just begun, is a partnership between Fold Housing Association (Fold Help CareLine), Foyle Health and Social Services Trust, and the Northern Ireland Housing Executive. It offers support to older people by supplying a range of assistive technology/ telecare services and community telemedicine services. Approximately 25 older people each year will receive assistive technology/ telecare packages in their own homes linked to Fold's alarms service, in some cases as part of re-ablement support following discharge from hospital. A demonstration house is also being developed. An initial evaluation has begun and the project will run until March 2004.

The Columba Project (A32) is led by Surrey Social Services in partnership with N. Surrey PCT and University of Sussex. It is part of the EPSRC funded TCPI project which is researching the large-scale implementation of telecare. The object of the project is to provide an alternative to residential home placement or the need for complex packages of care for older people discharged from hospital in N. Surrey. The project combines a time-limited period of recuperation with training for patients and carers in the use of telecare so that they return home more practically able to live independently and with an understanding of the capabilities and limitations of telecare. In parallel an education and training unit for health and social care staff has been established to train them and to disseminate the concepts more widely.

The Home Comforts Project (A13) led by South Ayrshire Council, is evaluating the use of a wide range of alarms, sensors, and other "plug and play" technology to support independent living at home and has developed guidelines for ethical practice based on the Astrid Guide.

The Guildford Falls Project (A14) led by Guildford Borough Council Emergency Communications Service, is testing the use of fall detectors, bed sensors and pressure mats with old people at risk of falling in their own homes and has found problems using these in practice. The Guildford Step-up/Step-down Project, led by

the Borough Council Sheltered Housing Department, is also testing the use of health monitoring equipment as part of step-down rehabilitation in sheltered housing following hospital discharge.

The Thistle Foundation<sup>34</sup> is a voluntary organisation, which provides support in their own homes for people in central Scotland with physical disabilities, learning disabilities, head injuries or mental health problems, many of whom are tenants of housing associations. It is informally trialing equipment such as flood detectors and smoke detectors linked through the Tunstall 4000 unit to the Hanover Careline centre in Edinburgh. Some clients have cameras mounted on the front door to enable visitors to be viewed on the television screen. The Foundation also hosts the Technology for Independent Living Network which brings together organisations, mainly within Scotland, with an interest in assistive technology.

Anchor Trust is a major provider of sheltered and warden-assisted accommodation in the UK. Anchor published a report in 2000<sup>35</sup>, based on a joint research project with BT, which included the use of technology for lifestyle monitoring. The report makes recommendations about the delivery and design of telecare services. Anchor will also be sponsoring a forthcoming publication entitled “Assistive Technology and Telecare: Forging Solutions for Independent Living.” Anchor is currently supplying alarms and sensors on a trial basis to individual tenants to explore the technical and care/response elements of a telecare service. Anchor is also developing a retirement village in Denham, which will incorporate the infrastructure for ICT-based technologies (see section 4.1).

The NeuroPage Service (A16), based at the Oliver Zangwill Centre, uses pagers to send individually tailored reminders to around 40 people across the country, who have memory and/or organisational difficulties primarily associated with brain injury.

### 3.2.3 Improving Access to Information using ICT

The growth of information sources available through the Internet and in the availability of Internet connectivity has spurred the development of a new category of service that can contribute to supporting independent living and that is the website devoted to information specifically for service users their and carers<sup>57</sup>. Accessing the Internet is possible through a home PC and through Digital Interactive Television<sup>60, 61</sup>. For example, the Department of Health has recently undertaken a trial with 50,000 cable TV subscribers in Birmingham to make NHS Direct available over TV and introduce some limited interactivity. The Government is also developing the CareDirect service in partnership with local councils as a gateway to information for older people.

The Government-supported Better Government for Older People programme includes several pilot projects focusing on access to IT for older people as a gateway to information and social contact. Further information is available on the Better Government for Older People website<sup>36</sup>.

Age Concern has a strong commitment to making the benefits of IT available to more older people and has carried out a national survey with Microsoft into the use of

computers and the internet by the over 50s in 2000. The Age Concern website<sup>37</sup> has information about all its current initiatives to increase uptake of computers and the Internet by older people.

CarePlus, (A17) based at the University of Sheffield, is a local information service pilot project for users and providers of health and social care, which builds on the EU-funded ACTION project. The information content is accessible via the Internet for people with personal computers and computers have also been placed in community centres. It is planned to make the service available on digital TV. An evaluation will be published in July 2002.

### 3.3 Other Relevant Activities

The following section gives some examples of initiatives supported by other Government Departments that will indirectly support independent living by older and disabled people, although that is not the prime reason behind the initiatives. In effect these initiatives are contributing to providing the necessary infrastructure (see section 5).

#### 3.3.1 Local Government

##### 3.3.1.1. London Connect

London Connect<sup>38</sup> is a public sector initiative to ensure a common strategic framework for e-commerce for the city. The aspects of the initiative of particular relevance are that three London Boroughs will be connected to NHSnet (the common communications infrastructure of the NHS) by late 2002. It will then be providing a common infrastructure for Social Services & the NHS in the particular context of Children, Elderly & Mental Health National Service Frameworks (NSF) and it will be developing information-sharing rules.

##### 3.3.1.2 Nuneaton and Bedworth

Over the next three years, Nuneaton and Bedworth's "Silver Surfers" project which is part of Nuneaton and Bedworth's Community plan, will provide; 100 internet access points throughout the borough, 800 digital TVs with internet access in older people's homes, training courses on how to use the Internet for 1,600 older people, a website specifically designed for older people and improved services designed specifically to help older people live independent lives.

#### 3.3.2 Department for Education and Skills – Wired up Communities Initiative

The Wired up Communities Initiative<sup>39</sup> is investing £10 million from the Capital Modernisation Fund to assess how individual access to the Internet can transform opportunities for people living in the most disadvantaged communities.

14,000 homes in 7 communities are piloting this initiative to test how making ICT accessible by putting it straight into people's homes can help overcome the digital divide.

The initiative will use a variety of technologies (e.g. standard telephone lines, broadband technology, digital TV) to link households in the selected communities to the Internet. This will enable them to access a wide range of local and national services such as government, job, health and education.

### 3.3.3. Office of the E-Envoy – UK Online; Broadband Strategy

The Office of the e-Envoy<sup>40</sup> is leading the drive to get the UK online to ensure that the country, its citizens and its businesses derive maximum benefit from the knowledge economy.

Over the last two years, the Government has outlined a set of key e-objectives to ensure that the UK is a world leader in the knowledge economy. Within these, it is committed to ensuring that everyone who wants it has access to the Internet by 2005 and that all Government services should be available electronically by the same date. It has set a goal to develop the UK as the world's best environment for e-Commerce by 2002<sup>41</sup>.

### 3.3.4 Department of Trade and Industry – The Application Home Initiative (TAHI)

The Application Home Initiative<sup>42</sup> has recently been started by DTI and currently a consortia of companies are scoping the implementation of a number of trials. The initiative is dedicated to the delivery and management of applications and services to and within the home. The applications and services range, in complexity and requirement for bandwidth, from automated meter reading to video entertainment and gaming including, but not limited to, home control, security, medical monitoring, education and home working.

The network focus is on the "last mile" of the wide area networks - connection to the home - and the "last metre" - connectivity within the home. Equipment may include the full range of domestic appliances, entertainment systems, computers, networking systems and network gateways.

The Initiative will also investigate and demonstrate the requirements of customer relationship management (CRM) solutions to support the sale and provision of the applications and services. Any operational or regulatory issues encountered in the provision of services will be addressed.

## **4. ICT in the Built Environment**

The construction industry is using ICT in two areas - building management and smart homes. Smart homes were until recently only available at the high price end of the housing market but as the link between smart homes and telecare is made then housing associations in particular are developing homes with the necessary communications infrastructure as standard. There is also some use of ICT in the existing care homes sector. This section reviews activity in these areas.

## 4.1 Building Management

All large public and private buildings have building management systems. As technology has developed these have grown from basic emergency systems to sophisticated networked control systems allowing central monitoring and control of features like evacuation, air conditioning, lighting and security. ICT and sensor technology have been the enabling technologies that have allowed the development of such complex systems and the market has grown so that there are many suppliers providing products and services. Several of these suppliers have formed the INTEGER Group<sup>43</sup> to raise awareness of these technologies and show the link with Smart Homes. Members of the group have built show homes across the UK. The infrastructure of a building management systems consists of sensors measuring various environmental parameters connected to a telecommunications backbone that in turn relays all the information to a control centre where it is processed, displayed and a response made as necessary. The control centre need not be located in the building, leading to the concept of remote monitoring.

This is very similar to the technical requirements of a telecare service; the technical differences being in the type of sensors required. The service response is of course quite different.

At the beginning of 2001, Westminster City Council, a long-standing partner in INTEGER, commissioned the consortium to study the refurbishment of an existing tower block. This represented a challenge for INTEGER as since its formation in 1996 it had looked at new build. Two demonstration flats and an exhibition area will shortly be available in the tower block showing how the refurbishment will be carried out and the facilities that the refurbished accommodation will offer residents. During the planning phase consideration has been given to using the installed infrastructure to provide care services and the project brief now states;

“Use control systems to provide passive and unobtrusive monitoring of residents to check that regular habits are kept to, and hence pick up any unusual behaviour which may be a signal of distress. Provide assistive technologies to help those with dexterity or sensory impairments to live more independently, and install effective call alarm and telecare support systems”

Anchor Trust who are a large provider of sheltered and warden assisted accommodation have been investigating telecare and the use of ICT generally in their properties. One of their major plans is to rebuild an existing care village at Denham in Buckinghamshire over the next few years. All the accommodation will be on a broadband telecommunications network allowing residents access to services provided from within the village and more widely. The provision of care services is an important consideration in the design of the village.

## 4.2 Smart Homes

‘Smart’ homes are homes in which ICT has already been installed to help control a variety of functions and provide communication with the outside world. Telecare services and ‘smart’ homes share a common technological base in information technology and telecommunications. Smart homes and telecare services are natural

companions, since both product (smart home) and application (telecare) entail similar technology.<sup>44</sup> For example, the monitoring equipment for telecare would probably already be installed in a smart home thus avoiding the need for retrofitting. For instance, two of the main data sources used in the Anchor/BritishTelecom telecare project (movement and temperature) could also be used to provide inputs for the security and environmental control systems of the home. For this reason, it has been suggested by Tang and Venables<sup>44</sup> that providers of telecare should be aware of developments in smart homes, and builders of smart homes should be aware of the possibilities for telecare.

Successful delivery of telecare to the home is as much dependent on the construction and condition of the housing stock as it is on the ability of the care provider to meet users' needs. Much of the UK's housing stock is both old and varied and it most certainly was not built with the later inclusion of smart technologies in mind. It has been already noted in the previous version of this report, that it is important that new research focuses on this point and contemplates the problems of providing smart features through renovation and refurbishment.

A basic and widely accepted parameter for systems is that they should be modular, that is, with the ability to add functionality as needs arise.

Core functions of generic smart home systems are:<sup>45</sup>

- Control of system
- Emergency help
- Temperature monitoring
- Water and energy use monitoring
- Automatic lighting
- Door surveillance
- Cooker safety
- Water temperature control
- Window, blind and/or curtain control
- Property security
- Online links

Additional functions of smart systems associated with provision for older people are:

- Memory joggers and diary facility
- Lifestyle monitoring<sup>1</sup>
- Medical monitoring
- Dementia care

Other researchers active in this field have identified some real and potential problems in the application of telecare and smart homes. For example:

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<sup>1</sup> In contrast to social alarm devices, which have become relatively commonplace, lifestyle monitoring is a relatively new concept and entails the continuous or intermittent gathering and interpretation of data relating to the movement, activity and behaviour of people in their homes.

- Systems interoperability and compatibility
- Lack of standardisation
- Confidentiality (remote analysis of person's activities not always desirable and transfer of personal information to third parties)
- Perceived danger of smart technologies removing choice and control from the user
- Perceived danger of substitution of more personal forms of care and support.
- Technology push as a driver for change, user needs overlooked
- Risk of underpinning the wrong model of care (i.e. oppressive) - as a result of inadequately considering the social context in which technology is placed.
- The lack of homes with installed smart technologies, the fact that they need to respond to the differing needs of residents and the lack of systematic evaluations of their impact means that there is some scepticism regarding their merits.

Many of these problems have an ethical dimension and ethical issues are discussed further in section 6.

The integration of smart homes and telecare services should lead to improved housing conditions, and deliver care and support services more efficiently to the home. Effective integration could improve the quality of life of all citizens and enable safer independent living. The benefits of such integration can be measured in terms of the extent to which people are able to live more independently and, importantly, the extent to which they may be empowered and socially included through the availability and use of such technologies. It should be noted, however, that integrated systems are only feasible when the manufacturers of system components agree upon a common standard.

Several smart homes are known to be planned or under development in the UK<sup>46</sup>. Some of the smart home initiatives (e.g. Gloucester)<sup>47</sup> consider the needs of older people with dementia and pay particular attention to monitoring. Recent developments are being conducted by Brunel University (Millennium Homes) (A25) and South East Belfast Trust (A33).

In reviewing the literature, it seems that the difference between telecare initiatives and smart home initiatives does not seem to be clear cut for some commentators and leads to a degree of confusion.

### 4.3 Care Homes

It is also relevant to consider the use of ICT-based new technologies within sheltered accommodation, residential homes and nursing homes, involving, for example, CCTV, passive alarms and sensors, and electronic tagging. The evidence available, which is mainly anecdotal, indicates that such use is limited but developing.

Standard 22 of the Department of Health's National Minimum Standards for care



homes for older people,<sup>48</sup> which covers adaptations and equipment, states that call systems with an accessible alarm facility should be provided in every room, but does not deal with the use of new technologies for care and monitoring purposes. Other standards stress the need for “privacy and dignity” and “autonomy and choice”.

## **5. National Infrastructure**

Many of the pilot and demonstration projects in telecare have indicated that they are seeking ways to introduce this new means of care delivery into mainstream services. To do this they have realised that there is a need for a national and local infrastructure to be in place. We will discuss the implementation of a local service later in the report (see section 7). At the national level, infrastructure is a broad term encompassing;

- Technical facilities, products and services such as telecommunications and sensors
- Appropriate organisational structures in both the statutory and voluntary sectors
- An educated workforce and service users and public who are aware of telecare
- Research and development network to support all of the above ranging from the development of prototype hardware through to business process re-engineering

The existing building blocks (section 3.1) contribute to the technical facilities required and the new policies in this area (section 2.1) will contribute to facilitating service re-engineering. Similarly, the related activity stimulated by Government departments and other agencies particularly in the area of wired communities could contribute to the infrastructure required.

### **5.1 Education and Training**

This section reports on the activity in education and training and on the underlying research and development that will also be required in the development of the infrastructure.

The impact of the introduction of new technologies (simple or sophisticated) on the daily activities of staff need to be carefully assessed and project implementations should reflect this. Many of the projects mentioned in this report (see section 3.2.2 and appendix), have recognised the need to find ways to “market” adequately the idea of introducing new activities and procedures for staff. The recent development of telecare in the UK, and the fact that it has not yet become part of the mainstream ways of care delivery means that care workers might not necessarily be aware (or convinced) of the benefits for them.

Many of the telecare demonstrator and pilot projects have devised their own training schemes for formal and informal carers as part of implementation. The training has been both formal and informal. There is now a large body of knowledge within the projects in the area of education and training which needs to be disseminated more widely.

This education and training needs to extend to awareness raising amongst other members of the public and service users, too. There are only a few organisations currently involved in education and training either in the area of professional education or in public awareness raising. Professionals need to know how telecare can be incorporated into their practice and the public need to understand that telecare is part of a structured service that can care for them at home.

#### 5.1.1. Professional Education

One of the few examples of professional education in this field is a multi-disciplinary M.Sc. in Assistive Technology offered by King's College, London. The course aims to produce Assistive Technology specialists who can understand the possibilities of assistive technologies; develop and apply assistive technologies with an understanding of the needs of older and disabled people, understand the roles of the rehabilitation care team and apply research evidence to practice. The modular programme gives students a broad introduction to the field of assistive technology practice and research.<sup>49</sup>

#### 5.1.2. Awareness Raising

Some early work on raising awareness amongst service users, carers and the public is being undertaken by voluntary sector organisations.

The voluntary organisation, Ricability, which produces independent consumer guides for older and disabled people on mainstream and disability products, published a consumer guide to community alarms and alarms services in 2000<sup>50</sup>. More recently Ricability has worked with the Centre for Accessible Environments (CAE)<sup>51</sup> and the Disabled Living Centres Council (DLCC)<sup>23</sup> on a joint project on electronic assistive technologies. Ricability has published a consumer guide<sup>65</sup> and CAE is preparing a guide for professionals.

Voluntary organisations, particularly Counsel for Care<sup>52</sup> and the Alzheimer's Society<sup>53</sup>, have criticised the inappropriate use of new technologies in care homes and discussed the ethical issues involved. Counsel and Care recently published the report "Showing Restraint"<sup>54</sup>, which covers the use of new technologies as part of a wider discussion about restraint, risk, safety, and consent in care homes. The voluntary organisation Values in Action also published a report on electronic tagging in 1998<sup>55</sup>. Their comments can be applied to the whole issue of the use of technology in delivering care and particularly to "informed consent". We will discuss ethical issues in more detail later in the report (see section 6).

Other work on raising awareness is being undertaken by AbilityNet. AbilityNet is a national charity, which provides information and advice on the use of computers by disabled people and has a network of regional centres. Information about its services can be found on its website<sup>56</sup>.

## 5.2 Research and Development

We feel that it is important to distinguish between project development, project evaluation and research as these terms are often wrongly used interchangeably. Project development entails devising and implementing an initiative on the basis of an identified need or an opportunity within the local care community. During the course of the study, we identified a number of projects at this stage which will probably be reporting shortly.

Most of the existing telecare projects are subject to some form of evaluation designed to identify the benefits and measure the impact of introducing ICT into local care delivery. This in itself is a very complex task. The evaluation work is described along with the pilot or demonstrator project in section 3.2.2

Research on the other hand is not project-specific and is undertaken with providing answers to more general questions such as the development of an organisational framework or to provide an insight into issues of service delivery (as an example, see TCPI project). (A31), or the innovative use of existing technologies. Some of the more established telecare projects have taken the results of their evaluations and are researching the broader issues that have been raised during their development.

Stimulus for research can come from many different directions. FAST (the Foundation for Assistive Technology) maintains an on-line database of assistive technology research and development, which is the basis of an annual report on this published by the Department of Health<sup>64</sup>. The database together with details of other activities, including the FAST User Forum, can be found on the FAST website.

Research activities are being performed in the UK with national funding, but there are also many projects being funded by the EU. Appendix 1 lists some of the projects found in the European Commission's database; those included are the ones with at least one UK-based partner.

### 5.2.1. UK Research Activity

This section lists some examples of research activity performed in the UK. The reference (A1, A2, etc) given after the project title corresponds to the page number in Appendix 1.

Advanced Sensors for Supportive Environments for the Elderly (A22) is a research project, based at the Department of Applied Computing, University of Dundee, which is investigating the use of intelligent visual sensors in automatically monitored supportive environments for older people living independently.

South and East Belfast Trust is involved in a range of projects. The Attract project investigated the use of low cost video-conferencing equipment in users' homes to provide therapy services and intensive home care support. The Confident project (A34) aims to develop an information environment to support the independent living of people with severe physical disabilities. The Trust is also involved in Smart Homes, telemedicine and the provision of environmental controls (A33).

The SILC project (A19) aims to develop an intelligent alarm system to increase the safety and independence of older and disabled people by means of automatic biometric sensors.

Memojog, (A23) based at the Department of Applied Computing, University of Dundee in partnership with the Oliver Zangwill Centre, is a project to develop an interactive electronic memory aid for older people based on a personal digital assistant.

RESORT (Remote Service of Rehabilitation Technology) (A20) was an EU-funded research project, which finished in 2000. RESORT is a telematic system to provide remote support to users of rehabilitation technology (RT). RESORT provides an easy to use and adaptable user interface and an open interface specification. RIG (the RESORT Interest Group) was set up in 2001 to create a framework for on-going activities. UK members include the Department of Applied Computing, University of Dundee.

Introducing Assistive Technology into Older People's Homes, (A28) a collaboration between Age Concern Institute of Gerontology and Centre of Rehabilitation Engineering King's College London and Research Group for Inclusive Environments, University of Reading, is researching the feasibility, acceptability, costs and outcomes of introducing a wide range of assistive technology in existing (older) housing occupied by older people.

Appendix 2 lists the centres of activity around the UK where on the basis of research outputs over recent years, we have identified significant, multidisciplinary activity in this area.

### 5.2.2 EU-funded activity

Governments in countries such as Australia, Japan and the USA are studying the feasibility of delivering health-care electronically. Similarly, the European Union is funding projects on telecare, focused, in large part, on enabling independent living and enhancing the quality of life of older and disabled people. Various projects have helped promote technological developments in these areas and have been influential in increasing the focus on older and disabled people.

European Union research activities are implemented for the most part under multi-annual research, technological development and demonstration (RTD) framework programmes.<sup>58</sup>

FP5 was conceived to help solve problems and respond to major socio-economic challenges the EU is facing. It focuses on a number of objectives and areas combining technological, industrial, economic, social and cultural aspects.

FP5 has a multi-theme structure, consisting of seven Specific Programmes, of which four are Thematic Programmes:

- Quality of Life and management of living resources (Quality of Life)
- User-friendly information society (IST)

- Competitive and sustainable growth (GROWTH)
- Energy, environment and sustainable development (EESD)

and three are Horizontal Programmes, which underpin and complement the Thematic Programmes by responding to common needs across all research areas:

- Confirming the international role of Community research (INCO 2)
- Promotion of innovation and encouragement of SME participation (Innovation/SMEs)
- Improving the human research potential and the socio-economic knowledge base (Improving)

Most of the projects focusing on the improvement of the quality of life which received funding during FP5 were part of the Information Society Technologies Programme, which is a major theme of research and technological development within the European Union. IST is a single, integrated research programme that builds on the convergence of information processing, communications and media technologies. IST has an indicative budget of 3.600 Million Euro.

The Sixth Framework Programme for Research (FP6) (2002-2006) will be launched between 11 and 13 November 2002.

The UK has been involved in several pan-European projects, with partners from the academic and industrial sector in many of them. (see Appendix 1)

## **6. Discussion and Observations**

### **6.1 Introduction**

In the two years since the previous report there have been several strategic documents published from various government departments and agencies reinforcing the message that the statutory services should adopt ICT to help support independent living. However, in the same period the number of pilot and demonstrator projects in this field has not increased greatly although those that were already in existence have made progress and the Falkirk Passive Alarms Service (A2) is well established as a mainstream service. There is a natural evolution from pilot through demonstrator to large scale trial to incorporation in mainstream care delivery. Of the pilot and demonstrator projects, only the West Lothian project (Opening Doors for Older People) has recently become a mainstream service, although some others intend to do so.

The slow progress may be accounted for by a lack of appreciation by local senior management of the potential benefits of telecare elsewhere in the system (and limited evidence about outcomes) or by priority being given to other developments, given that it requires considerable resource to introduce a new service across a range of diverse agencies. Although telecare falls within the remit of the Integrating Community Equipment Services (ICES) initiative (10), most local community equipment services are currently focusing on the more basic challenges involved in

integrating and modernising services and are themselves finding it difficult to access appropriate funding and management attention.

However, a number of themes are emerging and these are identified and discussed below.

## 6.2 Client Group

Most current telecare projects focus on older people who are physically frail and/or have varying levels of cognitive impairments and are therefore at risk of harm through falling, fire, flood, gas, wandering or other hazards. Some projects have a particular focus such as dementia or falls management.

A few projects are serving other client groups, generally younger people with cognitive impairments, or are planning to do so. The Falkirk service has always included some younger clients with cognitive impairments or memory problems due to such causes as head injury, stroke, or learning disabilities. The Thistle Foundation also serves a wide range of disabled people. There is no reason why the same technology and approach should not be provided to the younger age group where appropriate.

## 6.3 Care Settings

The focus of this report is on supporting older and disabled people in their own homes. However, we found activity in a variety of different settings including existing new build specialist housing, intermediate care, rehabilitation and recuperation homes, step-down facilities, and care homes. We can make a distinction between installations where the technology is used to alert resident staff to a situation and those where there is no resident formal carer and the alarm call goes to an informal carer and/or goes off-site to be handled by an external agency such as the community alarms service. Whilst the former has benefits for the small numbers of users and carers involved, it is the latter that offers the potential of supporting independent living in the community for large numbers, allowing earlier discharge from hospital or avoiding admission to a care home or hospital. Several of the telecare projects argue for early provision of technology as a preventive measure.

## 6.4 Person-Centred Care

Moving from a hospital setting to an own home setting changes the concept of person-centred care. This has been recognised by community care workers but seems to be thrown into sharper focus by the use of ICT. In the community the client is an active recipient of care in his or her own environment and this changes what services can be delivered and how they can be delivered. The client's environment is not only composed of their physical location but also includes the contribution of their informal carers and other social support mechanisms. The more involvement of the clients and carers in the decisions about care, the more successful the service.

## 6.5 Multi-Agency Working

The common understanding inherent in the strategic documents and demonstrated in the pilot projects, is that supporting independent living requires multi-disciplinary and multi-agency working and the integration of different approaches, such as combining nursing care, domiciliary care, assistive technology and telecare. Many of the projects demonstrate that success depends greatly on the quality of the interaction between the partners.

The large-scale telecare projects typically involve inter-agency partnerships from local authority social services and housing, the NHS, community alarms services (often local authority), housing associations and industry. We can see in some projects the influence of increasing joint working by NHS and social services (and in some cases housing) in developing services for older people, including intermediate care. In the future we are also likely to see increasing involvement in ICT-based developments from community equipment services, NHS clinical scientists with specialist expertise in electronic assistive technology, and housing providers involved in the Supporting People initiative, some of whom already use community alarms services.

## 6.6 Service Delivery and Care Needs Assessment

The Safe at Home project points out that “a robust local infrastructure to support the use of assistive technology is needed if the project is to achieve a successful transition to a service”. The infrastructure will need to support all stages of delivery, including referral, assessment, specification of equipment, installation and familiarisation, maintenance and review. The modalities for response to alarms should be agreed and supported by appropriate staffing and the monitoring centre should operate to high quality standards.

Assessment of care needs requires a holistic approach. Identifying the need for assistive technology or telecare should be an integral part of any assessment or care plan and there should be appropriate links to assessment for other forms of care and support. This is in line with the Single Assessment Process (SAP) being developed across the country jointly by health and social services as they implement the National Service Framework for Older People.

## 6.7 Ethical Issues

The Astrid Guide<sup>33</sup> provides a useful introduction to ethical issues in implementing telecare and assistive technology. While its main focus is on the use of technology in dementia care, its principles are applicable elsewhere. It points out that similar ethical issues, such as risk and safety, arise in the provision of other forms of care where technology is not involved. It suggests how to develop ethical protocols and how to deal with the issue of “informed consent”.

The message from the current demonstrator and pilot projects is that those implementing services should build in full and rigorous consideration of ethical issues from the outset, taking into account Government policies and professional values.

Approaches based on well-established principles of autonomy, choice, consent and confidentiality should be developed in consultation with older and disabled people.

## 6.8 Project Implementation

It is clear from the projects that robust project management and appropriate resourcing is needed to introduce a service like telecare, which is innovative and involves a range of agencies. Project implementation may require the introduction into the service delivery chain of new organisations with different priorities and organisational frameworks such as community alarms services. This is an expanded role for these services and the correct levels of response and involvement with issues such as product and system maintenance need to be developed. The Association of Community Alarms Services Providers (ASAP) will continue to contribute to these developments<sup>29</sup>.

Some projects have reported problems with using the hardware in practice, whereas others have not. This is to be expected in a situation where the few suppliers are themselves developing rapidly and accept that some of their products are still under development. The Safe at Home (A30) and ASTRID (A29) projects successfully used a core list of established products and found that any difficulties were due as much to inadequacies in response as much as technical failure.

It is important for projects to work closely with suppliers from the outset and be clear where products are still under development. In the longer term there is the need for product evaluation and the development of technical standards. The Medical Devices Agency (MDA) may have a role here along with other established medico-industrial bodies and voluntary organisations such as Ricability.

## 6.9 Evaluation

Several of the projects are undertaking an evaluation of their activity. This is extremely important to the development of the subject, as there is an absolute need to measure the impact of this new service delivery on the various stakeholders involved (including user and carer satisfaction) and to demonstrate improved outcomes. There is no generally accepted method of evaluating the impact of this new form of service delivery or of disseminating information about activity, sharing experience and building on best practice. These two aspects need to be developed in parallel.

## 6.10 Research

There is a nucleus of research activity both in the UK and in Europe which underpins the implementation of these services. This ranges from sensor development, infrastructure development and evaluation, through to more strategic studies. This research does not always seem to be well connected to service delivery requirements and implementation at local level. This is possibly due to the difficulty of setting up and funding multi-disciplinary research teams and in linking these to the



relevant range of interests across government and the private and voluntary sectors. The Assistive Technology Forum, which is being set up by The Foundation for Assistive Technology (FAST), may help here.

## 6.11 Development of Telecare

Few of the projects listed in section 3.2.2 seem to be built upon the lessons from projects in other locations. Researchers mainly seem to be applying the lessons learnt from their *own* previous projects (like SE Belfast Trust with ATTRACT<sup>59</sup> or Northampton with ASTRID<sup>62</sup>). Cross-referencing between projects appears to be quite limited, although many of them are pursuing very similar objectives. One of the reasons can be the lack of diffusion of results, or competitive behaviour, another the lack of sources of collated information to refer to. Efforts are likely to be duplicated if there is not enough diffusion of the results (positive and negative) of the existing activity.

The evolution of telecare projects from the last report to this one, seems to indicate that collaboration is developing between different professions and that the development of projects is becoming more interdisciplinary. However, there seems to be a need for another type of collaboration between project developers, the need to share experiences further. This seems to be happening in the related area of telemedicine, and for that reason, some telemedicine areas seem to be more mature and developed. In order to develop telecare, inter-project collaboration and a good source of reference information are needed.

## 7. Summary

This is still an emerging area of activity with some positive results from a limited number of trials. It is complicated because of its requirements for multi-agency and multi-disciplinary working. However, some limited generalisations may be made and some messages derived about the implementation of services.

Telecare fits into a care package that is derived on the basis of an individual assessment of need and which can include domiciliary care, assistive technology and home nursing care. The care package is thus personalised but a “core” hardware package is emerging to which elements can be added to meet individual needs. The current development work is making the capabilities of telecare clearer and the principles and practicalities of implementation are emerging.

### 7.1 Typical Telecare Equipment Package

The core telecare equipment package for safety and risk reduction in the home emerging from the UK pilot work is:

An enhanced capability telephone with a client pendant alarm as the hub of the home system. The hub receives alarm signals via wireless transmission from a fall detector, flood detector, smoke detector, carbon monoxide detector, temperature monitor, and movement detector. These are all automatically

relayed to the named carer or to a call centre, in some cases also triggering a shut-down of equipment.

This core package is commercially available.

Other sensors can be added to suit individual need, including bed or chair occupancy detector, fridge door closure detector, and front door open/shut detector. Some products are still under development.

More advanced telecare applications include:

lifestyle monitoring using intelligent systems;  
electronic prompts and memory aids;  
physiological monitoring systems (in conjunction with specialised telemedicine equipment)  
videotelephony and videoconferencing

## 7.2 Capabilities of Telecare

The main function of telecare is to enable older and disabled people remain in their own homes with increased safety and reassurance. Reassurance to the user that help can be summoned quickly; to the informal carer that their relative is safe and they will be called in the event of an emergency; and to the professional that there is cover when they are not present.

The capabilities of telecare are that it is:

- Remotely Delivered Service
- Flexible and Expandable
- Location Independent
- Risk Minimising

## 7.3 Principles and Practicalities of Implementation

The messages that are coming out of the activity in this area are that any new service to support independent living by older and disabled people should be established using some simple principles and address six practical issues.

### 7.3.1 Principles

Telecare should be:

- part of an integrated care package developed on the basis of a holistic assessment of need

- delivered as part of a comprehensive service with technical and support infrastructure which meets ethical and quality standards

### 7.3.2 Practicalities

Project implementation should:

- be appropriately resourced and supported by robust project management
- have clear, measurable objectives
- be integrated with other initiatives for older and disabled people
- build on examples of good practice
- engage all relevant agencies and disciplines and be jointly commissioned with agreed responsibilities, procedures and funding arrangements
- have the active involvement of users, carers, voluntary organisations and suppliers

## **8. Recommendations**

On the basis of the findings of this report we would make the following recommendations for the development of the use of ICT, telecare and new electronic assistive technologies to support independent living:

- There should be a better mechanism for co-ordinating activity in this field between Government Departments.
- The Government should provide guidance and information to assist the care services in implementing these new methods of supporting older and disabled people.
- There should be joint education and training of all health and social care professionals.
- Public awareness raising activities of this new method of care delivery should be supported.
- There should be a better mechanism for co-ordinating R&D activity in this field between Government Departments, the Research Councils and the care services.
- There should be research on project evaluation methodologies.

## 9. References

1. Department of Health (2000) "The NHS Plan: the Government's response to the Royal Commission on Long Term Care", Cm 4818-II
2. Health Survey of England (1995). The Stationery Office.
3. Department of Health (1998) "Modernising Social Services", The Stationery Office.
4. NHS Executive (1998), "Information for Health", ISBN 0-95327190-2
- 4A. Department of Health (2002) Delivering 21st Century IT Support for the NHS".
5. Royal Commission on Long Term Care (1999) "With respect to old age: Long term care – rights and responsibilities", Cm 4192, London, The Stationery Office
6. Audit Commission (2000), "Fully Equipped: the provision of equipment to older or disabled people by the NHS and social services in England and Wales", ISBN 1-86240-213-2
- 6A. Audit Commission (2002). "Fully Equipped: Assisting Independence". Available online at : <http://www.audit-commission.gov.uk/publications/upequipped02.shtml>
7. Department of Health (2000), "The NHS Plan", Cm 4818, The Stationery Office
8. Department of Health (2001), "Intermediate Care", HSC 2001/01: LAC (2001) 1
9. Department of Health (2001), "Community Equipment Services", HSC 2001/008: LAC (2001) 13 and Department of Health (2001), "Guide to Integrating Community Equipment Services", 2001
10. ICES Implementation Team website: [www.icesdoh.org](http://www.icesdoh.org)
11. Department of Health (2001), "National Specialised Services Definitions Set", available online at: [www.doh.gov.uk/specialisedservicesdefinitions/5disequip](http://www.doh.gov.uk/specialisedservicesdefinitions/5disequip)
12. Scottish Executive (2001), Scottish Executive's Response to the Report of the Joint Future Group
13. The Joint Future Unit at: [www.scotland.gov.uk/health/jointfutureunit/equipadapt](http://www.scotland.gov.uk/health/jointfutureunit/equipadapt)
14. Department of Health (2001), National Service Framework for Older People. The Stationery Office
15. Department of Health (2001), "Valuing People", The Stationery Office.

16. Department of the Environment, Transport and the Regions (2001), "Quality and Choice for Older People's Housing – A Strategic Framework". The Stationery Office
17. Department of the Environment, Transport and the Regions (2001), Supporting People – Policy into Practice, The Stationery Office.
18. Supporting People website: [www.spkweb.org.uk](http://www.spkweb.org.uk)
- 18A. Department of Health press release: 2002/0324. Expanded Services and Increased Choices for Older people –  
<http://tap.ukwebhost.eds.com/doh/IntPress.nsf>
- 18B. House of Commons health Committee (2002), Delayed Discharges, HC617, The Stationery Office Ltd. Also available at:  
[www.parliament.uk/commons/selcom/hlthhome.htm](http://www.parliament.uk/commons/selcom/hlthhome.htm)
19. Foundation for Assistive Technology (FAST) website: [www.fastuk.org](http://www.fastuk.org)
20. Cowan, D. and Turner-Smith, A. R. (1999). "The role of Assistive Technology in Alternative Models of Care for Older People". In *With Respect to Old Age*, report by The Royal Commission on Long Term Care, chair Prof. Sir Stewart Sutherland. HMSO London, 2, 325-346.
21. Disabled Living Foundation website [www.dlf.org.uk](http://www.dlf.org.uk)
22. Ricability website: [www.ricability.org.uk](http://www.ricability.org.uk)
23. Disabled Living Centres Council website: [www.dlcc.org.uk](http://www.dlcc.org.uk)
24. Potter, R. (2002) Private communication.
25. British Educational Communications and Technology Agency (BECTA) website [www.becta.org.uk/inclusion/index.html](http://www.becta.org.uk/inclusion/index.html).
26. NHS Purchasing and Supply Agency website [www.pasa.nhs.uk](http://www.pasa.nhs.uk)
27. British Society of Rehabilitation Medicine (2000), "Electronic Assistive Technology – A Working Party Report of the British Society of Rehabilitation Medicine".
28. Stead, A., (2002) "Life Support Technology Redefined: A qualitative study evaluating the experience of a small group of adults in acquiring and using environmental control systems", University of Leeds, Department of Sociology and Social Policy.
29. The Association of Social and Community Alarms Providers (ASAP), 4 Beaufort House, Beaufort Court, Sir Thomas Longley Road, Rochester, Kent ME2 4FB, Telephone: 01634 304200, website: [www.asap-uk.org](http://www.asap-uk.org)

30. Briggs, J. S., Curry, R. G. (2000) "Telemedicine and Telecare", in W. Abbott, J. Bryant, S. Bullas (eds), *Current perspectives in Health Informatics*, p107-114, British Computer Society, [ISBN 0-9535427-4-2]
31. Telemedicine Information Service website [www.tis.bl.uk](http://www.tis.bl.uk)
32. Gillies, B. (2001) "Smart Support at Home: an Evaluation of Smart Technology in Dispersed Housing", University of Dundee.
33. Marshall, M. (2000) "ASTRID: A Social and Technological Response to meeting the needs of Individuals with Dementia and their carers – A guide to using technology within dementia care", Hawker Publications Ltd ISBN 1 874790 52 3
34. Thistle Foundation – [www.thistle.org.uk](http://www.thistle.org.uk) Contact: Ian Williams tel - 0141 886 3375 email: [iwilliams@thistle.org.uk](mailto:iwilliams@thistle.org.uk)
35. Porteous J and Brownsell S, (2000) "Using Telecare: Exploring Technologies for Independent Living for Older People", Anchor Trust, ISBN 0 906178 56 8, see also [www.anchor.org.uk](http://www.anchor.org.uk)
36. Better Government for Older People website: [www.bettergovernmentforolderpeople.gov.uk](http://www.bettergovernmentforolderpeople.gov.uk)
37. Age Concern website: [www.ageconcern.org.uk](http://www.ageconcern.org.uk)
38. London Connect website [www.londonconnects.org](http://www.londonconnects.org)
39. Wired up Communities Initiative website [www.dfes.gov.uk/wired/](http://www.dfes.gov.uk/wired/)
40. The Office of the e-Envoy website: [www.e-envoy.gov.uk](http://www.e-envoy.gov.uk)
41. [www.e-envoy.gov.uk/ecommerce/broadband/bbsgrep\\_menu.htm](http://www.e-envoy.gov.uk/ecommerce/broadband/bbsgrep_menu.htm)
42. The Application Home Initiative (TAHI) [www.theapplicationhome.com](http://www.theapplicationhome.com)
43. INTEGER Group [www.integerproject.co.uk](http://www.integerproject.co.uk)
44. Tang, P. and Venables, T. (2000) "Smart homes and telecare for independent living". *Journal of Telemedicine and Telecare*, vol. 6, pp. 8-14.
45. Fisk, M. (2001) "The implications of smart home technologies" in Peace, S. and Holland C (eds.) *Inclusive Housing in an Ageing Society*. pp. 101-124 Bristol: Policy Press.
46. The Housing Innovation Site. Smart homes database developed and maintained by SPRU at the University of Sussex: [www.rethinkinghousebuilding.org](http://www.rethinkinghousebuilding.org)
47. For more information see Bath Institute of Medical Engineering website [www.bath.ac.uk/bime/projects/smart/index.htm](http://www.bath.ac.uk/bime/projects/smart/index.htm)

48. Department of Health (2002), "Care Homes for Older People: National Minimum Standards" The Stationery Office, ISBN 011 322579 2; website [www.doh.gov.uk/ncsc](http://www.doh.gov.uk/ncsc)
49. [www.kcl.ac.uk/core](http://www.kcl.ac.uk/core)
50. Ricability (2000), Calling for Help: A guide to community alarms.
51. Centre for Accessible Environments website: [www.cae.org.uk](http://www.cae.org.uk)
52. Counsel and Care website: [www.counselandcare.org.uk](http://www.counselandcare.org.uk)
53. Alzheimer's Society website: [www.alzheimers.org.uk](http://www.alzheimers.org.uk)
54. Clarke, A., Bright, L. (2002), "Showing Restraint: Challenging the use of restraint in care homes". Counsel and Care
55. Bewley C (1998), Tagging: a technology for care services?, Values into Action.
56. AbilityNet website: [www.abilitynet.co.uk](http://www.abilitynet.co.uk)
57. See for instance CarePlus: [www.shef.ac.uk/careplus](http://www.shef.ac.uk/careplus)
58. EC's Community Research and Development Information Service [www.cordis.lu](http://www.cordis.lu)
59. A description of the ATTRACT project can be found in the Appendix to this report p A 44.
60. Gunter B., Huntingdon P., Williams P., Nicholas D., (2001) "Health Advice on the TV: Early Opinions of Users" pp4-8, Online and CD Notes.
61. Gunter B. (2001), Is TV Good for You? The Library Association Record.103(9), pp558-559
62. See <http://www.astridguide.org/>
63. Woolham, J., B. Frisby et al.(2002) The Safe at Home Project. Using technology to support the care of people with dementia in their own homes. London: Hawker Publications.
64. Department of Health (2002). Chronically Sick and Disabled Persons Act 1970. Research and Development Work Relating to Assistive Technology 2001. Presented pursuant to c.44 1970 Section 22. Prepared by Sue Quinton and Moira Mitchell. Available online at: [www.doh.gov.uk/research](http://www.doh.gov.uk/research).
65. Ricability (2002), What's New? In Products for Easier and Safer Living" ISBN 0 9006 21 51 6. Tele: 020 7427 2460. Website: [www.ricability.org.uk](http://www.ricability.org.uk)



## 10. Bibliography and further information

Tang, P., Gann, D., Curry, R. (2000) "Telecare. New Ideas for Care @ Home". ISBN 1 86134 2160, pub. Bristol: Policy Press.

Telemed'02. Conference Proceedings. From the 9<sup>th</sup> International Conference on Telemedicine and Telecare. January 2002.

Journal of Telemedicine and Telecare. Telecare articles browsed for the 1999-2002 period. Available online at [www.coh.uq.edu.au](http://www.coh.uq.edu.au)

Journal of Dementia Care.

Engineering and Physical Sciences Research Council EQUAL Research Initiative (Extending the quality of life of older and disabled people) at [www.fp.rdg.ac.uk/equal](http://www.fp.rdg.ac.uk/equal)

The following list gives websites for the project and research groups mentioned in the report and appendices.

People at Home and in Touch:  
[www.durham.gov.uk/DurhamCC/usp.nsf/pws/Social+Services+-+People+at+Home+and+in+Touch](http://www.durham.gov.uk/DurhamCC/usp.nsf/pws/Social+Services+-+People+at+Home+and+in+Touch)

CarePlus: [www.shef.ac.uk/careplus](http://www.shef.ac.uk/careplus) and <http://www.careplus.information>, see also [www.act.shef.ac.uk/](http://www.act.shef.ac.uk/)

SILC: [www.fortec.tuwien.ac.at/reha.e/projects/silc/silc.html](http://www.fortec.tuwien.ac.at/reha.e/projects/silc/silc.html)

RESORT: [www.fortec.tuwien.ac.at/reha.e/projects/resort](http://www.fortec.tuwien.ac.at/reha.e/projects/resort).

CIRCA: [www.computing.dundee.ac.uk/projects/circa/](http://www.computing.dundee.ac.uk/projects/circa/)

SUPPORTIVE ENVIRONMENTS:  
[www.computing.dundee.ac.uk/projects/supportiveenvironments/](http://www.computing.dundee.ac.uk/projects/supportiveenvironments/)

MEMOJOG: [www.computing.dundee.ac.uk/projects/MemoJog](http://www.computing.dundee.ac.uk/projects/MemoJog)

ENABLE: [www.enableproject.org](http://www.enableproject.org)

[www.qub.ac.uk/tbe/arc/research/projects/equal.html](http://www.qub.ac.uk/tbe/arc/research/projects/equal.html)

[www.fp.rdg.ac.uk/equal/AT/](http://www.fp.rdg.ac.uk/equal/AT/)

[ASTRID www.astridguide.org/index.htm](http://www.astridguide.org/index.htm)

Safe at Home: [www.northamptonshire.gov.uk/council/documents/dementia/safe.asp](http://www.northamptonshire.gov.uk/council/documents/dementia/safe.asp)

TCPI: [www.sussex.ac.uk/spru/imichair/projects/template.cfm?content=telecare.cfm](http://www.sussex.ac.uk/spru/imichair/projects/template.cfm?content=telecare.cfm)

CONFIDENT:  
[http://212.73.32.174/Fundacion/Europeos/Confident/en/presentation/CF\\_TOCP](http://212.73.32.174/Fundacion/Europeos/Confident/en/presentation/CF_TOCP)

AMON: [www.md-center.net/AMON](http://www.md-center.net/AMON)

TELECARE: [www.uninova.pt/~telecare/publications.htm](http://www.uninova.pt/~telecare/publications.htm)

[DOC@:HOME: www.curonia.com/eur/Project%20Web%20Site.htm](http://www.curonia.com/eur/Project%20Web%20Site.htm)

MEDICATE: [www.medicare-online.org](http://www.medicare-online.org)

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