

Assistive Technology

Independence and well-being 2

Preface

- 1 Powerful forces are changing the nature of health and social care. With better access to higher education, information sources such as the internet and greater personal wealth, people want more say in how their health and social needs are met. There are also massive advances in information management, technology and science. These forces, facilitated by an increasingly pervasive electronic and radio-enabled environment, are rapidly converging to create exciting new ways to improve public services.
- 2 Harnessing these forces will help public services to meet the challenges posed by an ageing population and the needs of disabled people. The potential of technology to support independence is enormous and is one way to break the downward spiral that all too often leads to dependency, wasted lives and higher public expenditure.
- 3 Until recently 'aids and appliances' resided in the organisational shadows of the NHS and social services. That is now changing. A more modern expression, 'assistive technology' (AT) is now becoming commonplace as a result of technological advances and a growing appreciation of how it can support independence.
- 4 The Audit Commission's previous work in this area has examined 'traditional' AT: orthotics, prosthetics, wheelchair services, 'standard' community equipment and audiology services. This report concentrates mainly on some of the newer electronic assistive technologies of telecare and telehealth.¹ But the core messages are still relevant to all those with an interest in promoting the independence of older or disabled people.
- 5 This report is aimed primarily at service commissioners, service managers and the Government; although users, carers and their representatives will, hopefully, also find it of value as they develop a more prominent role at the centre of health and social care. It is one of a number of reports by the Audit Commission which share the common theme of promoting independence. Other reports to be published during 2003 look at:
 - ◆ older people's views of what keeps them independent, and the public policies in place to help them to do so;
 - ◆ the approaches that can be deployed to support frail older people and people with chronic diseases in their own homes;
 - ◆ the policy frameworks and various initiatives to support carers; and
 - ◆ the initiatives being taken across health, local government and other agencies to help people avoid losing their independence.

¹ The expressions 'telehealth' and 'telemedicine' tend to be used interchangeably. 'Telehealth' is considered the more accurate and so is used throughout this report.

Introduction

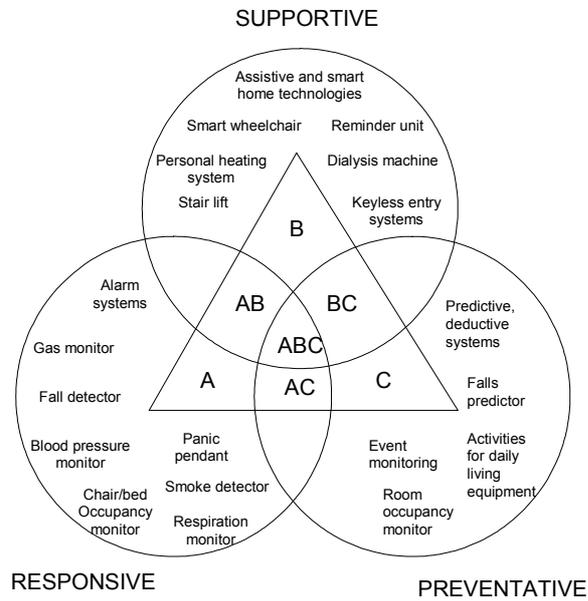
Background

- 6 Promoting independence has become central to public policy in recent years. In 1989, the White Paper Caring for People (Ref. 1) sought to provide a coherent framework to shape services 'over the next decade and beyond'. The subsequent 1990 NHS and Community Care Act highlighted the promotion of choice and independence as fundamental values. These objectives were echoed in the 1997 NHS White Paper The New NHS: Modern, Dependable and the 1998 Public Health Green Paper Our Healthier Nation, which had as one of its main themes the need to 'improve the health of the population by increasing the length of people's lives and the number of years people spend free from illness.
- 7 Since Caring for People was published the gap between policy and intention on the one hand and the reality of users' experiences has remained stark. Yet there is a new way of bridging the gap: new assistive technology (AT) can not only support the ways in which people maintain or regain their independence, it also has the potential to redesign the way in which many aspects of health and social care are delivered. That is what this report is about. AT can be defined as: 'any item, piece of equipment, product or system that is used to increase, maintain or improve the functional capabilities and independence of people with cognitive, physical or communication difficulties.' (Ref. 2) This broad definition incorporates an incredibly large number of devices, ranging from 'low-tech' mobility devices such as a walking stick to 'high-tech' speech synthesisers or stair-climbing wheelchairs.² These technologies can be used to support a wide range of user needs (Ref. 3) (Exhibit 1) and support their independence (Box A).

² To provide an idea about the number and variety of AT devices available for use today, an online catalogue of assistive technology (<http://www.abledata.com/>) includes over 18,000 items supplied by over 2,000 different companies.

Exhibit 1: Ways in which AT can support independence

AT can support a wide range of user needs.



Possible AT provision for the zones identified in Exhibit 1

Zone	User characteristics	Possible AT provision
A	People supplied with equipment to support earlier discharge from hospital	Blood pressure monitor Fall detector 'Panic' pendant Environmental control systems
B	Patient with muscular sclerosis People receiving palliative care at home	Wheelchair with integrated electronic technology Environmental control systems
C	People undergoing needs assessment, perhaps following a change in personal circumstances	Simple equipment to support activities of daily living Environmental control systems
AB	People who require some basic assurances and support in order to lead an independent lifestyle in their own homes – 'well older people'	'Panic' pendant Fall detector Video doorbell

		Medicine dispenser/compliance unit
BC	People with dementia requiring support to lead an independent life in their own homes or in supervised accommodation	Reminder unit General long-term monitoring
AC	Older person living at home requiring reassurance	'Panic' pendant Chair occupancy monitor Room occupancy monitor Security system Event analysis system Fall detector
ABC	<p>People at risk of accident or relapse</p> <p>People with physical disabilities</p> <p>People with chronic conditions such as diabetes, heart failure or respiratory disease</p> <p>People with dementia</p> <p>Anyone attracted by the design or convenience offered by assistive technology</p>	<p>Equipment for daily living</p> <p>Reminder unit</p> <p>Fall detector</p> <p>Environmental control system</p> <p>Chair occupancy monitor</p> <p>Room occupancy monitor</p> <p>Medicine dispenser/compliance unit</p> <p>Virtual consultations</p>

The purpose of this report

Box A

Independence defined

The independent living movement uses the word independent: 'in a practical and common-sense way to mean simply being able to achieve our goals. The point is that independent people have control over their lives, not that they perform every task themselves. Independence is not linked to the physical or intellectual capacity to care for oneself without assistance; independence is created by having assistance when and how one requires it.'

Source: Morris, 1993 (Ref. 6)

- 8 Previous Audit Commission reports have demonstrated how AT can deliver high-quality services at low cost (Ref. 7)(Ref. 8). A few health and social care communities are already using AT to deliver innovative services to the benefit of users, their carers, the wider public services and the taxpayer. But not all are making good progress. This report is aimed primarily at them and is presented in five further chapters:
- ◆ **Chapter 2** - examines the place of AT in the current policy context;
 - ◆ **Chapter 3** - describes the current evidence showing how AT supports independence;
 - ◆ **Chapter 4** - analyses the current obstacles to progress;
 - ◆ **Chapter 5** - explains how change can be introduced; and
 - ◆ **Chapter 6** - provides the conclusions.

Why AT Matters

9 Several forces are driving the development of AT:

- ◆ users' aspirations;
- ◆ its potential impact of public health;
- ◆ the impact of the ageing population;
- ◆ the prevalence of disability;
- ◆ current government policy; and
- ◆ future opportunities

Users aspirations

10 The aspirations of older or disabled people are similar to everyone else's. They want to be seen as individuals with a range of friendships and relationships; 80 per cent of older people want to live in their own homes (Ref. 9); they want to be independent and to be as healthy as possible; and most of all they want to be in control of their lives (Ref. 10)(Ref. 11). They do not want others to define their limitations. AT can support these aspirations by allowing people to maintain or regain their autonomy, and it can provide them with the choice of staying in their own homes rather than having to move into residential care.

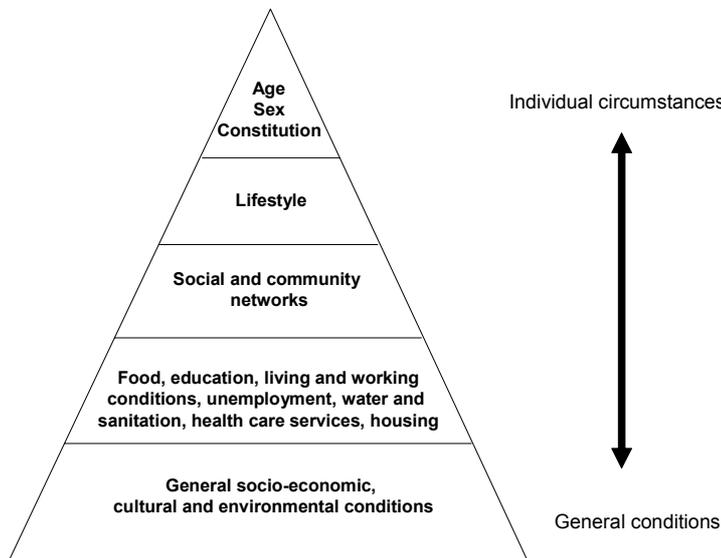
The potential impact of AT on public health

11 Public health is determined by a hierarchy of interacting components, several of which can be supported by AT (Exhibit 2). Technology can help to promote a healthy lifestyle: it supports the development of social and community networks by providing access to transport and leisure activities, it allows access to education and employment, it can improve living and working conditions and it can help to provide accessible and safer housing. AT can also be configured to meet individual needs and preferences.

Exhibit 2

Determinants of public health

Public health is determined by a hierarchy of components, several of which can be supported by AT.



Source: Audit Commission

Impact of the ageing population

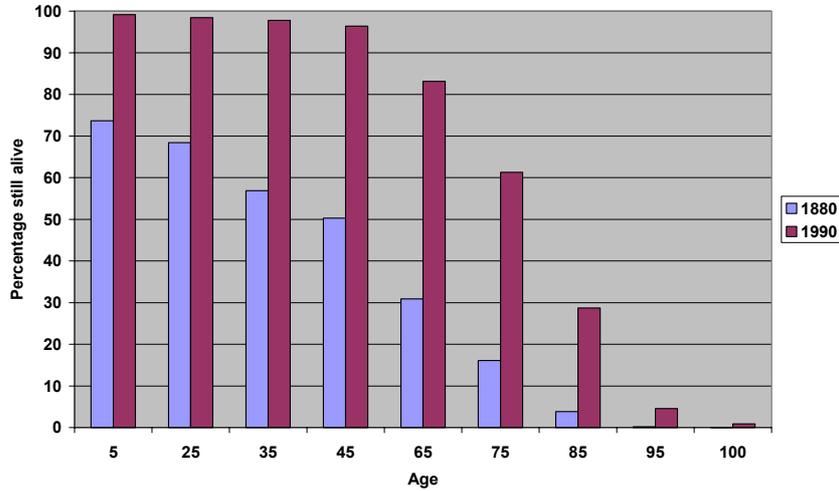
- 12 A greater proportion of the population is living to an old age compared with 100 years ago (*Exhibit 3*). In present day England, a person aged 65 has a three-in-four chance of living to 75. Even in Victorian times, 65 year olds still had a one-in-two chance of reaching 75; in fact, the ageing population is mainly the result of the numbers surviving childhood. In Victorian times, one-quarter of all children died before their fifth birthday, compared with less than 1 per cent today. As a result, half the human beings who have ever lived to be over 65 are alive today. Of those girls born in the developed world in 1990, 90 per cent will live to be 65 and over half will live beyond 85 years (Ref. 12). The greatest relative growth in the population will be among this latter age group: in England, it could rise by as much as 140 per cent over the next 50 years (Ref. 13).³ As people get older, their need for care services increases due to greater frailty and chronic disease (Ref. 14)(Ref. 15) but a range of ATs can improve their lives (*Box A*).

³ NB The Royal Commission on Long Term Care noted that the population aged over 85 was expected to increase less dramatically over the next 20 years by between 22 per cent and 50 per cent. Source (Ref. 3)

Exhibit 3

Survival rates in England in the 1880s and 1990s

A greater proportion of the population now survives to an old age.



Source: Kirkwood, 1999 (Ref. 16)

Box A

Common ailments that can be helped by the use of AT

Common conditions affecting people over age 65	Incidence in the population over age 65	ATs that can help to alleviate the condition and help to maintain independence
Arthritis	50%	Equipment for daily living
Hypertension and heart disease	30%	Wheelchairs; telehealth for remote monitoring of vital signs such as heart rate and variability and body weight
Diabetes	11%	Orthopaedic footwear; telehealth for remote monitoring of blood glucose, hypoglycaemia alarms and medication reminders
Hearing problems	32%	Hearing aids, induction loops, text phones
Cataracts and other forms of visual degeneration	26%	Visual aids, better lighting, reading magnification cameras and displays, colour sensors, text to sound converters
Mobility problems	35%	Wheelchairs, walking-frames, stair-lifts, fall detectors, bed monitors, personal environmental controls
Dementia	5%	Telecare systems to monitor safety and movement

Source: Audit Commission

- 13 There is a tendency to see the ageing population as a disaster in the making rather than the two-fold triumph that it is. Population growth has been brought under control and the proportion of deaths at an early age has been reduced. What is needed now are effective plans to maintain the independence of the growing number of older people which results from these successes. There are, however, different views about future prospects for the overall health of the population. Some believe that scientific advances will produce longer life with less disease and disability in old age, while others foresee the population becoming older and sicker (Box B).

Box B

Alternative scenarios for and the costs of the ageing population

Compression of morbidity thesis
Life expectancy is unlikely to continue to increase much beyond present levels and the adoption of healthier lifestyles and scientific advances will result in a compression of morbidity into a brief period at the end of life (Ref. 17). People will live extra years in good health, and end-of-life debility will be recognised and treated with care and support rather than aggressive medical interventions. In this scenario, the predicted cost of supporting people over age 65 in 2050 is 4 per cent to 6 per cent of Gross Domestic Product (GDP).
Equilibrium of morbidity thesis
Others argue that there is no evidence that a mortality ceiling has been reached, or will soon be reached (Ref. 18). Life expectancy may continue to increase and the balance between mortality and morbidity may be maintained. In this scenario, the predicted cost of care of the over 65s in 2050 is 6.5 per cent to 7 per cent of GDP.
Expansion of morbidity thesis
The prospect of an expansion of morbidity has also been argued, with people living longer in poorer health. Expenditure will rise because diseases will be treated with aggressive costly interventions with end-of-life debility unrecognised (Ref. 19). This would result in a two to three-fold increase in the incidence of chronic disease and disability (Ref. 20). In this scenario, the predicted cost of caring for the over 65s in 2050 is 8 per cent to 10 per cent of GDP.

Source:

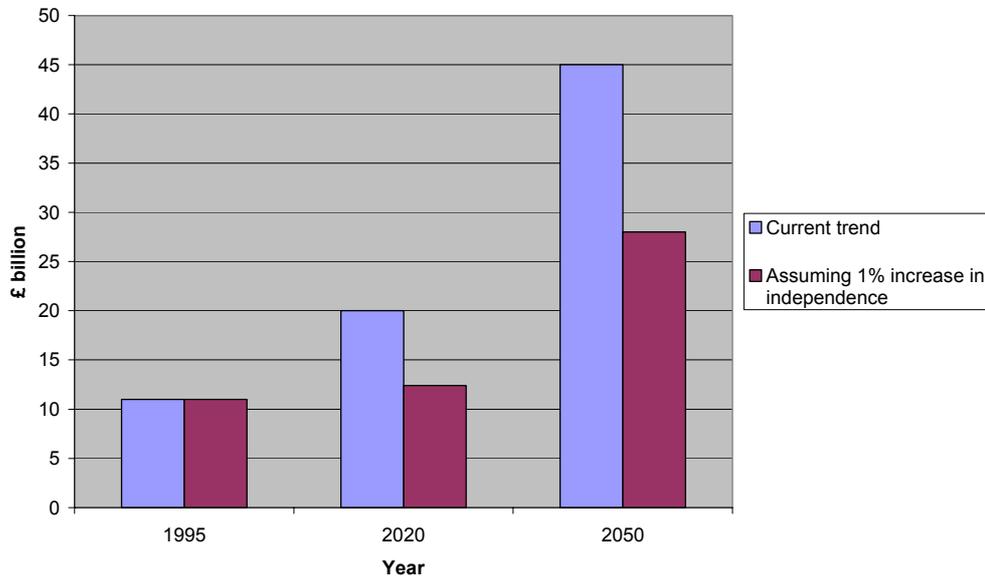
www.actuaries.org.uk/library/proceedings/aging_pop/2002conf/Bolnick_presentation.pdf

- 14 An expansion of morbidity would increase the costs of the ageing population significantly, whereas achieving a 1 per cent annual increase in independence would cumulatively make a significant difference to the cost of these population changes, all else being equal (*Exhibit 4*). So there is a big pay-off for individuals, their families, and society as a whole if the scale of disability in old age can be reduced through prevention, the use of AT and new forms of domestic and health care.

Exhibit 4

Current and future costs of caring for older people

A cumulative 1 per cent increase in independence would have a significant effect on the cost of caring for older people.



Source: Royal Commission on Long-term Care, 1999 (Ref. 3)

The prevalence of disability in the community

15 The prevalence of disability is high in some communities. For example in London, 22 per cent of households include someone with a long-term illness which restricts their functional ability (Ref. 22). Another study in Scotland found that one-third of households included a disabled person. Of this group, one-third used equipment to assist with self-care, with 41 per cent having purchased it for themselves (Ref. 23). There is also a significant level of unmet need. Those aged over 75 years have greatest unmet need for vision and hearing aids, whereas the younger age groups have a greater unmet need for AT to improve their mobility. Unmet need is highest overall in the younger age group, though this group is more likely to purchase devices themselves (Ref. 24). Many people remain unaware of the services that are available to support independence (Ref. 25)(Ref. 26).

The place of AT in government policy

- 16 The Government's objectives for supporting older or disabled people include:
- ◆ eliminating health inequalities: on average, a man in south-east England can expect to live 89 per cent of his 74½ years in good health, whereas men in Wales can expect to spend only 86 per cent of their 73 years in good health (Ref. 27);
 - ◆ promoting independence through rehabilitation, reablement and preventing unnecessary hospital admission;
 - ◆ providing fast and convenient treatment with fair access;
 - ◆ providing older people and their carers with a range of services, including preventive interventions, health promotion, support with activities of daily living, specialist treatment, rehabilitation and follow-up care;
 - ◆ integrating services across health and social care boundaries; and

- ◆ respecting the preferences of older or disabled people and their carers about where care is given (Ref. 28).

17 These objectives to support older and vulnerable people are intended to be delivered through an array of policy initiatives. Some of the main ones are listed here and described below.

- ◆ managing hospital capacity
- ◆ National Service Framework (NSF) for Coronary Heart Disease
- ◆ NSF for Mental Health
- ◆ NSF for Diabetes
- ◆ NSF for Older People
- ◆ services for people with learning disabilities
- ◆ NSF for Long-Term Conditions
- ◆ National Strategy for Carers
- ◆ information and communications technology (ICT) policy
- ◆ housing policy
- ◆ New Deal for Disabled People
- ◆ The Expert Patient programme

Managing hospital capacity

18 Managing access to acute hospitals is the top priority for most health communities. Some have sought to tackle it by funding extra beds but this is only part of the solution: once a bed is put anywhere into the system, there is always a tendency to fill it (Ref. 29). And this problem is not restricted to acute hospitals: 40 per cent of people in community hospitals could be cared for at home.⁴ Providing more beds simply adds to the risk of warehousing older people so health communities should be seeking to reduce demand by actively supporting people in the community, smoothing discharge from hospital, and rebalancing services by creating alternatives to hospital. In this way, acute hospital resources can be better targeted. This approach is recognised in the 2003/06 public service agreement between HM Treasury and the Department of Health, which sets a target to 'improve the quality of life and independence of older people so that they can live at home wherever possible, by increasing by March 2006 the number of those supported intensively in their own homes to 30 per cent of the total being supported by social services at home or in residential care' (Ref. 30). Moreover, the Department of Health's Priorities and Planning Framework for 2003/06 requires that growth in emergency admissions is to be less than 1 per cent annually (Ref. 31). AT has a part to play in delivering these targets as part of a comprehensive package of care (*Box C*).

⁴ Evidence submitted to House of Commons Health Committee into delayed discharge, 17th July 2002.

Box C

How AT supports top NHS priorities

AT helps keep people safer and independent

AT therefore helps to reduce admissions to acute hospitals

AT therefore creates bed capacity to enable acute hospitals to tackle waiting lists and reduce the number of outliers and the associated poorer quality of care and longer average lengths of stay

AT facilitates prompt and appropriate discharge

Source: Audit Commission

- 19 The Government’s determination to keep people independent was signalled by the Health Minister’s announcement in the House of Commons on 23 July 2002 that by 2006, an additional £1 billion for social services is to be provided to help deliver some challenging targets (*Box D*).

Box D

Government targets requiring the development of AT services

Faster assessment - by the end of 2004, first contact by social services will be made within 48 hours and the assessment completed within one month with 70 per cent completed in two weeks.

Community equipment - All necessary equipment and minor adaptations needed are to be in place within one week and based upon a single assessment process across health and social services.

Expanded range of services - compared with 1995, the amount of intensive home care packages will double, 70,000 more rehabilitation packages will be provided and there will be a 50 per cent increase in the number of extra care housing places.

Easier access to community equipment – there will be 500,000 more pieces of free community equipment benefiting an estimated 250,000 people.

Increased choices for older people - following assessment of care needs, all councils will be obliged to offer direct payments to all older people allowing them to make their own decisions about the care they need.

Delayed discharge – social services authorities will gain the financial responsibility for older people once they are ready to leave hospital.

Source: Department of Health, 2002 (Ref. 31)

NSF for Coronary Heart Disease

- 20 The NSF for Coronary Heart Disease (Ref. 32) emphasises the need to identify and monitor patients with the condition. AT offers opportunities to undertake monitoring from patients’ homes through the use of telehealth systems, improving convenience for patients and reducing demand on acute hospital outpatient services.

NSF for Mental Health

- 21 The NSF for Mental Health (Ref. 33) aims to reduce depression among older people. Overall prevalence has been found to be 2.6 per cent for men and 4.5 per cent for women; and when dysthymia is included, prevalence rises to 17 per cent and 23 per cent respectively (Ref. 34). Once established, depression becomes a chronic condition for many older people. It is particularly common in residential care, where one-in-three people become clinically depressed during the first year following admission (Ref. 35). The overall incidence of depression among people in residential homes is 40 per cent (Ref. 36). A recent study found that overall, older people received poor medical care and those in residential homes received worse care than those in their own homes because of harmful over-prescribing of medicines. Residents were more likely to be given neuroleptic medication or laxatives (Ref. 37). It follows that if people can be supported independently in the community, prevalence of depression and unnecessary prescribing may reduce, offering improved quality of life as well as cost savings.

NSF for Diabetes

- 22 In England, 1.3 million people have diagnosed diabetes and the number being diagnosed is growing. The impact and cost is considerable (*Box E*). Diabetes is closely associated with greater risks of disabilities. Studies in the US have found that people with the condition are two to three times more likely to be unable to walk 400 metres, do housework or prepare meals. One-quarter of women aged 60 years or over with diabetes are unable to walk 400 metres, compared with less than one-sixth of women of the same age without the condition. Women with diabetes also become disabled at twice the rate of non-diabetic women and have an increased risk of falls and hip fractures. The association of diabetes with physical disability is explained in part by the complications of diabetes (such as coronary heart disease, peripheral arterial disease, and visual impairment), but a 60 per cent excess prevalence of disability remains after controlling for these factors (Ref. 38)(Ref. 39).

Box E**The impact and cost of diabetes**

The impact of diabetes	
Life expectancy	Reduced, on average, more than 20 years in type 1 and up to 10 years in type 2 diabetes ⁵
Coronary heart disease (mortality)	Up to five times higher than average
Risk of stroke	Up to three times higher than average
Renal failure	A leading cause (more than one in six starting renal replacement therapy)
Lower limb amputation	Diabetic complications are a common cause of amputations
Blindness in people of working age	The leading cause
Pregnancy	An increasing risk to the baby: being lost during pregnancy/birth having a congenital abnormality dying in infancy
Impact of diabetes on health and social services	
NHS resources	5% of spend
Hospital inpatient resources	10% of spend
Hospital admission	People with diabetes twice as likely to be admitted to hospital as the general population
Stay in hospital	People with diabetes stay in hospital up to twice the average length
Diabetic complications – NHS costs	Increased >5 fold
Social services costs	5% of people with diabetes incur social services costs (average annual costs: £2,450 in 1999)

⁵ Type 1 Diabetes: A Total Lack of Insulin; Type 2: The Body Does Not Produce Enough Insulin or Cells Ignore it.

- 23 Implementing the NSF for Diabetes will increase demand for services since it is estimated that half of all people with the condition are currently undiagnosed. The Audit Commission has previously emphasised the importance of frequent and accurate monitoring of people with diabetes (Ref. 41), so without modernisation, this scale of increase will place more pressure on hospital outpatient services. AT offers a solution as many people with diabetes can be monitored at home through telehealth systems. Such an approach would be consistent with the NSF as it seeks to refocus services towards primary care.

NSF for Older People

- 24 The NSF for Older People (NSF(OP)) (Ref. 42) aims to integrate and improve access to health and social care, raise standards and promote independence for older people. The most common problems are related to mobility, vision and hearing. Previous Audit Commission reports have emphasised how AT can ameliorate the effects of these conditions (Ref. 7)(Ref. 8). There are two other target areas in the NSF(OP) where AT can make an important contribution: reducing injuries from falls; and helping people with dementia.
- 25 In June 1992, the White Paper *The Health of the Nation* (Ref. 43) included a target that by 2005 it would reduce death rates caused by accidents by one-third among people aged 65 or over. There was little evidence of any progress up to 1997. In 1998, the Green Paper *Our Healthier Nation* proposed that by 2010, accidents should be reduced by at least one-fifth (Ref. 44). But again there is little evidence of progress, the national mortality rate from falls is static. An accident can significantly change an older person's life, leading to loss of independence and confidence. This can in turn affect their emotional and physical well-being and contribute to low self-esteem (Ref. 45). And there are usually other direct costs such as NHS treatment, social care, domiciliary help or residential care. For these reasons, reducing falls among older people remains a priority (*Box F*).

Box F**Facts about falls**

In 1999, there were 648,000 A&E attendances and 204,000 admissions to hospital for fall-related injuries in people over aged 60 or over. These falls cost the Government £981 million, of which the NHS incurred 59 per cent (Ref. 46).
Half of all serious injuries experienced by older people who fall fracture their hips (Ref. 47). Such an injury increases an older person's chances of having to live in a care home, especially if the fracture is not treated promptly (Ref. 48).
The prevalence of accidental deaths among older people is highest for those aged 75 years and over (Ref. 49). 70 per cent all deaths due to accidents in the 75+ age group are the result of falls. This age group is more likely to be injured from an accident at home than in any other place (Ref. 50)(Ref. 51).
Accidents are higher among women than men: nine out of ten people who fracture a hip are women, and three-quarters are aged over 75 (Ref. 52).
Each year, 60,000 people fracture a hip, costing in excess of £300 million for hospital care alone. One-quarter of all orthopaedic bed occupancy is due to hip fractures. ⁶
The rate of fracture has doubled since 1950. On current trends, the number of hip fractures will increase to 120,000 a year by 2020 (Ref. 53).
Over 85 per cent of all fatal falls in the home in England and Wales are among people aged over 65 years (Ref. 54). People of 80 years and over are five times more likely to die as a result of an accident than people aged 65 to 74 years (Ref. 55).
The prevalence and frequency of falls is disproportionate for those in residential care. Frail individuals have a fall rate three times that of more agile older people (Ref. 50)(Ref. 56).
Older people with visual impairment are seven times more likely to fall and sustain a serious injury than people without sight problems (Ref. 57). Taking steps to reduce the risk of falls by providing rehabilitation and equipment is an investment that could significantly reduce expenditure on acute hospital care (Ref. 58).
70 per cent of falls occur at night: AT can automatically switch on a light when a person gets out of bed and may help to reduce this percentage.
Fear of falling is a significant contributing factor in the loss of independence and quality of life (fear both by the older person and their relatives/carers).

Source: References 47-59 and note VI

- 26 A range of factors could reduce older people's chances of falling. These include improving muscle strength, reviewing medication regimes, and introducing simple AT such as grab-rails, adequate lighting, stair coverings and hand-supports (Ref. 59). Falls detectors are also important enabling assistance to be provided quickly (Ref. 60). Home visits and surveillance to assess and, where necessary, modify environmental and personal risk factors are also effective in reducing falls.

⁶ Audit Commission analysis of Department of Health, HES data, 2003.

Surveillance can be done by nurses, health visitors, occupational therapists or volunteers, or can be carried out remotely using AT (Ref. 61).

- 27 Many local services have developed accident prevention strategies for older people, but these have not always matured into effective delivery. Services are usually piecemeal, with different agencies pursuing their own initiatives with insufficient co-operation and collaboration. To address these problems, the NSF(OP) sets out various milestones in establishing an integrated falls prevention strategy:
- ◆ April 2003: local partners audit procedures
 - ◆ April 2004: they plan and develop an integrated falls service
 - ◆ April 2005: integrated falls service in place
- 28 The greatest gain is likely to be from targeting prevention programmes at people who have one or more risk factors (Ref. 62). Using the annual screening programme of people over age 75 in primary care could provide an opportunity to identify those at particular risk (Ref. 61) (Ref. 26).
- 29 A second area in which AT can help to deliver the NSF(OP) is by supporting people with dementia. Dementia is strongly associated with old age: 5 per cent of people over 65 have dementia, and this rises to one-in-five of those aged over 80 years (Ref. 63). There are about 600,000 people in the UK with dementia, of whom one-quarter live alone in the community. Concern for their welfare or lack of carer support often leads to early admission into institutional care, even though being moved from familiar surroundings can cause great distress and behavioural problems. There is, however, emerging evidence that AT can open up opportunities for people with dementia to maintain their independence and quality of life for an extended period (Ref. 64)(Ref. 65)(Ref. 66)(Ref. 67)(Ref. 68). But as with all AT, services must be provided in a timely fashion to anticipate future needs.
- 30 There is, however, an important caveat to the potential for AT to reduce falls and help people with dementia. Increased surveillance and adaptation of homes presumes acceptance by users and carers, but this cannot be taken for granted (Ref. 69)(Ref. 70). Older or disabled people have every right to decide how much risk they want to take in their lives (Ref. 71). That said, where insight into risk is diminished because of dementia it may not always be acceptable *not* to provide a service because the person with dementia rejects it. If the consequences of not providing AT may be more serious than those of providing it, there should be serious consideration about whether the more ethical course of action might be to install the technology anyway.⁷

Services for people with learning difficulties

- 31 The White Paper, *Valuing people: a new strategy for learning disability for the 21st Century* (Ref. 72) acknowledges that AT can increase 'control, choice and independence' for people with learning difficulties. Many of the technologies that can help people with dementia can be adapted to support people with learning disabilities and vice versa.

⁷ The ASTRID guide (Ref. 67) provides a discussion of the ethical issues and a way in which ethical dilemmas of this kind can be framed and considered by those responsible for making such decisions.

NSF for Long-Term Conditions

- 32 The NSF for Long-Term Conditions (NSF(LTC)) is planned to be published in 2004, with a view to implementation in the ten years from 2005. Many people with long-term conditions need AT to support their independence. Prevalence is increasing because medical advances have increased survival rates across a wide spectrum of diseases and traumas. For example, those for spinal cord and severe brain injury have dramatically increased in recent decades due to better trauma care. Similarly, survival rates for low birth-weight babies have increased 70-fold over the past 25 years, directly affecting the prevalence of developmental conditions and learning disabilities.
- 33 Commissioning arrangements for AT services to support for people with complex disabilities falls within the arrangements for national specialised services (Ref. 73). The DH has said that ‘...primary care trusts will need to co-operate to secure the full range of (health) services for their local community. Commissioning of tertiary services (including some aspects of AT) is likely to require PCTs within a strategic health authority to collaborate actively on a health authority-wide commissioning plan. Some specialist services will require even greater collaboration to allow commissioning at a higher level’ (Ref. 74). However, PCTs are relatively new organisations and many are still developing their approach to commissioning. It will be important for the NSF(LTC) to give prominence to commissioning arrangements that range across several health communities if these specialised services are not to be marginalised.

National Strategy for Carers

- 34 The National Strategy for Carers gives examples of AT that might assist carers to carry on caring, particularly by improving safety (Ref. 75). AT solutions can be configured to the individual’s needs and address a wide range of risks that can threaten the safety and security of vulnerable people. AT can amplify the carer’s efforts, thereby helping to bridge the demographic gap between the growing needs for personal care and the shortage of carers available to provide it. Telecare technology in particular can relieve carers of some simple, tedious and often intrusive tasks. Moreover, AT gives carers increased confidence, which in turn leads to relaxation of responsibility and less chance of them giving up their role of carer. (The Audit Commission is currently preparing a report on the role of carers in supporting independence.)

ICT policy

- 35 Information and communication technology (ICT) comes under the umbrella of ATs that can help older or disabled people live independently and safely at home. *Information for Health* (Ref. 76) 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 services is also included in the latest national ICT programme (Ref. 77), which has set targets that by December 2007, telehealth facilities will be available in all GP surgeries, and by December 2010, home telecare will be provided in all homes where it is needed. One of the drivers moving this forward over the next few years will be the development of digital TV and broadband links into the home. By 2010 it is likely that the majority of homes will have incoming digital TV links and possibly half of homes will have broadband links out. The cost of this is currently in the region of £25 per month, so it will be relatively inexpensive to justify broadband connectivity into every person’s home that needs it for AT support..

- 36 This will require a sizeable investment in health care. Having telehealth facilities available in all GP surgeries would equate to 10,000 GP surgeries each spending perhaps £5,000 – a total of £50 million. Moreover, if telecare is to be provided in all homes where it is needed, a sizeable market will be created. There are currently over 4 million people with diagnosed diabetes, chronic airways disease or heart failure. This number will grow through better diagnosis, as the population ages, and the availability of new technologies to increase the opportunity for remote monitoring of chronic conditions. The NHS Purchasing and Supplies Authority (PASA) should start work now on estimating the size of the market for ICT systems that support telecare and telehealth and develop procurement plans to take this agenda forward.

Housing policy

- 37 The safety and independence of older or disabled people is greatly affected by their environment (Ref. 78)(Ref. 79)(Ref. 80)(Ref. 81)(Ref. 82). The use of telecare to help older or disabled people live safely at home is reflected in government policy (Ref. 83)(Ref. 84). Architects are also being encouraged to introduce greater flexibility into housing design, based partly on the concept of 'lifetime homes' (Ref. 85). This approach promotes design that anticipates future building adaptation to cater for people's changing needs (Ref. 86).
- 38 There is, however, the need to consider the wider housing policy agenda. AT by itself cannot provide a total solution. There is little point in investing in AT if the basic housing is inadequate. To put this into context, there are between 30,000 to 40,000 avoidable deaths each winter in the UK because of shortcomings in basic living conditions, with 4.3 million people living in 'fuel poverty'. Older people tend to live in the least energy efficient houses. One-in-five homes has dampness, condensation or mould problems; and 1.4 million occupied homes are deemed unfit for human habitation. So there are other competing priorities to bring many houses up to standard. When there are so many basic needs remain unaddressed, it is hard to find the necessary investment money for AT services linked to the home (Ref. 87).

New Deal for Disabled People

- 39 The New Deal for Disabled People (NDDP) (Ref. 88) is a government initiative to help people with an incapacity, illness or disability return to work. Many require the support of AT to return to employment. For example, the Department for Education and Skills' *Access to Work* programme provides financial assistance to employers towards the extra costs of employing someone with a disability. The type of support available includes a wide range of AT, such as adaptations to a vehicle if someone cannot use public transport to get to work because of their disability, special equipment such as personal environmental controls that can be used by a physically disabled person to operate a computer where this would otherwise be difficult or impossible, and alterations to premises or a working environment necessary because of a person's disability. The opportunity is enormous. There are 3.5 million people registered with a long-term disability, 2.9 million of whom receive sickness, disability or incapacity benefit. Of these, 1.2 million report that they would like to work (Ref. 89). The Department of Work and Pensions should review ways to use AT to help bring a significant proportion of this number back into employment and off State benefits.

The Expert Patient programme

- 40 In the UK nearly 18 million people, or one-third of the population, has chronic diseases, such as arthritis, asthma, diabetes, heart disease and depression (Ref. 90). Many are expert patients and know better than clinicians how best to manage their individual conditions. Sixty per cent of GP consultations are related to these conditions, which in total account for roughly 70 per cent of all healthcare costs.⁸ The impact of chronic disease is not just on health but can also affect social inclusion, employment and mobility. Telehealth systems have the potential to provide great support to many of these people.

Future opportunities afforded by assistive technology

- 41 Technological developments are proceeding apace, particularly in the field of electronics, information and communications. Faster computer processing units, miniaturisation and short-range wireless communication have become established in many electronic-based AT products. This trend is predicted to continue leading to the development of more sophisticated and less expensive AT products that better address users' aspirations. This potential is further enhanced by three other important factors:
- ◆ using AT to complement formal human care;
 - ◆ rising public awareness and accessibility of AT; and
 - ◆ public/private partnerships to promote AT.

Using AT to complement formal care

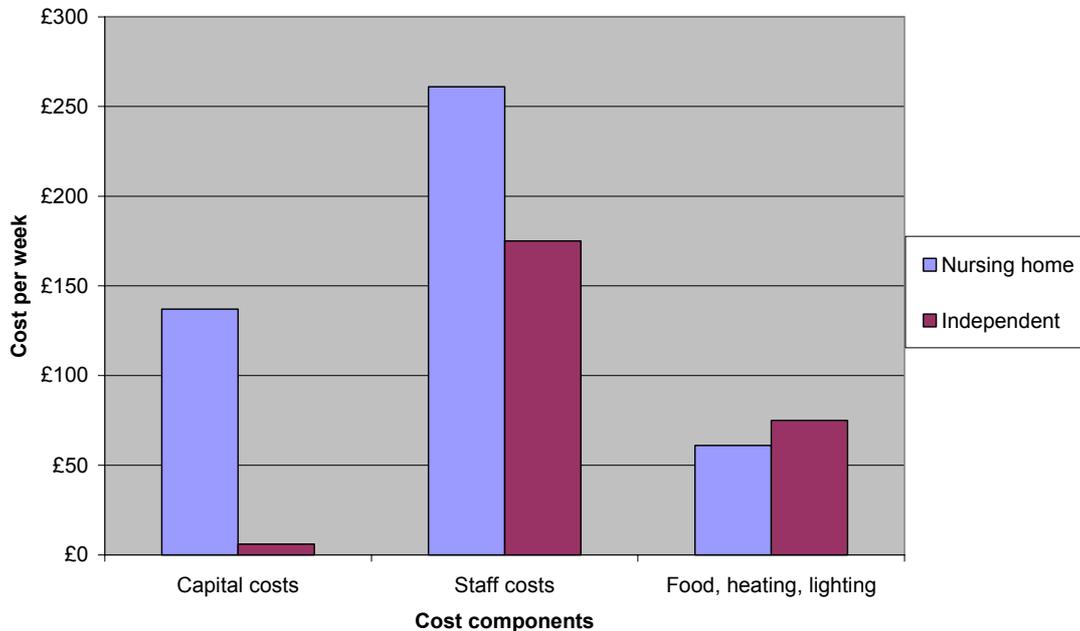
- 42 A key driver for the development of AT is its potential to support and make the best use of human effort. Many public services face shortages of care workers and recognise the need to relieve the pressure on informal carers. AT can play an obvious role. Indeed, it has been demonstrated that for most people, AT by itself is more efficacious than personal assistance (Ref. 91). Such evidence is also highly relevant in relation to the escalating cost of providing reasonable standards in nursing and residential care (Ref. 92)(Ref. 93). One study has modelled that the full cost of operating a care home that meets all national minimum standards is £459 per week for nursing care and £353 per week for residential care. These costs are some £75 to £85 a week more than the average fees paid by local authorities. An extra £1 billion would be needed each year to fund fees at this level (Ref. 94). Keeping people independent with the support of AT rather than formal carers is a more economic alternative (*Exhibit 5*).

⁸ Office for National Statistics, 2002

Exhibit 5

Alternative costs of care

Keeping people independent in the community with the support of AT costs less than residential care.



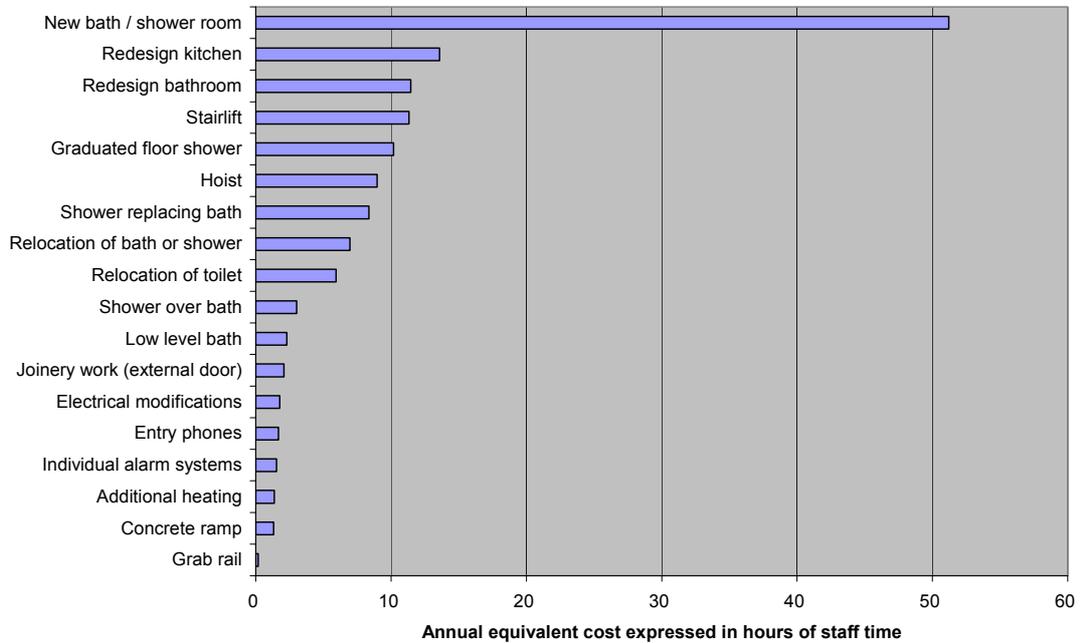
Source: Laing, 2002 (Ref. 94)

- 43 More importantly, for most people, using AT is preferable to human effort, especially because it may help them to maintain their dignity. There can be few more degrading experiences than needing help from someone after going to the toilet. WCs that can wash and blow dry have been available for the last 20 years, and yet they have not been widely introduced because of their apparent high cost. And yet in actual fact, AT is inexpensive compared with the equivalent cost of staff. For example, the median cost of installing a new bath is £10,470, which equates to an annual discounted cost over its ten year life (at 4 per cent) of £1,291. This is enough to buy about 50 hours of care each year (Exhibit 6). It makes economic sense to substitute AT for human effort wherever possible. As a case in point, Sandwell MBC has invested in telecare systems to relieve the pressure on residential care services for older people with dementia. Evidence from its early pilot studies show that the cost of providing basic telecare equipment is the equivalent of just one week's residential care provision. Even a 'top-of-the range' package of telecare, including devices to detect fire, wandering, bed-occupancy, flood and gas with appropriate automatic switch-offs, would cost about £1,200 per installation, or just one month's worth of residential care.

Exhibit 6

The annual cost of various equipment or adaptations, expressed in equivalent hours staff cost

Assistive technology is inexpensive compared with care staff.



Sources: Audit Commission analysis of data provided in Ernst and Young (1994) *Benchmark study of the costs of aids and adaptations, Report No.4*, Report to the DoE, London

Data were collected from 40 local authorities and adjusted to current prices using BCIS/ABI House Rebuilding Cost Index. Major variations were reported, reflecting the range of work undertaken and local eligibility criteria so the median rather than the mean has been used to overcome the spread of reported costs. Costs should therefore be taken as illustrative rather than statistically representative.

Annual equivalent factor assumes a ten year life

Annual equivalent factor index from Lumby, S, *Investment Appraisal and Financing Decisions*, 1988, VNR, Table E, p. 483

- 44 It is also important to remember the improvement in productivity that using AT brings about. In every industry, when costs rise employees have to increase productivity or go out of business. This is currently the situation in the care industry; increased use of AT offers probably the only way to achieve significant productivity gains.

Awareness and accessibility of AT

- 45 Almost everyone is becoming familiar with a range of technologies and older or disabled people are no exceptions. On the contrary, one survey of residents in sheltered housing found that 44 per cent had their own VCRs and 45 per cent had their own microwaves (Ref. 95). Familiarity with one technology makes it easier for people to manage others, and this is not inhibited by age (Ref. 3), with newly-retired people the fastest growing group of internet users (Ref. 96). Clearly, the internet will have a particularly significant impact on the delivery of health and social care (Ref. 97). The Royal Commission on Long Term Care concluded that: 'one of the ways in which life could improve for older people is in the harnessing of new technology in new, imaginative and profitable ways.' Building awareness is key to creating a paradigm shift from a model dominated by State provision and control of AT to one where suppliers of AT market products to individuals.
- 46 It is very important that access to AT is provided early enough to make a long-term difference. For example, AT schemes that seek to support people with dementia need to be introduced as soon as the diagnosis is confirmed in order to encourage familiarity while mental faculties are strong. Similarly, people at risk from falling, perhaps because of failing vision, need AT systems to be installed as soon as the problem is identified, not after they have had a serious fall.

Public/private partnerships to promote AT

- 47 Public services alone cannot and should not be the sole provider of AT. Many people would prefer to buy their own rather than seek an equivalent, statutorily provided device that attracts a real or perceived social stigma. This is one reason why the commercial potential of AT is not developing as rapidly as might be expected; and there are several others (*Box G*).

Box G

Reasons for the slow growth in AT

Poor understanding of user needs on the part of designers and suppliers, with an emphasis on technology rather than user aspirations
Lack of information about the potential benefits and users' fears about system operation, failure, loss of privacy and other ethical issues
Difficulties in integrating and installing systems, including lack of common standards, leading to fears of 'vendor lock-in'
The expense of some equipment and systems
Some immature technology, causing concern about systems defects, rapid obsolescence and a lack of potential upgradeability and adaptability
The design of equipment is not always aesthetically pleasing
The poor reputation of parts of the UK construction industry means that many older or disabled people prefer to live without the adaptations they need rather than employ a builder

Source: Metz, 2000 (Ref. 98), Gann, ¹⁹⁹⁹ (Ref. 99), (Ref. 100)

- 48 Only when AT becomes more visible in the high street will its full potential be achieved and unit costs of production fall. The market for manufacturers and retailers selling directly to consumers will increase as the population ages: at present, over 4 million people in the UK use AT (Ref. 101). Moreover, the AT consumer climate is changing rapidly. New rights enshrined in legislation, and attitudinal change, are generating not only higher awareness and expectations, but also employment opportunities which in turn will deliver greater spending power with which people can meet them. Closer working between the public and private sectors is needed to meet these needs. Public/private partnership (PPP) arrangements need to examine ways to:
- ◆ enhance AT design;
 - ◆ improve information about AT, and
 - ◆ increase uptake through innovative schemes.
- 49 Firstly, enhancing the design of AT is a wide-ranging agenda. Older or disabled people need not only specialist equipment, but also ordinary equipment such as easy to open milk cartons, TV controls with big buttons, clothing for wheelchair users (which does not ruck up), and shopping trolleys that provide support. AT's commercial potential extends beyond a small specialist market and will mature into a more general one. In particular, the growing spending power of older people will apply pressure to the design process.
- 50 An important challenge is how products are marketed for different users: clearly, younger disabled people make up a very different market from older people. And a large number of potential AT users are older people who do not regard themselves as disabled. The 'market' for AT products can be segmented in a number of ways (*Box H*). But the overarching aim of AT design should be to create devices that are attractive in their own right and add capability without removing status. Better design should then go some way to tackling the problem that AT issued by public services is sometimes unused.

Box H

Marketing segments for AT

Marketing objective	Typical age group
Maximising life chances	Birth to 21 years (education)
Enhancing opportunity and quality of life	21 to 65 (employment)
Support for self-care	65 to 75 (third age)
Providing reassurance	75 to 85 (third age)
Sustaining independence	85+ (retirement)

Source: Audit Commission

- 51 Design also needs to consider the wider environment. The concept of ‘universal design’ seeks to provide products, communications and environments that are usable by everyone, to the greatest extent possible, without the need for adaptation or specialised design.⁹ Universal design concepts also need to be incorporated into housing, building regulations and public transport to anticipate future needs. For example, ‘lifetime homes’ are ordinary dwellings that can be adapted with minimum fuss at minimum cost. Incorporating design features to support the use of AT adds as little as 0.5 per cent to 1 per cent to the cost of new-build housing (Ref. 102), whereas adapting the existing housing stock is comparatively expensive.¹⁰ Since most people live in older accommodation, it is important to pay more attention to technologies that can be easily retrofitted to existing homes.
- 52 Improving information about AT extends from basic information about what’s available to getting feedback about the user’s experience. At a simple level, the uptake of AT is dependent on accessible information about availability, cost, assessment procedures and funding sources. Most information about AT is currently aimed at professional staff, not users and carers. Inadequate understanding of their needs has been cited as a barrier to the implementation of smart home technologies (Ref. 103) but the problem extends across the whole terrain.
- 53 There is a need for a more effective and systematic interchange of information between the public and private sectors about the effectiveness of AT products in use. One example of innovative practice has been established in the West Midlands by Rowley Regis, Tipton PCT and Medilink West Midlands. The project employs an industrial designer to work at the interface between users, manufacturers and professionals to improve information flows about products and the experience of the product in use. New designs are emerging from this consultation process which better meet both users’ and providers’ needs.¹¹ There is also the need to introduce innovative but practical schemes to raise awareness and accessibility of AT (*Box 1*).

⁹ The Center for Universal Design:
<http://www.design.ncsu.edu/cud/index.html>

¹⁰ Further information on the interrelationship between older or disabled people, housing and assistive technology may be found at www.kcl.ac.uk/acig; and at www.equal.ac.uk/AT

¹¹ Further information is available from Chris Ramsden chrisramsd@advantagewm.co.uk or Rob Chesters rob@medilinkwm.co.uk

Box I**Ways to raise awareness and accessibility of AT**

In the short term, the current public service provision of AT providers could be marketed more effectively as a way of raising awareness of AT products. Users and service professionals could be signposted to AT providers' websites at every NHS interface: for example, there could be sponsored leaflets in GP surgeries and disability equipment centres, on GP surgeries' own websites, through the NHS Direct website, and in NHS Direct leaflets and advertisements. Disabled Living Centres also have a vital role to play.

In the medium term, it may be possible to facilitate the development of a provider-sponsored one-stop web-shop. For example, the British Healthcare Trades Association and a consortium of disability/older people organisations could work together on such a project. The launch alone would be a considerable commercial branding opportunity. Such an initiative would be an ideal candidate for a Department of Health Section 64 grant to fund scoping costs.

A one-stop web-shop and paper directory could be promoted through strategic partnerships with disability/older people organisations' own publications (for example, *MS Matters*) or with organisations like Motability (for example, Motability could provide information with every car application pack). Similarly, the Benefits Agency could send information on AT to everyone who applies for Invalidity Benefit or Disability Benefit.

An opportunity is afforded by the NHS Patient Entertainment Initiative: by December 2003, all inpatient beds in acute hospitals will have their own TV. This provides an opportunity for a promotional video of a one-stop web-shop to be viewed by patients to raise awareness. AT providers would subsidise purchase of new integrated TV/video player stock and give special offers to inpatient mail-order customers.

Rehabilitation ward and appointment reception areas could host AT product demonstrations while people wait for their appointments (the NHS could charge companies to do this).

There is scope to learn more from other countries that have extended the visibility of AT in the high street (ref. 104). The DH's self-assessment rapid access project, based on the United Healthcare's *Evercare* model in the USA, seeks to make AT more accessible to people who want to buy their own equipment.¹²

Further opportunities to promote the use of AT include using the potential of the mobile phones as a means of delivering telecare, especially once picture messaging becomes commonplace.

There is also the potential arising from creative schemes to encourage greater uptake of AT. For example, people are commonly discharged from hospital with equipment to meet their immediate rehabilitation needs but users also find the equipment helpful in their everyday lives once independence has been restored. For example, Carlisle Housing Association provided AT to 420 of their service users following a transfer of care, if they were deemed at risk of falling, or if they were identified as at risk of needing admission to hospital. After their immediate problems had been stabilised, 80 per cent of users chose to pay to retain the AT packages because of the reassurance it offered. One marketing opportunity would be for suppliers to sell AT products into the NHS at a discounted rate - people could then be offered the item for private sale subsequently.

¹² Details of the SARA project are available from www.icesdoh.gov.uk

- 54 Establishing effective public/private partnerships will not be achieved overnight and much will need to be left to local innovation. But there is a need to provide some central co-ordination to bring together the influential stakeholders to give a clear strategic direction and reduce duplication of effort. The Audit Commission has previously argued that the UK needs a national forum on services designed to support independence, such as is available in Scandinavia¹³ and the USA (Ref. 8). The supply industry has the funding and the incentive to sponsor such a body to promote the introduction of AT through shared learning, by establishing collaborative practice and contributing to establishing national standards and competencies. It should be noted that such a proposal appears to be gaining ground in Scotland (Ref. 105).
- 55 Leaving aside public sector involvement, there are clearly major marketing opportunities for the private sector that can add shareholder value by meeting growing consumer demands for AT. The major telecommunications giants and some high street retailers sense an opportunity. (Box J).

Box J

B&Q's Total Diversity Policy

The foundations of company policy developed from an analysis which found that the company's staff turnover costs were highest among 18 to 20 year olds. B&Q therefore decided to recruit instead from long-term unemployed, women returners, older people and disabled people. It opened a pioneer store staffed entirely by people aged over 50 and analysis showed significantly higher of performance over a six-month period compared with equivalent stores the chain:

- profits were 16 per cent higher;
- staff turnover was six times lower;
- sickness absence was 39 per cent lower; and
- customer perceptions of service improved.

With the business case proved for a new approach to employment, B&Q turned to the access requirements of the Disability Discrimination Act. Disabled people, including those with hidden disabilities, participated in focus groups and acted as mystery shoppers. Problems were identified and integrated into B&Q's first fully-accessible store in Norwich, whose design became a blue print for subsequent ones.

B&Q's rationale is based on sound business sense: it is targeting the several millions of older or disabled people of working age and their carers in the multi-billion pound home improvement market. New business opportunities have been identified, notably low-cost accessible kitchens. Normally custom-designed and costing £15,000 to £20,000, B&Q has been able to mass produce accessible kitchens at a small fraction of the cost. A further business spin-off has been the Daily Living Made Easier range, which offers ordinary products with inclusive design features, rather than specialist ranges.

Source: Audit Commission

¹³ The Swedish Handicap Institute www.hi.se

Chapter summary

56 This chapter has shown that AT could make a significant contribution to improving public health by promoting independence among older or disabled people. It is highly relevant to many government policy initiatives. In a sense, AT is almost a common enabler that knits together the various strands of a wide-ranging public policy agenda. Provided users, public services and suppliers co-ordinate their energies, continuing advances in technological capability and improvements in design will increase the potential of AT, especially as the evidence base grows stronger and becomes more widely recognised. This is the subject of the next section.

Current evidence and practice

57 The last Chapter showed that AT has a prominent part to play in policies designed to support the independence of growing numbers of older or disabled people. But how strong is the supporting evidence and existing practice? This section describes the types of research evidence and the current evidence base. It then concentrates on two broad categories of assistive technologies not previously examined by the Audit Commission: telecare and telehealth.

Types of evidence about AT

58 Research evidence is commonly graded according to a system widely used in the formulation of guidelines and standards of care (*Table 1*).

Table 1

Strength of evidence and grade of recommendations

Level of evidence	Type of evidence
1a	Meta-analysis of randomised controlled trials (RCTs)
1b	At least one RCT
2a	At least one well-designed, controlled trial but without randomisation
2b	At least one well-designed, quasi-experimental study
3	At least one well-designed, non-experimental descriptive study (for example, comparative studies, longitudinal studies, correlation studies, case studies.)
4	Expert committee reports, opinions and/or experience of respected authorities

Source: Agency for Healthcare Policy and Research, 1993 (Ref. 106)

The current evidence base

- 59 The DH has commissioned an overview of the current developments in the application of ICT to support independence (Ref. 109). Information is presented from the UK National Database of Telemedicine (www.tis.bl.uk) and the Housing Innovation Knowledge Bank (www.rethinkhousebuilding.org). The overview concludes that AT has enormous potential to support independent living but says that developments have largely been undertaken as a series of individual initiatives, which are incremental and outside any national strategy. The consequent lack of co-ordination has led to some technical incompatibility and duplication of effort.
- 60 The value of AT in alleviating dysfunctions and preventing health and social problems has also been demonstrated in a wide range of studies and literature reviews in the UK (Ref. 110) and overseas (Ref. 111)(Ref. 112)(Ref. 113)(Ref. 114)(Ref. 115)(Ref.116)(Ref. 117). A considerable body of evidence has been assembled by the University of Buffalo's Centre for Assistive Technology (Ref. 118) and the Rehabilitation Engineering Society of North America (www.resna.org). In aggregate, this accumulated pool of evidence is strong and growing stronger.

- 61 There is, moreover, strong evidence of the links between technology and its potential impact on quality and costs elsewhere in the healthcare system. Inspiration for the virtues of AT can be found from the Kaiser Permanente organisation in the USA. Unit healthcare costs in the NHS are similar to Kaiser's but in many respects the latter's performance is better, particularly access to services. Kaiser also has comparable outcomes to the NHS using significantly fewer acute beds (Ref. 119). This has been achieved through real integration between primary and secondary care. Patients with chronic conditions are treated at the most cost-effective level of care with integrated care pathways which seek to make trade-offs in expenditures based on appropriateness and cost-effectiveness rather than artificial budget categories. As a direct result of its integration and its use of technology, Kaiser is effective in controlling admission rates and lengths of stay so that its patients spend one third of the time in acute hospital compared with NHS patients. There is ample evidence that reduced length of hospital stay does no harm (Ref. 120) and, in view of the risks of staying in hospital, may be beneficial (Ref. 121). In particular, there is evidence that older people's dignity and autonomy is undermined the longer they stay in a healthcare setting (Ref. 122).
- 62 This model is being held up as an exemplar to the NHS in England. In recent months, several health communities have undertaken study visits to California. Moreover, the latest DH guidance on structural arrangements has come down firmly in favour of redesigning rather than relocating local services (Ref. 123). Again, using AT to keep people out of hospital is a vital part of this integrated, local approach. The DH also estimates that currently three-quarters of hospitals are engaged in some form of major reconfiguration debate (Ref. 124). The imperative of maintaining local services augers well for the widespread adoption of AT: strategic health authorities' modernisation efforts should be brought to bear on this agenda.
- 63 Previous reports by the Audit Commission have also examined the contribution that orthotics, prosthetics, wheelchair services, audiology services and community equipment services can make to supporting independence (Ref. 7) (Ref. 8), and there are further examples of the evidence-base underpinning AT (Appendix 1).¹⁴ This report now looks at the evidence supporting two other broad categories of AT, sometimes called telecare and telehealth.

Telecare

- 64 Telecare is based around homes in which a variety of functions are controlled with various technologies and which provide communications to the outside world. Once telecare systems, 'electronic assistive technologies' and 'environmental controls' are integrated, the term 'smart housing' is sometimes used to describe the totality of the system (Ref. 99). Telecare systems allow people with a range of needs to retain their independence through:
- ◆ avoiding hospitalisation;
 - ◆ virtual visiting;
 - ◆ reminder systems;
 - ◆ home security; and
 - ◆ social alarm systems.

¹⁴ A recent literature review commissioned by the Audit Commission can be found at www.audit-commission.gov.uk/asssitivetechology

Avoiding hospitalisation

- 65 Based on a number of studies of telecare in the USA (Ref. 125)(Ref.126) and its potential in intermediate care in the UK (Ref. 127), it is reasonable to assume that telecare supported home care could replace the need for hospital admission in 5 per cent to 15 per cent of patients aged over 70 years; and for the length of stay in hospital to be reduced by between 20 per cent and 60 per cent.
- 66 The NHS Plan (Ref. 128) introduced the concept of intermediate care, which provides a 'bridge between hospital and home...(to) speed up discharge from hospital when patients are ready to leave. The new services will give older people more independence rather than being forced to choose a care home.' (Ref. 129). This level of care seeks to address a shortfall where care drops from 24 hour a day hospital care one day to zero after discharge. However, AT can also be positioned as a form of intermediate care where people could be discharged from hospital and then given technology in their own home. Some people, perhaps with carers or family at home, can be provided with modular technologies in which certain components can be withdrawn incrementally as their rehabilitation progresses.
- 67 Such an approach has the advantage of shifting a fixed cost (in terms of the bricks and mortar of an intermediate care facility) to a marginal cost (in terms of equipment placed in people's homes). It gets people home more quickly where independence is likely to be maintained and avoids introducing another step in the process from hospital to home, where there will be more transfers, more handovers and more opportunity for things to go wrong.

Virtual visiting

- 68 Home visiting significantly reduces mortality (by around 25 per cent) and admissions to long-term care (by around 45 per cent) among older people at risk of an adverse event (Ref. 130). But such support has all but disappeared in Wales (Ref. 131), and in England services are under considerable pressure. So although home visiting is beneficial, it is not undertaken as often as desirable because of cost and staffing pressures. Telecare offers an alternative. Trials have shown that millions of visits by healthcare staff to older or disabled people can be avoided (Ref. 132). Studies of community nursing activity have found that between 15 per cent and 46 per cent of visits could be replaced with remote monitoring (Ref. 133). This approach gives high levels of user and professional satisfaction with no evidence of any negative affect on communication (Ref. 134). Virtual visiting is particularly powerful in monitoring the safety of a dementia sufferer living alone (Ref. 135).

Reminder systems

- 69 Telecare systems can provide reminders for a variety of users. For example, short-term memory loss is a natural part of the ageing process but for people in the early stages of dementia, it can rapidly curtail independence. Simple technologies can combine features of an alarm, communicator, diary and reminder. Such devices remind the owner of routine tasks and special events as required. Attaching such technology to the ubiquitous mobile telephone also allows carers and others to stay in touch or be contacted.

- 70 Similarly, reminder systems can be used to help people manage their medication. Adverse reactions to medication account for 10 per cent of hospital admissions, somewhat more result from poor compliance, particularly among older people (Ref. 108)(Ref. 136). Various strategies have been developed addressing these issues, ranging from compartmentalised pillboxes which alarm when medication is due through to reminders from call-centres or carers.
- 71 A concept developed in the USA is a modification of the automated pillbox which operates from a small workstation in the patient's home. The workstation reminds the patient to take their medicines and asks standard questions to monitor their well-being. It also asks questions about their condition and delivers educational material if they get the answer wrong. In one study, such devices improved compliance with medication regimes from 34 per cent to 94 per cent and reduced admission rates for patients with congestive heart failure by 41 per cent.¹⁵

Home security

- 72 The benefits of telecare systems extend beyond health and social care. Other public agencies are showing interest in their potential. Some local authorities and police services are aware of the improved security opportunities offered by telecare systems as a means of reducing crime through better surveillance. Furthermore, some fire services are becoming interested in the potential of automatic fire detectors that can alert a call-centre to the presence of smoke or significant increases in heat. Such innovative projects involving piloting integrated call centres with the police, ambulance, fire and rescue services have been funded by HM Treasury's *Invest to Save* scheme (Ref. 137). The funds available to local authorities through the *Supporting People* initiative can also be applied to these housing-related services.

Social alarm systems

- 73 Telecare systems can thus provide feedback to individuals to help them to retain their independence. The final piece of the jigsaw is the provision of a response service for when help is needed. Social alarm systems were introduced shortly after the Second World War and there are between 1.2 million (Ref. 138) and 1.6 million users (Ref. 139). They connect users from their homes via the telecommunications network to people at call centres who can provide reassurance or obtain assistance. Such technology is reactive and responsive rather than proactive and preventative but nevertheless can deliver impressive results. One study of over 100 users found that following the introduction of a scheme, there was a 25 per cent reduction in the number of hospital admissions and average hospital inpatient days fell from 9.2 to 5.7 days (Ref. 140).
- 74 The current network of some 300 call centre systems operated by local authorities provides a platform on which to build much more advanced telecare services by integrating a range of services aimed at providing reassurance, improving crime surveillance, fire alarm services, community safety, telehealth and many others. Building upon what is already there is always easier than starting from scratch. One of the longest-established telecare projects in the UK is provided by West Lothian Council, which demonstrates significant benefits (*Box K*).

¹⁵ Mercy Health Center's telemedicine congestive heart failure disease management program shows significant savings with Heath Buddy ® and Health Hero ® iCare Desktop.

Box K

Findings from the West Lothian telecare project

Services provided

- A rapid response service for emergency care: packages of personal care which may include smart technology and active rehabilitation.
- A home safety service: assessment and installation of technology packages and support services provided by a home safety team.
- Housing with care provision: housing with care facilities with smart technology installed in each tenancy and a 24-hour housing support team located on site.

Service outcomes

- Number of people using the rapid response service: 394
- Average number of visits per rapid response service user: 30
- Number of people using the home safety service: 1,275
- Number of housing with care tenancies: 92

The above services along with other changes in service delivery across the whole system have resulted in the following.

- Estimated number of NHS bed-days saved 3,364
- NHS opportunity cost saving £841,000
- Capital costs
- Housing with care tenancies and 75 home safety users: £750,000
- Home safety upgrade to 1,200 service users: £750,000
- Continuing telecare project work

The home safety service will be expanded in 2003/2004 to a further 1,900 service users at a capital cost of £750,000 and a weekly revenue cost of £4.87. An additional 30 housing with care tenancies will be completed in March 2004 at a capital cost of £90,000 for technology. Stirling University is presently undertaking a three-year evaluation of the housing with care developments and home safety service which is due to be completed in December 2004.

Source: Derived from Bowes and McColgan, 2002 (Ref. 141) and Gillies, 2001 (Ref. 142)

- 75 Social alarms have a potential to go beyond reactive 'push-button' systems. Smoke detection, burglar alarms, activity monitoring and the integration of the social alarm into a universal electronic network at home have all been technically feasible since the 1980s. Now there are ever-growing possibilities, such as providing social alarms via TV networks, integrating social alarms with environmental control systems and life-style monitoring. The health status of older or disabled people can be determined remotely by monitoring simple parameters such as measures of mobility, use of cooking and washing facilities, sleep patterns and toilet usage, which measure the interaction of individuals with their environment (Ref. 143)(Ref. 144). Such monitoring offers huge potential to reassure carers and target scarce care resources. Research has modelled the cost of upgrading the existing community alarm service in Birmingham. It concluded that an initial investment of £6.4 million would result in an annual cash-releasing saving of at least £8.3 million a year, equivalent to £700 per user (Ref. 145). (If extrapolated nationally, this equates to a saving in excess of £1 billion). However, the problem is the necessary investment monies, as the scheme modelled a negative cash flow until year five.
- 76 It would be wrong, however, to suppose that building on the existing call-centre network is the only way forward. Indeed, the network is often criticised as being inefficient, and it is true that there is considerable scope for rationalisation, particularly of much of the supporting 'back-office' computer technology. There is also the potential to outsource call centres to private sector partners or establish links with NHS Direct.

Telehealth

- 77 Telehealth (or clinical home monitoring) enables a clinical process to be conducted remotely. In a sense, it has been used since the invention of the telephone (a device that could still be used more widely to improve efficiency in the management of certain chronic conditions with no detriment to the quality of patient care (Ref. 146)). But, increasingly, new AT enables patients to carry out routine monitoring of vital signs at home. For example, a chronic disease management service run by the West Yorkshire Metropolitan Ambulance Service can remotely measure a person's blood pressure, pulse rate and ECG, breathing rate, breathing amplitude, blood oxygen saturation levels and temperature. Patients are taught how to apply the sensors and take a reading. A monitor automatically records and sends data via a dial-up telephone line to a service-based control centre. If the measurements are within protocols defined by a clinician, the data are simply recorded. But if measurements are outside pre-defined parameters, a clinician is alerted and given the log of the past history of readings. If measurements are not received when expected, the control centre reminds the patient. If measurements are still not received, a clinician is alerted. Clinicians can log on to the system via a hospital or surgery computer at any time to view the data received from patients.
- 78 Telehealth (or clinical home monitoring) enables a clinical process to be conducted remotely. In a sense, it has been used since the invention of the telephone (a device that could still be used more widely to improve efficiency in the management of certain chronic conditions with no detriment to the quality of patient care (Ref. 146)). But, increasingly, new AT enables patients to carry out routine monitoring of vital signs at home. For example, a chronic disease management service run by the West Yorkshire Metropolitan Ambulance Service can remotely measure a person's blood pressure, pulse rate and ECG, breathing rate, breathing amplitude, blood oxygen saturation levels and temperature. Patients are taught how to apply the sensors and take a reading. A monitor automatically records and sends data via a dial-up telephone line to a service-based control centre. If the measurements are within protocols defined by a

clinician, the data are simply recorded. But if measurements are outside pre-defined parameters, a clinician is alerted and given the log of the past history of readings. If measurements are not received when expected, the control centre reminds the patient. If measurements are still not received, a clinician is alerted. Clinicians can log on to the system via a hospital or surgery computer at any time to view the data received from patients.

79 The benefits of telehealth include:

- ◆ patient empowerment, obtained through information provision, more active involvement in the management of their condition, and allowing choice about their treatment;
- ◆ reduced numbers and lengths of hospital inpatient stays;
- ◆ fewer outpatient attendances through remote monitoring;
- ◆ delay or avoidance of admission to nursing home;
- ◆ better use of healthcare professionals' time;
- ◆ better compliance with medication regimes;
- ◆ quicker diagnosis and treatment; and
- ◆ reduced stress and greater convenience for patients.

80 The potential of telehealth is growing with the development of multi-media capability (using voice-recognition, vision, images and data); the range of remote sensors available for diagnosis, monitoring and treatment; the ubiquity of key technology; the introduction of systems that do not need to be 'hard-wired'; and the potential for systems to be made artificially intelligent. Such developments mean that telehealth can be used to improve access in terms of time, place and convenience as well as a means of overcoming distance. Future developments will be supported by:

- ◆ the development of non-invasive bio-medical devices that enable monitoring of vital signs, blood analysis, organ or whole body images, and implant function;
- ◆ increases in computing and telecommunications power with falling relative prices;
- ◆ the growth of digital mobile telephony, video and satellite phones, and digital TV; and
- ◆ ubiquitous access to the internet

- 81 Telehealth offers a great opportunity to reduce some of the pressure on acute hospitals. For older people, around 20 per cent of bed days are probably inappropriate if alternative facilities are available, and in the overall hospital inpatient population perhaps 10 per cent of bed days are avoidable (Ref. 147). People aged 65 and over occupy two-thirds of general and acute hospital beds and account for over half the recent growth in emergency admissions. Since 1991/92 around half the extra emergency admissions per person aged 75 and over have been for 'symptoms, signs and ill-defined conditions'. The growth in this diagnosis might reflect the inadequacy of community health services and the growing pressure on carers (Ref. 28).
- 82 In contrast, the Netherlands, Canada and the USA have had constant or falling hospital admission rates for older people in recent years because these pressures for emergency care are dealt with in the community where telehealth systems play a prominent part (Ref. 28). In the USA, for example, the use of video technology in the home has been found to provide clinical care for patients with certain conditions of an equal quality to hospital care and at a reduced cost (Ref. 148). The potential of telehealth can be further described with reference to the following common conditions:
- ◆ Chronic obstructive pulmonary disease
 - ◆ Congestive heart failure
 - ◆ Hypertension
 - ◆ Asthma
 - ◆ Diabetes¹⁶

Chronic obstructive pulmonary disease

- 83 Chronic obstructive pulmonary disease (COPD) is a chronic disease which includes bronchitis and emphysema. It affects 5.4 per cent of the population and kills 30,000 people each year. The number of undiagnosed people in the UK is unknown but in the USA one estimate is that at very best only one-half of all cases are diagnosed (Ref. 149). The disease accounts for one in eight medical admissions (Ref. 150) and costs the NHS as a whole £800 million each year (Ref. 151). Emergency admissions for COPD have recently risen dramatically, putting pressure on hospital beds (Ref. 152). Exacerbation of COPD can occur up to 12 times per year and typically a patient stays in hospital for seven days to recover.

¹⁶ Telemedicine systems are also available to support service users with non-chronic conditions. A wide literature exists which demonstrates the benefits of home monitoring of pregnancies. Examples are available at www.huntleigh-diagnostics.com

- 84 AT offers a partial solution to the challenge of COPD. Early discharge schemes have shown that time spent in hospital due to acute exacerbations can be reduced by half if patients are supported at home with AT and an appropriate treatment package (Ref. 153)(Ref. 154). Such intensive home nursing care costs £125 a day (Ref. 150)(Ref. 154). It has been found that about one-third of patients admitted to A&E with acute exacerbation of COPD could have been successfully managed at home (Ref. 155)(Ref. 156). One study also found that a single 24-hour period of more intensive monitoring at home uncovered unsuspected and treatable co-morbidity, principally heart failure and obstructive sleep apnoea in one-third of cases.¹⁷ Longer-term monitoring also helped to reduce acute exacerbations but, interestingly, the participating carers believed this was more to do with daily contact and consequent improved sense of security rather than the monitoring itself. These findings are confirmed by studies in the USA which found that COPD patients kept at home with telehealth support were able to manage their own health conditions with a higher quality of life (Ref. 157), and with significant cost savings (Ref. 158).
- 85 The case for telehealth to support people with COPD is compelling. In England in 2001/02, COPD accounted for 81,283 admissions for 725,790 bed days (Ref. 159). If 30 per cent of cases can be managed at home, then assuming a typical cost of a day in hospital of £250 per day (Ref. 160), this would release 218,000 bed days or over £50 million. Savings would also come from reducing the average length of stay for COPD (mean 9.1 days; median 6.0 days) (Table 2). Further savings would result from the reduced nursing visits needed when the patient is discharged from hospital.

Table 2**Potential savings from investing in telehealth to manage patients with COPD**

	Improvement opportunity	Patients	Bed-days	Total cost
Current provision		81,000	726,000	£181m
Reduce admissions by	30%	24,000	218,000	£54m
Reduce average length of remaining admissions by	50%	28,000	254,000	£64m
Total gross saving opportunity			254,000	£118m
Annual cost of telehealth to provide continuous monitoring for all patients				£55m
Total annual saving opportunity				£63m

Source: Audit Commission

17 Sleep apnoea occurs when the patient's airways constrict whilst asleep, causing them temporarily to stop breathing. This debilitating condition affects about 5 per cent of the population and can cause hypertension, heart disease and respiratory failure. The usual way to diagnose it is to admit a person to hospital overnight to monitor his or her breathing and oxygen levels whilst asleep. Portable telehealth equipment can now allow the monitoring to be done at home.

Congestive heart failure

- 86 The NSF for CHD stated that by April 2002 all PCTs were to have in place protocols for the systematic assessment, treatment and monitoring of people with CHD. Many could be supported by telehealth. Similarly, the Priorities and Planning Framework for 2003/06 includes the target that local health communities are to improve the management of people with heart failure in line with the National Institute for Clinical Excellence (NICE) clinical guidance due in 2003 and to set local targets for reducing the number of patients admitted with heart failure.
- 87 CHF affects over 1 per cent of the population, mainly older people. It is usually due to coronary heart disease or high blood pressure, and accounts for 5 per cent of all medical admissions to hospital (120,000 hospital admissions annually) costing the NHS an estimated £360 million a year. There are 6,000 deaths each year. (Ref. 32) The disease has a poor prognosis with a median survival time of 16 months from first hospital admission, which is worse than for most common cancers. But many patients with CHF can be managed in the community (Ref. 161). Effective management with medication can improve the function of the heart and reduce fluid retention, thereby reducing the number of exacerbations and improving the quality of life.
- 88 Many patients do not adhere to their medication regimes, and enter a cycle of recurrent acute exacerbations and admission to hospital. Typically, their hearts have failed to the extent that fluid accumulates in the lungs and legs. However, potential crisis points can be predicted by the patient monitoring and reporting their weight: fluid in the body will accumulate for about seven days before patients become acutely ill, and their weight will increase by about 1kg. per day. Daily weighing enables carers to monitor patients' condition and take corrective measures. It also provides direct positive feedback to patients to encourage compliance with medication regimes. This simple concept has been shown to reduce A&E attendance from 30 per cent to 3 per cent and to reduce admissions by two-thirds (Ref. 162). Re-admissions are high for patients with CHF, though with telehealth it is estimated that about half of re-admissions may be preventable (Ref. 163). Again, there is a strong case for investing in telehealth to support patients with CHF (*Table 3*).

Table 3**Potential savings from investing in telehealth to manage patients with congestive heart failure**

	Improvement opportunity	Patients	Bed-days	Total cost
Current provision		120,000	1,072,000	£268m
Reduce admissions by	67%	80,400	718,000	£179m
Reduce average length of remaining admissions by	50%	19,800	177,000	£44m
Total gross saving opportunity			177,000	£224m
Annual cost of telehealth to provide continuous monitoring for all patients				£105m
Total annual saving opportunity				£118m

Source: Audit Commission

Hypertension

89 Hypertension is common and a significant predisposing factor for heart disease and stroke. Treatment is life long and expensive and can have unpleasant side effects, which reduces compliance with medication regimes. Yet measuring blood pressure in a hospital or clinic environment produces an artificially high reading in 40 per cent of cases because of patient anxiety. Consequently, one-in-five patients are given medicines they don't need (Ref. 164). Self-monitoring at home has been shown to be more accurate (Ref. 165); and to reduce anxiety, outpatient appointments and costs (Ref. 166). In one controlled trial, the patients in an intervention group who monitored their blood pressure, changes in medication, and any side-effects over the course of a year needed an average of 1.5 visits to their doctor compared with 2.7 visits per year by patients in the control group (Ref. 167).

Asthma

90 Some patients with asthma need continuous monitoring of peak flow breathing, but studies have found that paper recording of results leads to poor adherence and falsification of data (Ref. 168). Telehealth systems with electronic recording devices have been shown to improve adherence from 44 per cent to 91 per cent and enable optimal self-management (Ref. 169).

Diabetes

- 91 Several studies of home monitoring of diabetes have found improved outcome (Ref. 170)(Ref. 171)(Ref. 172)(Ref. 173). In one study, a significant improvement in glycohaemoglobin concentrations was found in a group of 56 diabetic patients sending details of their glucose concentrations through a modem to their doctors, compared with a control group entering their glucose concentrations in diaries (Ref. 170). Two other studies found that glucose monitoring by telehealth led to significant reductions in glucose concentrations (Ref. 171)(Ref. 172). In one of these trials, a follow-up questionnaire showed that patients using telehealth had developed a better understanding of blood glucose control and had better motivation for self-management (Ref. 171). Evaluation of remote access to a computer-assisted diet education system found that it significantly improved dietetic knowledge, dietetic habits and metabolic balance (Ref. 173).

Chapter summary

- 92 There is an extensive body of literature that demonstrates the potential value of AT and, although much of it comes from the USA, leading clinicians have acknowledged in another context that clinical research is usually transferable (Ref. 174). Moreover, some of the benefits of AT are so obvious that procedures such as randomised controlled trials are unnecessary. Nevertheless, to convince the risk-averse, the newer ATs of telecare and telehealth would benefit from the legitimising effect of 'official' evaluation. NICE has already lent its weight to one form of AT in respect of digital hearing aids. NICE, in association with the British Thoracic Society, is now developing clinical guidelines for managing COPD (Ref. 175). These are expected to be issued in 2004 and it would be enormously valuable if this work included an evaluation of the associated AT. NICE may also consider undertaking a series of cost effectiveness studies to evaluate the impact that AT could have in the management of other chronic conditions. And further legitimisation of AT could be provided by making specific reference to it in the NSF(LTC) currently being prepared.
- 93 In view of the huge potential of AT, service providers should now take practical steps to use it as a central component in meeting local delivery plans. Service providers may wish to consider establishing a working group led at a senior level to be responsible for drawing up a local implementation plan for AT. This group should include representatives from across the health and social care community. Service providers should also review their implementation plans for the delivery of the NSF for Older People and consider whether practical AT solutions are given adequate prominence. Similarly, they should make sure that telecare and telehealth projects are included in their ICT implementation plans. All health and social care communities could look to include at least one major AT project in their local delivery plans in each of the next three years.

Obstacles to progress

- 94 The potential of AT to promote independence and save money across public services is not in doubt. For many people, it provides a better quality and cheaper alternative to other forms of health and social care. But although strong evidence has been available for some time, there has not been widespread implementation of AT solutions. This chapter seeks to analyse why.
- 95 The failure to act on evidence is not confined to AT services. There are many examples of positive research findings that have not found timely acceptance in practice (Ref. 176)(Ref. 177). Many assume that if research evidence is disseminated, practice will change automatically however this is not the case (Ref. 178). Simply providing information is unlikely to produce change (Ref. 179), and this observation applies across all public services (Ref. 180)(Ref. 181)(Ref. 182)(Ref. 183). Thus there is no strong relationship between the strength of the evidence base and the rate of adoption into practice.
- 96 To better understand the obstacles to progress and the ingredients of success, two pieces of research were undertaken. In 1998 the Health Education Authority produced an analysis of 33 cases studies of innovative UK practice in accident prevention, many involving AT (Ref. 52). The present status of each project was examined. Secondly, the NHS Plan required community equipment services to be integrated by April 2004. This gave AT services a significant boost, and some of the organisations involved in the integration process have been examined. The common findings from these two initiatives were matched against the existing literature on change management to provide an understanding of what factors may obstruct or support the introduction of AT services. The need to understand these organisational obstacles appears to be gaining prominence in the research community (Ref. 184)(Ref. 185).
- 97 The overall findings emphasise the difficulty in delivering service changes: only eight out of the thirty-three Health Education Authority projects are still operating. Similarly, at the time of writing, at least one-third of community equipment services were judged unlikely to deliver an integrated service by April 2004. The common obstacles identified are discussed under the following headings:
- ◆ The volume of change
 - ◆ Changes in organisational structure
 - ◆ Lack of consumer pressure
 - ◆ Funding AT developments
 - ◆ Organisational fragmentation
 - ◆ Staffing issues

The volume of change

- 98 Senior managers in the public services invariably face an extensive agenda and some are reluctant to accept that managing in the public sector is now largely about managing change as a continuous state (Ref. 186). There can also be opposition to change that is imposed from outside. Integrating community equipment services has, in some places, been seen as an unwelcome addition to these pressures, especially if it does not coincide with local priorities and if there is inadequate management capacity to deliver. It is also clear that many organisations do not have a clear set of strategic priorities. Instead they have many things that become urgent. Such organisations invariably seem unable to introduce service improvements.

Changes in organisational structure

- 99 Analysis of the accident prevention projects found that at least one-third had fallen victim to imposed structural reorganisations through the creation of unitary local authorities, PCTs or the demise of GP fund holding schemes. Similarly, progress towards the integration of community equipment services has been impeded in some health communities by the creation of new PCTs, which have had to concentrate on structural issues rather than service development. Many of the old health authorities had built up close working relationships with local social services, whereas new PCTs have had to build new relationships. Two important side-effects of structural change are that key personnel move on and it leads to a sapping of energy around new projects. This problem is not limited to AT services: research has found that organisations that avoid structural change are the most able to deliver front line service improvements (Ref. 108).

Lack of consumer pressure

- 100 Whilst users of public services are now far more aware of their rights and more vociferous in claiming them, they do not exert genuine economic pressure in the same way as customers and shareholders of private sector organisations do. Service changes are seldom generated by direct consumer pressure. Moreover, older or disabled people are not always sought out to participate in the planning and running of new schemes.
- 101 The statutory involvement of patients in the NHS through the new Commission of Patient and Public Involvement and the presence of Patients' Forums in each PCT may add some genuine consumer pressure in hitherto 'Cinderella' services (Ref. 187).¹⁸ Similarly, the emphasis on public involvement in local government through the best value regime may also add weight to consumer pressure. Local authority health overview and scrutiny committees should also have a positive role in helping to focus attention on the user's perspective and thus generate more pressure. There is mounting case study evidence of the value of user-run services in the promotion of independence.¹⁹
- 102 Providing better advice and information needs to become a top priority for service providers and industry – a better informed public will enable people to make informed decisions. This will be particularly important when direct payments start to become a vehicle for people to purchase their own services through public sector routes.

Funding of AT

- 103 There are several significant funding obstacles impeding AT services. Firstly, there is the low financial profile of AT services which currently accounts for less than 1 per cent of personal social services expenditure (*Exhibit 7*). The 150 social services authorities spend on average just over £400,000. So it is hardly surprising that AT often fails to register on the organisational radar.

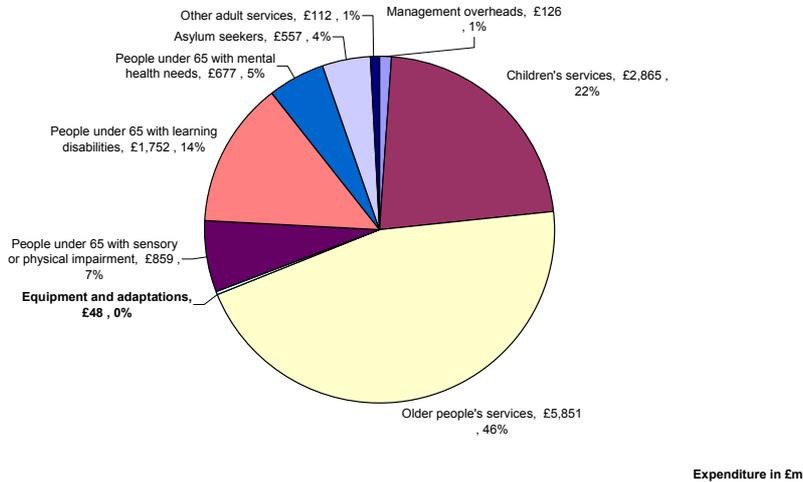
¹⁸ Section 11 of the 2001 Health and Social Care places a duty on all NHS bodies to make arrangements to involve and consult patients and the public.

¹⁹ The study team were particularly impressed by the services operated in Sandwell. Further information is available from www.idealforall.co.uk

Exhibit 7

Gross expenditure on personal social services, 2000/01

AT accounts for less than 1 per cent of personal social services expenditure.



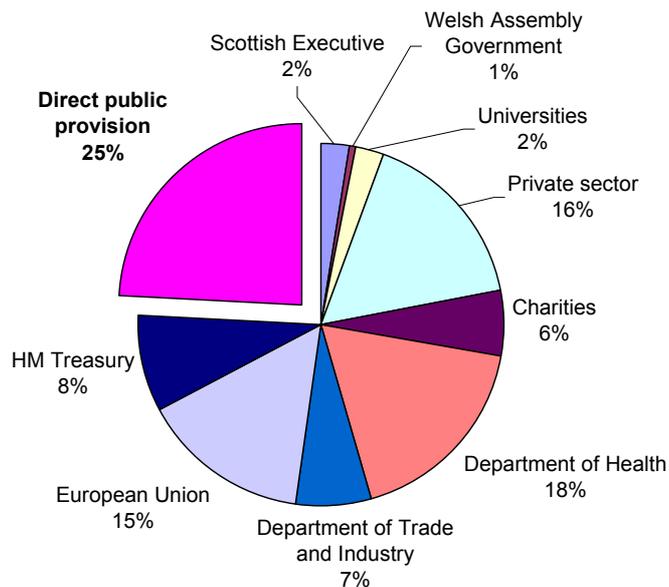
Source: DH Statistical Bulletin, June 2002

104 This low level of baseline funding for AT often means that projects have to be developed with pump-priming fund, which can leave them vulnerable when the funding stream dries up. Analysis of 165 AT development projects shows that only one-quarter had recurrent funding (*Exhibit 8*).

Exhibit 8

Funding AT developments

Only one-quarter of a sample of AT projects have recurrent funding.



N=165

Source: Audit Commission (analysis of data provided on www.tis.bl.uk/tm/owa/orgs)

- 105 A further financial obstacle is the transition costs of modernising services. Most health and social care communities have high amounts of backlog maintenance that consume almost all their block capital allocations, leaving little to invest in service modernisation. Most organisations will prioritise clear and present financial risk before wider organisational risks.
- 106 A final funding problem is the concern that resources released through AT projects may simply lead to a lowering of admission thresholds and higher costs overall. The savings derived from using AT as a substitute for existing services may simply be swallowed up by more demand because of the very large measure of remediable disability and undiagnosed chronic conditions currently left untreated (Ref. 188).
- 107 Curing these financial problems is harder than diagnosing them. One difficult solution is for PCTs to take far more radical steps in commissioning by investing in AT while taking capacity out of the acute hospital sector. Theoretically, the benefit for acute hospitals would be that fewer emergency admissions, which would help them to achieve the 85 per cent bed occupancy target cited by the DH as being the optimum figure for efficiency in acute bed management.
- 108 The Government also has a role to play and sees the virtue in providing non-recurrent funding through grant mechanisms to pump-prime AT services. In February 2003 it made available specific grants to support targets for the improvement of community equipment services (£7.6 million) and to support home care and intermediate care (£125.8 million) (Ref. 189).

Organisational fragmentation

- 109 Financial obstacles are overlain with problems of organisation. In particular, the NHS is seeking to remodel service delivery patterns to reduce the number of people who are inappropriately placed in acute hospitals. But it is clear that older people are admitted for a variety of reasons which are often a complex interaction of health, social, personal and economic factors. If public services are to use AT to help people stay independent, they will have to address a range of factors, not just those that fit neatly into the category of health, housing or social services. Without integrating mechanisms, service improvements are difficult to achieve (Ref. 190)(Ref. 191).
- 110 But public services are often organised into units responsible for specific functions. Although some have tried to break down the 'silos', many are still characterised by highly stratified departmental structures with their own cultures and processes. This is a particular problem for AT services which typically need input from several departments (*Table 4*). Problems of integration are even greater where social services and housing are run by different tiers of local government, and when the respective boundaries of PCTs and local authorities are not aligned. Trying to mediate between their individual organisational interests can make progress painfully slow.

Table 4

Local authority departments typically involved in promoting independence

Department	Service
Social services	Care services for older people, families and children
Housing	Adaptations
Education	Supporting life long learning
Economic development	Anti-poverty strategies, and access to work
Environmental health	Healthy housing
Technical services	Built environment
Community services	Community safety

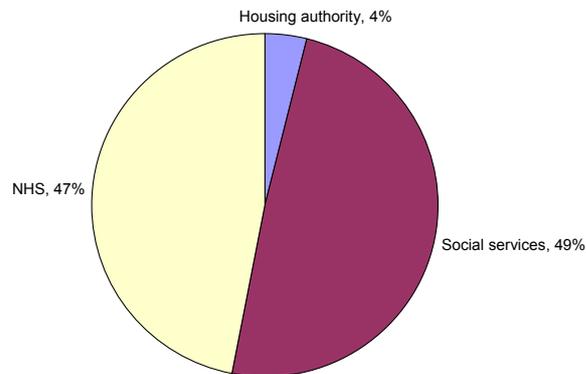
111 These problems are exacerbated if partnership working creates perverse organisational incentives. For example, housing departments are usually expected to fund telecare systems, but the financial benefits accrue mainly to social services and the NHS (*Exhibit 9*). So what is in the interests of users and the public services as a whole may not necessarily be in the narrow interests of the agency making the investment. Trust boards and chief executives, as accountable officers, have a statutory responsibility for their organisations to deliver in-year financial balance. This tension has bedevilled ‘whole systems’ working down the years.

Exhibit 9

The distribution of savings accruing from telecare projects to contributing agencies

The financial benefits of telecare systems accrue disproportionately to social services and the NHS.

Source: *Brownsell, et al, 2001 (Ref. 145)*



- 112 A further organisational challenge is that the forward momentum of the change process can easily be lost or go into reverse very quickly. 'Leading' organisations can be 'nearly there' but unforeseen problems such as an unbalanced budget or the turnover of key personnel can cause the project to stall fatally. Typically, social services, housing, and the NHS all need to be engaged in AT projects, and it only needs one to have a local problem for the project to collapse. The way to insulate the change process is to establish a formal partnership as early as possible to safeguard incremental progress.

Staffing issues

- 113 The flexibilities available under the Health Act theoretically address some of these financial and organisational obstacles. But the presence of statutory power does not in itself mean that those responsible for running services will respond in a timely manner. Lack of management time and capacity are further obstacles to progress. Most managers acknowledge the potential of AT, but resile from the challenge of changing the way in which people's work is done. For example, the introduction of telecare and telehealth requires difficult and time-consuming job redesign.
- 114 The concern for self-interest of front line staff also results in a lack of flexibility and leads some organisations to take refuge in doing what they have always done, failing to adapt to changing circumstances or users' needs. For example, the requirement to introduce by April 2004 a single assessment process across health and social services (Ref. 192) has been slow in many places because of the inability of health and social services occupational therapists to agree how they will work together. Moreover, many of the proposed tools of assessment are essentially health-based, with some fairly minor housing and social elements bolted on. They are particularly deficient in considering the role of AT and telecare in overcoming assessed risks. It can therefore take considerable time and effort to convince people of the benefits of change, though, ultimately, marrying together clinical skills and new technology has the potential to enrich jobs, improving both recruitment and retention.
- 115 Introducing AT projects would become easier if technology suppliers were to move towards 'whole package' solutions which offered both the technology and support with implementation. For example, suppliers could work with public agencies in supporting initial assessments for AT and subsequent reassessments as users' needs change. They could also provide the integrated care pathways or care protocols that need to be used alongside their technology.²⁰ This would ease the adoption of the technology into the public services and reduce some duplication of effort. If some suppliers could look to offer more ready-made service solutions to public services, the latter may be more likely to respond.

²⁰ Guidance on the preparation of integrated care pathways has recently been published by the NHS Modernisation Agency and NICE, *What is protocol-based care*, 2003

- 116 The thrust of public:private partnerships and local strategic partnerships between public services, communities, the voluntary sector and business requires a new approach. Business has a key role to play as a systems integrator and service provider to overcome the skills and organisational deficit in some health and social care organisations. A recent report from the Scottish Executive, *Equipped for Inclusion*, makes important points about the need to marry developments in the public sector with those in the wider commercial world, which is the key to creating better public awareness and offering wider choice.

Delivering change to introduce AT

- 117 This section describes the attributes of organisations where AT schemes have been successfully introduced. Research has confirmed how the rate and pace of change between NHS organisations with broadly similar change objectives (Ref. 193). Such variation is explained by the complex interplay at a local level between the content, context and process of organisational change. Research into change in private sector organisations has shown that local circumstances and context are critical (Ref. 194). There are no 'simple recipe' solutions: there is no one right answer and believing that there is leads to doctrinaire solutions that seek to impose one template on everybody and everything.
- 118 Notwithstanding these broad caveats, it is possible to study services that have implemented AT projects successfully and inductively identify some common attributes that lead to success. However, the energy and the capabilities needed to underpin these attributes cannot be conjured up quickly: the past has a great influence on local perceptions, and layers of competence emerge only slowly to enable and protect the introduction of AT. The relative importance of the following attributes will also vary from place to place:
- ◆ the role of users and the public;
 - ◆ project management arrangements;
 - ◆ availability of key people to lead AT projects;
 - ◆ collecting evidence;
 - ◆ effective relationships between managers and clinicians;
 - ◆ simple and clear goals;
 - ◆ orchestrating financial pressure; and
 - ◆ fit with local circumstances.

Role of users and the public

- 119 Long-term pressure from users' and carers' groups has been shown to be important in delivering AT projects. For example, the recent progress in improving audiology services was in large measure a product of the pressure maintained by the Royal National Institute for Deaf People and the National Deaf Children's Society (Ref. 8). Pressure and support from users' groups would also appear to be a key success factor in those accident prevention projects that have thrived. Other areas of AT do not have enough strong and united user associations.
- 120 Sound information and advice about AT is the key to providing better services. The provision of AT by the State is too often associated with professional control rather than consumer choice. Many people would have the confidence to purchase products themselves if they had access to reliable information and were able to try products out first. This will become ever more important as direct payments are used instead of service provision. Facilitating the quality and flow of information should become a central role for public services.

- 121 Systematic training, as well as user self-help and support group activity, also needs to be co-ordinated more effectively. A possible model for AT services would be to emulate the CancerVOICES project (now part of Macmillan Cancer Relief) to facilitate user involvement in the development of cancer services. Macmillan and the DH have been jointly funding work at Cancer Network level to make this a reality. Each of the 34 Cancer Networks have been given £10,000 by the DH to 'bring together a group of patients and provide training and support for them in the task of suggesting improvements to the way that cancer services are developed locally. The project is being developed in partnership with Macmillan Cancer Relief, which will contribute additional funding and expertise.' (Ref. 195)

Project management arrangements

- 122 Plans to introduce AT need to be consistent, clear and supported by strong project management arrangements. This allows people at different organisational levels to become committed, and allows top-down pressure to be married to bottom-up concerns as front line people become engaged. The inertia around some community equipment services can be traced to the absence of a shared view of the future in different layers within organisations. The common vision has also to be shared across several organisations. Partnership between them needs to be developed as 'core' business, not an optional 'add-on'.
- 123 There is a need for a strategic decision-making body and an operational group that takes responsibility for day-to-day operations and the development of the joint service. The strategic group, made up of senior managers from the funding agencies, needs to work at the boundary between the AT project and the wider executive to address strategic priorities. Involving executive and non-executive directors and council members is important both to top-level buy-in and to implementation. It has an important legitimising effect on the development of partnership and on the promotion of cross-agency consensus.
- 124 Plans have to be matched to a realistic and achievable financial framework. Annual budgets can destabilise large projects making it necessary for progress to be planned in incremental steps. In this way, plans can be matched with operational practicality by breaking down the overall project components into actionable pieces.

Availability of key people to lead AT projects

- 125 Analysis of the accident prevention projects and the integration of equipment services across England shows that the stability of key personnel is vital to project sustainability. The importance of local champions in introducing change has been emphasised both in terms of keeping the project on the agenda and shepherding it through internal processes (Ref. 196)(Ref. 197). The link between the unplanned movement of key personnel and the draining of energy, purpose, commitment and action from major change programmes is well established (Ref. 198)(Ref. 199). Projects can easily lose impetus because of the turnover of key personnel and leave new people to start again in a non-receptive context for change.

Collecting evidence

- 126 Grant funding can be a useful way to pump-prime innovative projects but whilst such money is available, it is vital to collect systematic evidence about the value of the project to build a subsequent case for recurrent funding. AT services need to plan carefully how they will collect evidence of service improvements across the health and social care community. For example, Herefordshire County Council's Home Check scheme has collected detailed evidence on the performance of the project against its original objectives. Systematic collection of evidence also helps to maintain the consistency of the approach if key people move on.

Effective relationships between managers and clinicians

- 127 Good relationships between managers and clinicians are always desirable but are especially critical to the introduction of telehealth systems, which fundamentally redesign the way that senior clinicians work. Similarly, community equipment services will operate most effectively where there are shared protocols of care between the professional staff using the equipment service. Clinicians can exert a powerful block on progress when they go into opposition, so establishing common ground and involving them is central to successful implementation (Ref. 200). Considerable management acumen is needed to build trust and alliances. Relationships are slow to build up, but quick to sour.

Simple and clear goals

- 128 Where AT has been introduced successfully, managers have been able to narrow the change agenda into a set of key priorities, and to insulate this core from the constantly shifting short-term pressures. Rather, persistence and patience in the pursuit of objectives over a long period is associated with successful project delivery. Managers need to minimise some of the ever-changing sources of pressure, while using others to amplify their pre-existing change agenda. When everything is crucially important, few things get done; greater progress is achieved when there are explicit attempts to buffer the change programme from energy-sapping short-term pressures (Ref. 199).

Orchestrating financial pressure

- 129 Continuing financial pressure often drains the energy from project implementation. However, those same financial pressures can be turned to advantage and used as an opportunity for radical reconfiguration of services through introducing AT. Its gradual introduction needs some initial investment but then releases savings which can be invested in more AT, releasing even more savings in a self-financing cascade.
- 130 One way in which some organisations have brought telecare and telehealth on to the agenda is to link them with the organisation's long-term ICT programme, which has both government backing and guaranteed ring fenced funding. This provides an important legitimising effect and serves to buffer the AT project against short-term pressures.

- 131 Outside of such programmes, shortage of capital remains a problem, especially where one organisation needs to invest for the benefit of others. This common problem would most readily be overcome in the case of telecare schemes by extending central funding such as *Invest to Save* or *Supporting People*. In the case of telehealth schemes, the way forward is simpler because most of the responsibility resides within the health community. PCTs as service commissioners need to invest in AT as part of their service modernisation strategies. The new NHS financial framework based around healthcare resource groups will provide a potent incentive for PCTs to commission services very differently in the future. SHAs may wish to consider establishing designated modernisation funds to provide the necessary capital for modernisation using telehealth schemes.

Fit with local circumstances

- 132 Private sector change studies demonstrate the importance of local circumstances for building the right climate for change (Ref. 201). In the case of AT services, the following are important: the degree of co-terminosity with social services; whether there are one or two centres of population; and the strength and nature of the local political culture. A recent examination of the take-up of the flexibilities available under section 31 of the Health Act 1999 (Ref. 202) showed that where the powers had been applied successfully, the partner organisations tended to make equal financial contributions to the partnership; they were clear about the nature of mainstream or external funding; and they had local organisational stability with co-terminus boundaries and local service networks. Local context would appear to be the prime pre-disposing factor contributing to effective partnership working. Awareness of its critical influence enables the necessary targeting of effort.

Conclusions and recommendations

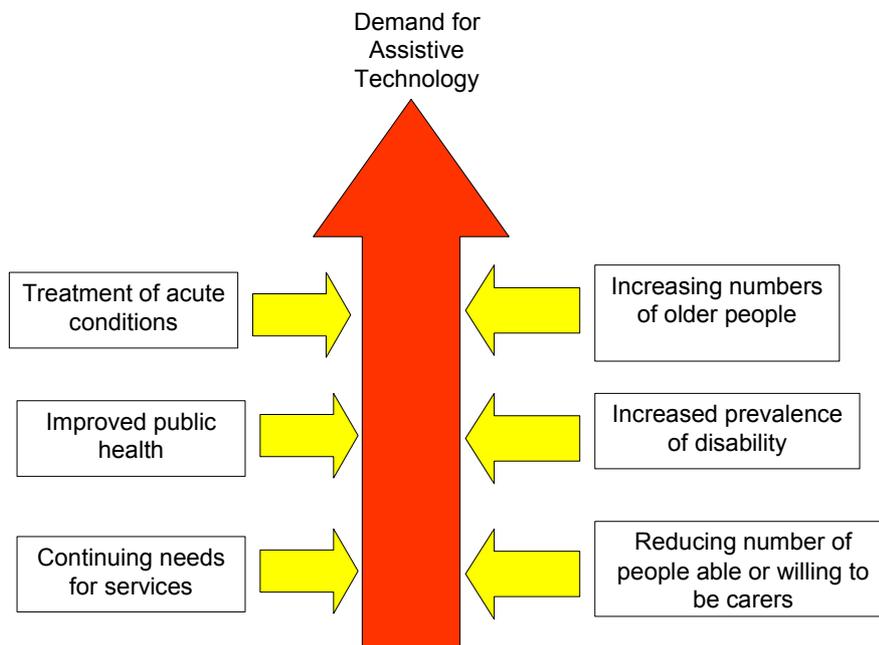
Conclusions

- 133 Perhaps the two greatest public policy achievements of the last 50 years were the tackling of infectious diseases and closing of asylums for people with mental illnesses and learning difficulties. The challenge for the next 50 years will be to foster innovation and technology that will maintain the independence of older or disabled people. Several forces are driving the demand for AT (*Exhibit 10*).

Exhibit 10

Forces driving the demand for assistive technology

There are several forces driving the demand for AT.



Source: Audit Commission

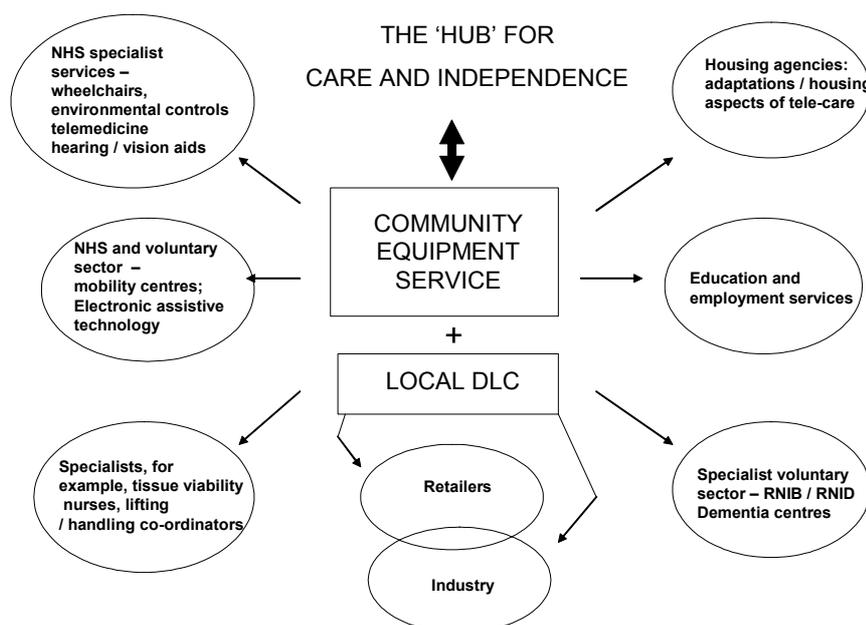
- 134 The delivery of many of the goals and targets set out in NSF's and in the Public Service Agreement for 2003/06 can be helped through the use of AT. In particular, the effective use of AT to keep people at home offers one very powerful way of reducing the pressure on most acute hospitals, both by preventing emergency admissions and reducing the number of delayed discharges. There is thus the tantalising possibility for public policy to meet more people's desire to remain independent for longer while at the same time as saving money overall. So a vision is emerging of an AT and ICT-supported health and social care system able to deliver care where it is most appropriate thereby increasing the flexibility of care packages and improving the quality of people's lives.
- 135 However, this will require extra investment in the short term, whereas any cost benefits to other parts of the health and social care system will only arise in the longer term. And, of course, there is the risk that the additional capacity created by AT may simply be consumed by improved quality or increased access, leading to increased costs overall. Funding strategies that integrate a whole health and social care community are needed to target modernisation strategies and money at the most appropriate level of care. Government should continue to encourage agencies to make greater use of section 31 flexibilities.

- 136 There is a more than adequate evidence base supporting the value of AT, even if many of the studies are small-scale and locally based. The evidence is as strong as in many other areas of health and social care. It is also clear, however, that like in these other areas, there is no direct causal relationship between the strength of the available research evidence and implementation. So the take-up of AT is slow and piecemeal, meaning that its full potential is nowhere near reached.
- 137 There will be faster progress if investment money is made available. HM Treasury should therefore consider extending its *Invest to Save* project, and the Office of the Deputy Prime Minister its *Supporting People* initiative, specifically to support AT developments. Similarly, the DH should encourage individual SHAs to establish designated modernisation funds to provide the necessary capital money for telehealth schemes.
- 138 Previous reports have stressed that the fragmentation of AT services presents a major obstacle to progress (Ref. 7)(Ref. 8). There exists a broad church of interests associated with AT that needs to be knitted together across natural health and social care communities. Some ideas about possible organisational models have been discussed (Ref. 203), and there is an emerging view supporting the notion of using integrated community equipment services, supported by a disabled living centre, as an information ‘hub’ through which people can access more specialist ‘spoke’ services (*Exhibit 11*). Telecare technologies would fit very comfortably within such arrangements, and would avoid an overly ‘medicalised’ organisational model. Such an approach could be supported by extending the role of the DH’s Integrating Community Equipment Services Implementation (ICES) Team to cover telecare.

Exhibit 11

Community equipment services as the information ‘hub’ for assistive technology

Integrated community equipment services could provide the gateway to information about more specialised services.



Source: Richards, 2002 (Ref. 204)

- 139 Telemedicine schemes, on the other hand, are very clearly an alternative to or an extension of acute hospital care. As such, their most appropriate organisational location is with PCTs.
- 140 A debate about the 'best' organisation location for telecare and telemedicine is secondary to the need to support organisations that are seeking to use AT as part of their overall rehabilitation strategies and their strategies to promote independence. Central organisations such as the Improvement and Development Agency (for local authorities) and the NHS Modernisation Agency are well placed to assume this important function. The latter has already undertaken some important work in promoting wheelchair and orthotics services. There may be merit in extending this work to a broader *Action on Independence* which could knit together current work programmes and the wider agenda of independence and choice. A practical first step would be to transfer the existing DH Integrating Community Equipment Services Team to the NHS Modernisation Agency to start integrating these efforts.
- 141 Finally, the importance of a call centre as an information hub should not be overlooked. The existing network could be used to link service users to crisis intervention teams (for example, emergency services, rapid response, relatives, the on-call GP); community care well being maintenance staff (for example, home helps, pharmacists and nurses; and to provide access to information for service commissioners and managers. There is, however, an organisational point to be considered of whether such an enhanced model should be run by existing community alarm services, by NHS Direct, or by some new organisation. An investment of some £90 million has been made in NHS Direct and an expanded service is high on its list of priorities. There are many more community alarm centres with a similar investment in equipment and staffing. Merging these services could be seen as one of the greatest opportunities and challenges for producing an integrated telecare / telehealth policy. Although AT services generally need to move beyond the stage of demonstration projects into the mainstream of service provision, the integrated call centre model could usefully be piloted.

Recommendations

- 142 These conclusions lead to the identification of several obstacles and corresponding possible solutions that form the principal recommendations of this report (*Box L*).

Box L

Main obstacles to progress and recommendations

Obstacles to progress / problems	Possible solutions / recommendations
<i>Recommendations for service providers</i>	
<p>The huge potential of AT remains largely untapped.</p>	<p>All agencies should review their service plans and consider whether AT has an appropriately prominent part. <i>(Paragraph 87, 88)</i></p> <p>Social care organisations should review their current arrangements for the provision of formal care and consider whether AT has an appropriately prominent part. <i>(Paragraph 38)</i></p> <p>Service providers should review their implementation plans for the delivery of the NSF for Older People, particularly their falls reduction strategies, and consider whether practical AT solutions are given adequate prominence. <i>(Paragraph 88)</i></p> <p>Service providers should review their ICT implementation plans and consider whether telecare and telehealth projects are given adequate prominence. <i>(Paragraph 88)</i></p> <p>Service providers could include at least one major AT project in their local delivery plans in each of the next three years. <i>(Paragraph 88)</i></p>
<p>Performance management incentives do not always encourage investment in prevention and independence.</p>	<p>SHAs' modernisation agendas should emphasise the potential of AT to promote independence and reduce pressures elsewhere in the healthcare system. <i>(Paragraph 51)</i></p> <p>Local authority overview and scrutiny committees should monitor aspects of NHS performance that have a direct bearing on social services' performance, such as AT services. <i>(Paragraph 96)</i></p>

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<p>Performance management incentives do not always encourage investment in prevention and independence.</p>	<p>SHAs' modernisation agendas should emphasise the potential of AT to promote independence and reduce pressures elsewhere in the healthcare system. <i>(Paragraph 51)</i></p> <p>Local authority overview and scrutiny committees should monitor aspects of NHS performance that have a direct bearing on social services' performance, such as AT services. <i>(Paragraph 96)</i></p>

Obstacles to progress / problems	Possible solutions / recommendations
<i>Recommendations for Government</i>	
<p>The model for the provision of AT is dominated by State provision and control.</p>	<p>Government, suppliers and healthcare trade associations should encourage the marketing of AT services to private individuals. (Paragraph 40)</p>
<p>Better use of AT offers the opportunity to improve the employment opportunities for disabled people.</p>	<p>The Department of Work and Pensions should devise ways to use AT to help bring a significant proportion of this number back into employment and off State benefits. (Paragraph 34)</p>
<p>The newer assistive technologies of telecare and telehealth would benefit from the legitimising effect of 'official' evaluation.</p>	<p>NICE should evaluate the benefits of using AT as part of an integrated care pathway for COPD as part of its current investigation with the British Thoracic Society. (Paragraph 87)</p> <p>NICE should consider undertaking a series of cost effectiveness studies to evaluate the impact that AT could have in the management of other chronic conditions. (Paragraph 87)</p> <p>Specific reference should be made to the ways that AT can support independence and targets should be included in the National Service Framework for Longer-Term Conditions. (Paragraph 87)</p>
<p>Not all local authorities and NHS trusts are promoting a whole systems approach. In the absence of an integrated approach, AT developments are unlikely to thrive because the agency required to invest in home or intermediate care (typically social services) is not the principal financial beneficiary (typically NHS hospitals).</p>	<p>Government should continue to encourage close working between agencies within a whole systems approach and greater promotion of section 31 flexibilities. (Paragraph 130)</p>
<p>Investment money is needed to support AT.</p>	<p>HM Treasury should consider extending its <i>Invest to Save</i> project specifically to support AT developments. (Paragraph 132)</p> <p>The Office of the Deputy Prime Minister should consider extending the <i>Supporting People</i> initiative to support telecare services. (Paragraph 132)</p> <p>SHAs should consider establishing designated modernisation funds to provide the necessary capital to support telehealth systems. (Paragraph 132)</p> <p>Some demonstration projects for integrated call centres should be established and evaluated. (Paragraph 136)</p>

Recommendations for Government (continued)	
Obstacles to progress / problems	Possible solutions / recommendations
<p>There is no change agent to drive forward the opportunities afforded by telecare and telehealth.</p>	<p>The DH's ICES team should be transferred to the Modernisation Agency and its remit extended to cover telecare. A Modernisation Agency collaborative programme for AT services as part of a wider Action on Independence should be established. (Paragraph 135)</p>
Obstacles to progress / problems	Possible solutions / recommendations
Recommendations for the supply industry	
<p>Management capacity to deliver the improvements available through the widespread adoption of AT is limited in many health and social care communities. Pressure on management costs will always make it difficult for public bodies to innovate and adopt new schemes and methods of working required by the adoption of AT. This is a serious obstacle to service improvement. This problem could be partly addressed by private sector suppliers being more creative in the package of solutions they offer to the market.</p>	<p>Currently, many suppliers of AT are simply in the business of providing the kit, not a service. They may consider the business opportunities that would be afforded through vertical integration to support potential customers to redesign people's jobs. For example, as well the technology, suppliers could also provide the integrated care pathways that need to be used alongside the technology. This would ease adoption of the technology into the public services and reduce duplication of effort. (Paragraph 110)</p>

Examples of the evidence base to support assistive technology provision

143 Assistive technology can perform a number of functions. These include the following:

- ◆ helping to prevent accidents;
- ◆ enabling independence and quality of life;
- ◆ ameliorating the effects of illness and disability; and
- ◆ assisting carers to care.

Main aim	Benefits of AT provision	Supporting evidence
Prevention of accidents and reducing risk	Facilitation of home safety and limitation of risk. Preventive home modification (for example, providing hand rails and grab rails.	The bathroom is a particularly risky area with high incidence of falls. Provision of devices can limit risk (Ref. 205). There are benefits to be gained from preventive home modification but further research is required (Ref. 206).
Enabling continued independence and quality of life	Housing adaptations to make home environment more appropriate and safe Equipment to help fulfil social roles, work and leisure Equipment to enable control over the environment	Provision of housing adaptations and more accessible housing increases the functional abilities of frail older people (Ref. 82). The greatest level of unmet need is for bathroom adaptations (Ref. 24). Good adaptations for disabled children are highly beneficial and assist with functional tasks and social integration (Ref. 207). Devices can be valuable in enabling participation in valued leisure occupations, and re-engagement with abandoned activities (Ref. 69). Assistive technologies for work are more likely to be used by people with sensory impairments (Ref. 208). Assistive technology, for example, communication aids and wheelchairs, can assist adults with developmental disabilities to participate in society (Ref. 209).
Ameliorating the effects of disability and illness	Facilitation of hospital discharge Limiting use of other forms of assistance	Devices can be instrumental in assisting people to return home but care has to be taken to ensure utilisation (Ref. 210). Changes in functional status following hospital discharge can alter needs for equipment (Ref. 211)(Ref. 212).

	<p>Surveillance</p> <p>Systems to call for help</p>	<p>Training after return home may be effective in improving usage (Ref. 213).</p> <p>Equipment can facilitate continued independence and limit need for personal assistance (Ref. 79).</p> <p>Equipment is the best strategy for reducing and resolving limitations resulting from mild to moderate disability (Ref. 91).</p> <p>A range of systems is available to monitor a person in their own home (Ref. 214).</p> <p>New developments are being investigated, particularly for people with dementia (Ref. 65).</p> <p>Community alarms are a valuable technology for those who have fallen or are at risk of falling (Ref. 70).</p>
<p>Helping carers to care</p>	<p>Equipment to prevent carer injury</p> <p>Technology to provide advice and support to carers</p> <p>Giving people more choice about staying put</p>	<p>Many carers experience injury from moving the cared for. (Ref. 42)(Ref. 215)</p> <p>Carers need access to equipment to assist with lifting and handling (Ref. 216)(Ref. 217).</p> <p>Carers need to be convinced of the benefits of these applications (Ref. 218).</p> <p>Systems can promote independence of the cared for but carer burden can remain high (Ref. 219).</p> <p>How technology can help older people should be placed in the context of why house moves are considered necessary (Ref. 220).</p>

Processes supporting the delivery of assistive technology services

The evidence underpinning the main processes supporting the delivery of assistive technology services is described in the following table

Process	Issue	Supporting evidence
Supply	<p>Limited accessibility of mixed economy of provision</p> <p>Lack of attention paid to aesthetics and quality of commonly used devices</p>	<p>The majority of equipment is self purchased, but younger people are more likely to buy (Ref. 24).</p> <p>Appearance can be a disincentive (Ref. 91).</p> <p>People want to purchase items that are attractive (Ref. 221).</p> <p>Inclusive design elements have yet to be incorporated into assistive technologies (Ref. 222).</p>
Provision	<p>Knowledge of what is available</p> <p>The complexity of the process</p> <p>Delays in assessment and provision</p>	<p>Selection of a device can be limited by what is available.</p> <p>Information provided in different formats may be valuable for older as opposed to younger people (Ref. 223).</p> <p>Providing equipment in response to assessed need incorporates a number of processes including assessment and training (Ref. 224).</p> <p>Home visits should be conducted to assess for assistive technology, involving all family members (Ref. 225).</p> <p>Delays can compromise both dignity and independence (Ref. 226).</p>
Utilisation	Instruction for usage	The importance of providing adequate instruction is indisputable (Ref. 213).

Effectiveness	Use of assessment and outcome measures	<p>Outcome of provision of assistive technology is not routinely measured (Ref. 231).</p> <p>There are few examples of assessment and outcome measures exist (Ref. 82)(Ref. 232).</p> <p>There is a need for a comprehensive evaluation to identify the factors that increase users' active engagement of in assessment for and prescribing of equipment (Ref. 225).</p>

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