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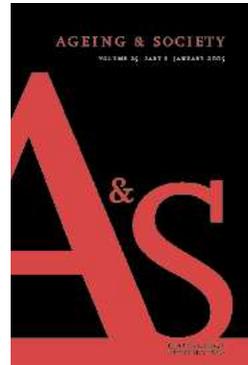
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The acceptability of assistive technology to older people

CLAUDINE McCREADIE* and ANTHEA TINKER*

ABSTRACT

Assistive technology (AT) is defined in this paper as ‘any device or system that allows an individual to perform a task that they would otherwise be unable to do, or increases the ease and safety with which the task can be performed’ (Cowan and Turner-Smith 1999). Its importance in contributing to older people’s independence and autonomy is increasingly recognised, but there has been little research into the viability of extensive installations of AT. This paper focuses on the acceptability of AT to older people, and reports one component of a multi-disciplinary research project that examined the feasibility, acceptability, costs and outcomes of introducing AT into their homes. Sixty-seven people aged 70 or more years were interviewed in-depth during 2001 to find out about their use and experience of a wide range of assistive technologies. The findings suggest a complex model of acceptability, in which a ‘felt need’ for assistance combines with ‘product quality’. The paper concludes by considering the tensions that may arise in the delivery of acceptable assistive technology.

KEY WORDS – assistive technology, older people, acceptability, felt need, home, housing.

Introduction

Internationally, the increasing number and proportion of older people living in their own homes with limitations in mobility, dexterity and mental capacity is a well-recognised social fact (Grundy *et al.* 1999; Grundy 2003). In the United Kingdom, the *Royal Commission on Long Term Care* (1999) gave prominence to the contribution that assistive technology can make to help older people remain living in their own homes. This has been endorsed by the influential Audit Commission (2004). Use of the term ‘assistive technology’ (AT) is relatively recent in the United Kingdom (Tinker 2003): the more familiar terms are aids, community equipment and housing adaptations. Recent developments in electronics have increased the potential for AT to support people, through the use of sensors, robotic devices and

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remote control devices (Gann, Barlow and Venables 1999; Gann *et al.* 2000; Fisk 2003). Home-networking (or 'smart' technology) makes it possible to activate these and other household items from a remote computer (Pragnell, Spence and Moore 2000). Currently, there is considerable discussion about the scope for extending medical care in the home through remote monitoring or consultations by tele-communications (Severs 1999; Tang, Curry and Gann 2000; Tetley, Hanson and Clarke 2000; Brownsell, Bradley and Porteus 2003; Fisk 2003). In the United Kingdom, there is a developing policy vision about how the different components of AT might fit together in private housing (Tinker 2003; Audit Commission 2004).

The research reported in this paper addressed a question of crucial importance in any debate about the role of AT – how acceptable is it to the user? The question was one component of a larger, multi-disciplinary project which investigated the feasibility, costs and outcomes of introducing AT into the existing homes of older people (Tinker *et al.* 2004).¹ This paper reports on the findings from in-depth interviews with 67 people aged 70 or more years in England and Scotland about their use and experience of diverse AT. In the light of the findings, we propose a model for understanding the acceptability of AT to older people in terms of the interaction of users, housing and the technology. This paper focuses on users and housing, and concludes with a discussion of the possible tensions around the extensive use of AT. The AT components are discussed in more detail in McCreadie (2004).

Defining assistive technology

Assistive technology was defined in the research as 'any device or system that allows an individual to perform a task that they would otherwise be unable to do, or increases the ease and safety with which the task can be performed' (Cowan and Turner-Smith 1999). This definition embraces services and interventions provided by various professions and organisations and with different funding sources. Many in Britain have been separately provided, namely community equipment, housing adaptations, community and other alarms and 'smart' technology, except when prescribed and commissioned by occupational therapists. The definition also embodies a 'social model' of disability, which recognises that older people's disability arises from the interaction between their physical and mental capacities and the environment, especially their housing. The value of the social model of disability to the circumstances of older people is increasingly recognised (Askham 2001; Heywood 2001; Heywood, Oldman and Means 2002). As Oldman (2002) wrote, 'the message is never so compelling as in the case of housing ... the house, its steps and stairs, its too

narrow doors, its overall standardised design, its lack of space and much else besides creates the disability'. Several British studies have clearly borne this out (Frain and Carr 1996; Hanson 2001; Kellaher 2001), as have others in Finland and the United States (Mann *et al.* 1994; Gitlin *et al.* 2001; Teikari, Sipilainen and Kylmaaho 1998), while Hanson (2001) has reversed the normal ascription of the problem to the person with the term 'architectural disability'.

Perspectives on older people's use of assistive technology

Assistive technology (AT) has the potential to narrow the gap between an individual's capacity and their environment, and therefore to make it easier for people to remain in their existing accommodation. The extent to which AT can narrow the gap depends on older people's willingness to use it, which in turn depends on several complex factors: the needs that people perceive, among which safety may be the most important (Mann *et al.* 1994; Zimmer and Chappell 1999; Wielandt and Strong 2000; Roelands *et al.* 2002); the perceived usefulness of the AT (Czaja and Barr 1989; Hartke, Prohaska and Furner 1998; Chamberlain *et al.* 2001); and whether the individual feels that use of the device either supports or undermines their sense of personal identity (Gitlin, Luborsky and Schemm 1998). The heterogeneity of older people and the diversity of their living circumstances mean that individual preferences will play a strong part in people's attitudes.

Recent American research has shown that AT has considerable potential as at least a partial substitute for various social and health-care interventions (Verbrugge, Rennert and Madans 1997; Agree 1999; Agree and Freedman 2001; Hoenig, Taylor and Sloan 2001). This is not to say that technology should dominate the care and treatment that people receive, but that there is scope to increase choice and to facilitate many routine everyday tasks, whether undertaken alone or with another's help. A Belgian study of attitudes to AT use among older users found that the highest scoring attitude item was that, 'assistive devices are a good solution to certain problems' (Roelands *et al.* 2002).

Studies of outcomes have used various approaches (Heaton and Bamford 2001). Those focusing on users generally outline the positive benefits of AT in terms of quality of life, safety and the ease of performing everyday tasks (Heywood 2001; Bamford 2001), although a recent paper by Agree and Freedman (2003) that reported a secondary analysis of mobility-aids data questioned these benefits. Users particularly value the independence given to them by showers, stair-lifts and downstairs toilets (Heywood 2001). There are also preventive benefits, which are likely to result in reduced

TABLE 1. *Percentage using assistive technology and reporting need for AT by severity of disability, people aged 65 or more years in Great Britain*

Type of assistive technology	Level of disability			
	Moderate		Severe	
	User % ¹	Need % ²	User % ¹	Need % ²
Mobility aids: including wheelchairs, walking sticks, crutches, walking frames, trolleys.	55	5	78	10
Vision aids: including guide dog, white cane, magnifying glass, Braille equipment, writing frame, frame for telephone, talking-book machine/cassette recorder, audile/tactile measuring device, sonic aid, ordinary stick, low-vision aid.	41	9	38	9
Hearing aids: including hearing aid, adaptor for telephone, adaptor for TV, adaptor for radio, flashing light for telephone, flashing light for door, flashing alarm clock, pointer board, typewriter.	21	11	23	10
Furniture or daily living aids: including bed-hoist, bed poles and ladders, cradle for bed clothes, orthopaedic mattress, ripple mattress, sheepskin mattress, other special bed or bedding, commode, sani-chair, toilet hoist, other aids to toileting, bath seat, bath hoist, non-slip mat, other aids to bathing, environmental controls, <i>e.g.</i> possum, special chair.	28	12	51	17
Gadgets or small aids: including special crockery, special cutlery, special utensils (<i>e.g.</i> potato peeler, tin opener), tap turner/special taps, special door handles, pick-up aid, dressing aids, electric toothbrush, gadget to summon help.	19	9	33	14
Adaptations to accommodation: including ramps outside instead of steps, handrails outside, ramps inside instead of steps, hand rails inside, doors alerted for better access, <i>e.g.</i> widened, stair-lift, other alterations for better access, fitted furniture altered (<i>e.g.</i> shelves, cupboards, cooker), new bathroom or toilet added, shower installed, bath grab-rail installed, door answering/opening system.	28	19	45	28
Sample size (unweighted base)	1,234		551	

Source: Special tabulation by Gerontology Data Service, Institute of Gerontology, King's College London from Disability Follow-Up to the 1996/7 Great Britain *Family Resources Survey*.

Notes: 1. Percentage of group who have AT devices installed. 2. Percentage with an unmet need for AT.

demands on health and social care services and reduced admissions to hospital and other communal care settings (Mann *et al.* 1999).

Use of assistive technology in the United Kingdom

The use of most kinds of AT increases with both the severity of disability and age (McCafferty 1994; Edwards and Jones 1998; Martin, Meltzer and Elliott 1988). Table 1 indicates the extent to which several kinds of AT were

used by respondents with moderate or severe disability to the Great Britain 1996/7 *Family Resources Survey* 'Disability' follow-up (Grundy *et al.* 1999). Among those with moderate disabilities, the most commonly used assistive technologies were aids to mobility and vision. For those with severe disabilities, furniture, daily-living aids and housing adaptations came second to mobility aids. At both levels of disability, there were unmet needs for all types of AT, but the highest levels of unmet need were related to housing adaptations.

It has been estimated that there are around 1.3 million social alarms in the United Kingdom, mainly but not exclusively installed by housing providers (Laing and Buisson 2000; Fisk 2003). Social alarms 'can be defined as devices (with or without some intelligence) located in the home, which, when activated, facilitate communication with a responder and the sending of information relevant to the user's well-being' (Fisk 2003: 4). Changes in technology, particularly in sensors, have now increased considerably the scope for monitoring people's movements around the home and for detecting environmental hazards, such as water overflow or carbon monoxide leaks. Room thermostats, smoke detectors and passive infrared devices (*e.g.* to switch on an outside light) are commonplace. Over two-thirds of occupied dwellings in England in 1996 had a smoke alarm, but only seven per cent of these were hard-wired; and the government has urged local authorities to provide smoke alarms in all their properties (Department for Transport, Local Government and the Regions (DTLR) 2001). New types of alarm are being tried in several older people's housing schemes (Matthews and Mackenzie 2000; Curry, Tinoco and Wardle 2003; Fisk 2003; Audit Commission 2004).

The study

Study setting and sample selection

This paper reports the findings of an opinion survey using a semi-structured questionnaire of the acceptability of AT among a purposive sample of 67 people aged 70 or more years living in the community in England and Scotland. A purposive sample was drawn because, to our knowledge, no sampling frame of older people in receipt of AT living in the community is available. The fieldwork took place in 2001 in conjunction with 10 housing partners – five local authority housing departments and five registered social landlords (RSLs).² The RSLs included two large and one small generalist provider, one large specialist provider for older people, and one small housing association that specialised in innovative AT. The local authorities were chosen to reflect different types of area (rural, inner city,

TABLE 2. *Housing partners and response rates*

Housing provider	Questionnaires sent	Returns	Eligible interviews
Registered Social Landlords¹			
Large specialist, North of England ²		7	7
Small specialist, Scotland ²		5	5
Large generalist, NW England	40	22 (55%)	7
Small generalist, SW England	40	25 (63%)	8
Large generalist, London ³		12	8
Total	80	59	35
Local Authorities			
South England	40	25 (63%)	8
Inner London	40	18 (45%)	8
West Midlands	40	25 (63%)	8
East Midlands	40	24 (60%)	8
Total	160	92 (58%)	32
Grand total	240	151	67

Note: 1. A generalist RSL provides housing for all age groups. A specialist RSL provides housing for particular groups in the population, *e.g.* older people, or people with a special need. 2. Tenants selected because they had 'high tech' assistive technologies installed. 3. Purposively-selected respondents.

suburban and coastal) but all had forward-looking housing policies for older people. One local authority partner in the south of England was unable in the end to assist with this part of the research. All the respondents lived therefore in social rented housing – a form of tenure that in 1996 accommodated around one-third of people aged 70 or more years in the United Kingdom (Matheson and Summerfield 1999: Table 1.15).

The target was to interview in each area eight respondents who received some form of AT, including innovative items like video door-entry systems, fall detectors and environmental alarms other than smoke detectors. People with dementia, and participants in any specially-funded innovative AT project were excluded. Four of the local authorities and two of the RSLs held lists of people by date of birth and the year of a housing adaptation, and these were used as the local sampling frame to select 40 tenants. Systematic sampling was used, with replacements to increase the diversity of AT installations. The tenants were sent a screening questionnaire that included questions about AT in their home and their age, gender, type of housing, living arrangements, vision and functional capacity (questions on stair climbing, using a bath or shower).

The response rates to the screening questionnaire are shown in Table 2. Eight respondents were recruited from the returned screening questionnaires to include a range of AT, ages, gender, types of housing, extent and types of disability, and those living alone or with others. One RSL in London did not have a recording system that allowed them to distinguish

which tenants aged 70 or more years had received a housing adaptation during the past two years. This RSL selected the respondents for interview following a brief from the researchers. The large specialist housing provider invited the researchers to focus on the installation of innovative AT in a sheltered housing scheme, and the housing manager selected the tenants for interview, again following the brief. The final housing partner was invited to participate in the research because it was committed to the installation of the latest AT. It transpired, however, that this had almost entirely been installed to help tenants with dementia (not included in the study) or younger tenants. The provider was able to recruit one tenant living in their specialist accommodation, and approached a neighbouring local authority with an active programme of AT installation to arrange interviews with five tenants who met the age inclusion criterion.

The interviews

In total, 67 eligible in-depth interviews were conducted and tape-recorded in people's own homes. The semi-structured interview schedule had three main sections: background, the nature and severity of disabilities, and the assistive technology. The AT section covered: entry and movement; baths and lavatories; communication, safety and alarms (which included telephones, door entry phones, and social and environmental alarms); electrical devices; and other devices (including lever-taps and colour-contrast decoration). The questionnaire employed open-ended questions to investigate the respondent's use and experience of AT, including their experience of the installation, servicing and repairs. The disability section focused on functional capacity and drew on the *EasyCare* assessment system that covers the 'activities of daily living' (ADL) (using stairs, bathing and getting dressed), the 'instrumental activities of daily living' (IADL) (housework, meal preparation, going shopping), and using the telephone (Sheffield Institute for Studies on Ageing 1997–9). Shopping and meal preparation have been identified as particularly important for older people in maintaining a sense of independence (Godfrey and Callaghan 2000). Sight and hearing were also included. Use of this instrument enabled an approximate score of disability to be derived from the respondents' self-reports.

Data analysis

The data on respondent characteristics and on AT was coded and analysed, and the interview scripts were transcribed in full. The responses were initially categorised by type of AT, *e.g.* lifts (vertical and stair), showers (over-bath and level-access), social-alarms, smoke-detectors, grab-rails, and

door-entry systems. For each type of AT, the following were addressed: use, benefits, problems, installation, information and training, servicing and repair, user views and recommendations. The responses were also analysed by the respondents' housing, disability, living arrangements, informal and formal support and their views about managing their independence. Detailed reports were written about each housing provider. The results were then interpreted and, building on the literature review, used to develop a model for explaining the acceptability of AT.

Results

Respondents' characteristics

Of the 67 respondents, 33 were aged 70–79 years, and 34 were older (with five aged 90 or more years). The age range was from 70 to 97 years; four-fifths of the respondents were women; and 52 lived on their own, including all those aged 90 or more years. Seven people aged in the seventies, and four in the eighties, lived with their spouse. Only four lived with other family members, and just one in a three-generation household. The age and gender profiles of tenants in the different areas were similar. As to their housing, 39 lived in flats or maisonettes (12 on the ground floor), and the remainder were equally divided between houses and bungalows. Those living in houses concentrated in three of the local authorities, while the respondents living in bungalows concentrated in accommodation provided by the two large generalist RSLs. Most respondents were in touch with their family, and their relatives generally offered social contacts and considerable support, particularly with shopping, housework, outings and room-decoration. In several instances, grandchildren played an active role. In a minority of cases, children or grandchildren offered substantial personal-care assistance. Few respondents received formal care, but most were 'managing' with or without their family helpers but with very little assistive or telecare technology.

On the basis of the *EasyCare* assessment, approximately one-half of the respondents were classified as having 'moderate' disabilities, about one-quarter 'mild' and one-quarter 'severe' disabilities. All three categories embraced, however, various severities of disability and therefore only approximated the individual's functional health and capacity. There was little variation by the different housing partners. The respondents suffered from various disabling conditions, but by far the most common was arthritis: it was reported by 30 of the 67 respondents, in line with the national prevalence. Few respondents had been disabled throughout their life. The respondents were stoical when talking about their pain and

TABLE 3. *Assistive technology devices installed in the respondents' homes*

Assistive technology	N	%	Assistive technology	N	%
Telephone	64	95	Level-access shower	21	31
Remote control	64	95	Over-bath shower	21	31
Smoke detector	57	85	Wheelchair	19	28
Grab-rails inside	54	81	Walking frame	16	24
Social alarm	48	72	Low-access shower	14	21
Grab-rails/ramps outside	40	60	Stair-lift	8	12
Walking-stick	36	54	Environmental alarms	6	9
Electric plugs/sockets changed	30	45	Additional lighting	4	6
Door entry phones	29	43	Mobile hoist	2	3
... with video	8	12	Overhead-track hoist	1	1
Raised lavatory seat/frame	27	42	<i>Sample size</i>	<i>67</i>	

Notes: No respondents had any remote control device except for a television set. No respondents had their own personal computer, although one household had one.

disability, but invariably had to surmount everyday physical and psychological difficulties. As Mrs Bennett, aged 90 years, said: 'The arthritis is in all my fingers ... I have a hearing aid ... but some people don't speak up and I can't hear a word they say. ... I can't carry anything now either. You know I'm getting a bit weak in the body I think' (chuckling).³ Over and again, people stressed that they wanted to manage and cope for themselves, even at the cost of increased pain or a lower quality of life. The following quotation typifies the remarks that were made during the interviews:

I had two ladies from home-help come to see me this morning. 'We're very worried about you', one said, so I replied, 'Well don't be. Let me lead my own life. Don't keep on to me'. I'm not being facetious, and I'm not being obstructive, but I do my own meals, and I do my cleaning. ... I do this room one morning, the passage the next day, and the bedroom the next. ... I hang on my frame and just go around. But, you see, if I don't do these things I'll vegetate, wouldn't I? And I've been active all of my life. (Mr Castle, aged 87 years)

Ownership of assistive technology

The forms of assistive technology examined in this research were both specialist items – grab-rails, walking-sticks, wheelchairs, stair-lifts, hoists and social alarms – and standard items that have specific 'assistive' applications – remote controls, showers, telephones, door-entry phones, smoke-detectors and other forms of environmental alarm (Table 3). The most common AT device, included because of its immense importance for social life and participation, was the telephone, and running very close to it, remote-control for a television set. Smoke-detectors and indoor grab-rails were used by more than 80 per cent of the respondents, and

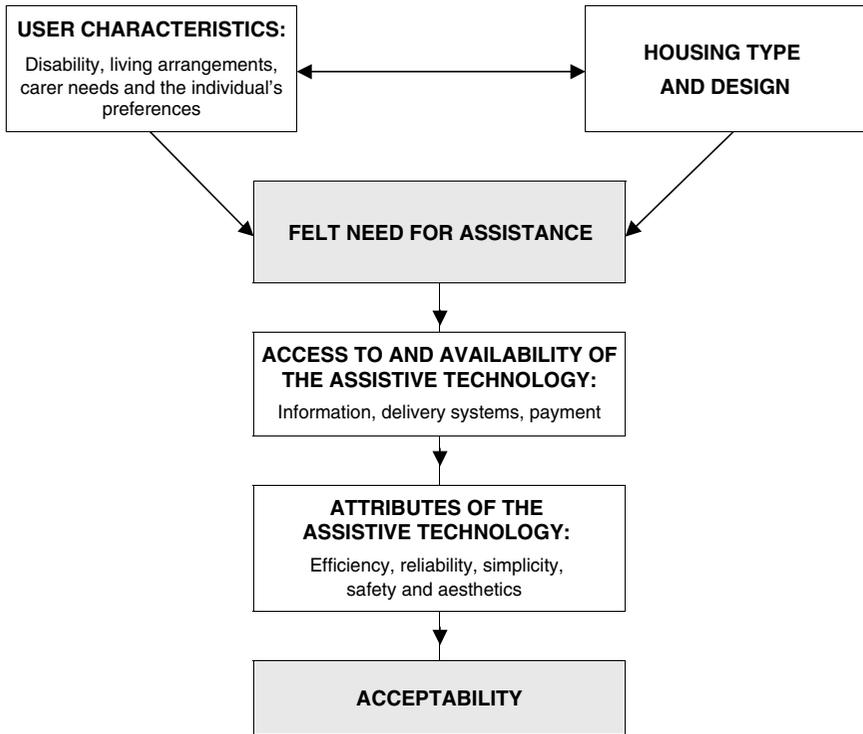


Figure 1. A model of the acceptability of assistive technology.

social-alarms by more than 70 per cent. One-half of the respondents used walking-sticks, one-quarter used walking frames, and one-quarter wheelchairs. Eighty per cent of the respondents had a shower of some kind, and nearly one-half had a door-entry phone, reflecting the large number that lived in blocks of flats. About one-in-eight had stair-lifts, and 50 per cent of those who lived in houses. Despite the special effort to include the more recent innovative technology, only a very few respondents had the latest electronic devices.

A model for understanding the acceptability of AT to older people

Our analysis of the interview data and review of previous research leads us to propose the model outlined in Figure 1 of the acceptability of AT to older people. It suggests that the acceptability of AT depends on the interactions between a 'felt need' for assistance, the recognition of 'product quality' – the efficiency, reliability, simplicity and safety of the technology or device, and its availability and cost. 'Felt need' depends on several user characteristics, the housing type and design, and the interaction of these

variables. Four user attributes were found particularly relevant: the older person's disability, their living arrangements, care needs, and their personal motivations and preferences.

The older person's disability

Much of the assistive technology that the respondents used was to accomplish everyday tasks. For example, they needed grab-rails to help them get up and down steps or to manage in their bathroom, or a stair-rail to go up and down staircases. The AT helped them to bridge the gaps between the limitations imposed by their disability and environments and the everyday activities and tasks that they wanted to perform. Stair-lifts, bed-levers, level-access showers, raised lavatory-seats and social-alarms were all cited as essential to their everyday routines. Effective AT can often ameliorate sensory disabilities. Mrs Fisher, who had a severe hearing impairment, had a portable device that amplified the sound and also flashed when the door-bell rang: she recommended it warmly. Mrs Stephens had a magnifier that enabled her independently to read text on a TV screen. As she said:

[The magnifier] changed my life, because I don't know what I would have done without it: I just wouldn't have been able to read anything at all. My daughter comes in once or twice a week. She reads all my mail; she does all my correspondence; she fills all my forms and that sort of thing. As far as reading anything is concerned, no way.

Living arrangements and family support

The respondents' living arrangements influenced both the forms of help that they required with practical everyday living tasks and their social needs for safety and company. For many of the married couples, there was a strong element of reciprocity, as summed up by Mrs Armour in the phrase: 'I'm his leg and he's my memory', and by Mr Bernard's daughter, 'We're the alarms'. But whether they lived alone or with others, the respondents retained a strong desire to manage for themselves. So the fact of having someone available to help did not stop them wanting to be independent, in whatever ways they could be. As was pointed out to us several times, a co-resident cannot always be there at the moment when they are needed.

Carer needs

In a few cases, the respondent was the carer of someone with severe disabilities and the installed assistive technology made a great difference to them. Mr Black cared for his wife, aged 81 years, who had had a severe

stroke and was paralysed from the neck down. He had been greatly helped by the use of a portable hoist and a vertical lift. Mrs English cared for her wheelchair-bound mother, who had severe Alzheimer's disease complicated by strokes that affected both mobility and vision. They lived in a new purpose-built bungalow where Mrs English appreciated the very easy access and the plugs and light switches at wheelchair-accessible heights. As she explained, 'This house is adapted for a handicapped person, so it's marvellous: you can go straight out with the wheelchair both back and front, which is – oh it's fantastic!'

Personal motivations and preferences

Although there was impressive unanimity among the respondents about managing and coping, as expected there were also marked differences in how individuals responded to their situations. As recognised by the proponents of 'successful ageing' (Baltes and Carstensen 1996), people have different ways of adjusting, and this affects their perceptions of the advantages and utility of AT. So there were examples of people not liking or using AT, because they did not feel a need for it. Wearing or not wearing pendant social-alarms illustrated very well the extent to which a person felt the need for the technological assistance. As one respondent said:

Yes, I haven't got it round my neck now. It's in the bedroom. I don't go outside into the garden without it. ... I don't feel too bad today, but if I don't feel so good I put it on. And at night-time, it's just at the side of the pillow, so it's right there. It's in the bedroom now [at] the side of the bed. I haven't used it. (Mrs Irving, aged 84 years)

Factors relating to housing type, design, location and facilities

The users' attributes interacted with their type of housing, for some experienced more 'architectural disability' than others. Many had general accessibility problems such as: difficulties in entering or leaving at either the front or the back of the house because of steep steps or paths; moving around inside the house, particularly for people with wheelchairs; getting upstairs and downstairs; and opening and closing windows. Some people lived in first-floor flats or maisonettes without a lift, so that even if they could manage quite well inside, they had difficulties entering and leaving their house. Difficulties with stairs were cited as a reason for moving to other accommodation. Of the eight respondents who lived on their own in a two-storey property (including one ground-floor maisonette), seven suffered from arthritis, some severely. In three cases stair-lifts had been

installed, and in two cases the tenants were awaiting the installation. In the other three cases, tenants were managing valiantly.

Interestingly, such housing limitations emerged during the interviews that focused on the installation of the latest alarms. While the latest devices addressed many of the respondents' safety needs, they did nothing to meet their mobility needs. For example, swivel-seats for baths had been provided for two respondents, but both were uneasy about using them. Mrs Stephens was 80 years of age and lived alone in a first-floor flat that is reached by four flights of five stairs and to which she had moved two years earlier. She suffered from arthritis and macular degeneration, but while she had plenty of AT to address her visual disability, mainly from the *Royal National Institute for the Blind*, almost none addressed her mobility problems from arthritis. Although there were rails on the stairs to her flat, there were none on the landings or at the entry to the block. Of the 19 respondents who used a wheelchair, seven were dependent upon them indoors. Although some had made creative adaptations, several commented on the difficulties of managing with a wheelchair and the damage caused to the paintwork. There were also difficulties for people in opening and going through doors. Wheelchair storage was also a problem: in most cases, even for those who only used them outside, they were stored in a bedroom, living room or hallway. Recently designed accommodation was generally more accessible, which the tenants explicitly appreciated. Mrs Nottage, aged in the eighties, lived alone in a specially designed older person's bungalow, to which she had moved three years earlier. The helpful design features included level access at the front door, a ramp into the garden, extra door locks, passive infrared lights for the porch and garden, wide internal doors and level thresholds.

These factors combined to generate *a felt need for assistance*. People wanted to do things for themselves, but how they chose to manage differed according to their disability, their housing situation and their personal preferences. They had their own view of their capacities in relation to their 'goals' and to their environment – which included varying degrees of help and support from family, neighbours and, in a few cases, from formal sources.

Assistive technology must work properly, reliably and safely

A 'felt need' was however only one element in the acceptability of AT, another was attributes of the AT itself, the most important being that it worked properly, reliably and safely (McCreadie 2003). Stair-lifts that had broken down, alarms that went off by mistake, shower chairs that felt slippery, grab-rails that wobbled or were in the wrong place, smoke-alarms

that went off as soon as the toast burnt, and intrusive wiring – these kinds of things the respondents criticised. On the other hand, they praised highly stair-lifts that worked, showers that had level and low access and were simple to step into and out from and were simple to operate, alarms that worked reliably, and various devices that assisted with hearing and vision.

Access to assistive technology

The final element of the model concerns people's capacity to access AT. This was not a focus of the research but its importance became clear during the interviews. Mediating the relationship between the user and the product is a system or, in some cases, a market. Access to AT depends on information and on contacts with suppliers, which for most AT for most people, are housing, health and social care services, and on payment. Felt need may also be affected by these factors, since someone may cope heroically and not feel they need help because they have no idea that such help is available.

Conclusions

The underlying premises of this study were that housing-related needs are central to the role of assistive technologies and that there has been no systematic investigation of their scope in existing as opposed to *new* properties. A large component of the research was the examination of the feasibility of introducing a package of assistive technologies, prescribed to meet closely the needs of seven hypothetical users at two points in time, into a wide range of extant properties in the 10 study areas. The broad conclusions are that most properties can accommodate most kinds of AT, but that the greater the individual's needs and the more building work required, the more variable the costs by type of property. It is at this point that the consideration of acceptability of AT to the individual becomes important.

The interview data suggested that the combination of individual need and the home environment creates a *felt need* for help: the individual feels that they need help. Some respondents were managing bravely in difficult circumstances but did not see themselves as needing help. None were technophobic but they made essentially pragmatic judgements. If the AT was straightforward, reliable and met a need, respondents were positive. The attitudes to stair-lifts, level-access showers, social-alarms, smoke detectors, lever taps, door openers, grab-rails and remote controls for TV/video were overwhelmingly constructive. Newer devices, such as door entry systems with video, movement sensors, remote controls and, in one

case, an automated window opener, were judged similarly. The number of positive comments far outweighed the negative comments about the failures of AT to work properly. Mrs Joyce, 86 years old, suffered severe visual and hearing impairment, was exceptionally vocal and articulate about technology and said that she was 'full of ideas'. Chronological age appeared far less important than people's 'felt need'.

It appeared that most respondents would have benefited from more AT. All 67 respondents were sufficiently disabled to have qualified for some housing adaptation, yet none had a comprehensive AT package. Apart from those who had been purposively selected for inclusion in the research, none had fall or movement detectors, window opening mechanisms, or flashing telephones. Although door-entry systems were common in communal blocks of flats, only one respondent (again selected) had a door opening mechanism for her private house. Yet, relative to the cost of housing adaptations, these items are not expensive. Many respondents lacked simple items like extra grab-rails or adequate lighting for steps and stairs. On the other hand, there were several examples of people with the more innovative devices but without housing adaptations to facilitate access or to enable them to bathe safely.

These paradoxical situations point to the danger of being carried away by smart-home technology without commensurate attention to the resident's mobility restrictions. There was considerable variation among the partner local authorities, and the position of tenants of RSLs was complicated. Leaving aside the complicated issues about the supply and funding of AT, and assuming that the current promotional policies succeed, our findings about the multiple and subtle influences on AT acceptability suggest that caution would be wise before embracing the large claims about its ability to increase independent living in private homes.

Three tensions arising from the current claims for AT can be identified. The first is the disparity between objectively- or professionally-assessed and 'felt' need. For beneficial outcomes to be experienced, older people have to be party to decisions about the provision and installation of AT in the home. The research evinced older people's capacity to articulate their needs. The model emphasises that there are not only diverse needs, but also variable interpretations of comparable needs by different individuals. In this respect, it challenges the introduction of comprehensive packages of AT without individual user assessment: the assessment of 'objective' need has to be balanced by reference to the individual's perception of his or her own needs. This, in turn, requires individuals to have information about how AT might address those needs. This might usefully be provided in relation to the five areas of daily life that are important to older people: keeping clean and comfortable; enjoying a clean and orderly

environment; being safe; accessing social contact and company; and keeping active and alert (Qureshi and Henwood 2000).

The second caveat arises because the vast majority of respondents placed significant value on their home. Their accommodation expressed a strong sense of individuality, comfort and homeliness. Home, as Kellaher (2001) emphasised, is 'more, much more ... than stairs and plumbing and the obstacles they can present to daily living'. Associations with the past, proximity to family or to long-established neighbours, familiarity, and a sense of being a part of neighbourhood life were all mentioned as conditioning people's views about moving. The acceptability of AT to an individual may depend on the extent to which it alters the character of their home. Some people may want to remain in their own home even though to do so it has to be altered substantially. Other people find, however, that the provision of AT requires unacceptably radical alterations, as when the property has to be converted to accommodate a wheelchair. The feasibility component of our research found that this sometimes meant changing the sizes, shapes and uses of rooms, *e.g.* the second bedroom had to become a bathroom. While such changes might be less unacceptable and life changing than having to move, very often the intrusion of AT alters subtly the individual's sense of their home environment. Respondents sometimes commented adversely on raised lavatory seats (which they were often keen to get rid of) and plastic grab-rails. Certainly, many of the items that we observed were the antithesis of sensitive design: a more inclusive and creative approach might address some of these limitations (McCreadie 2004).

Finally, there is a caveat and potential tension about the substitution of AT for human support and help. It would be a gross distortion of our findings to conclude that AT can replace human contacts and support, which we do not believe. Important balances have to be struck between human and technical contributions to care. Technology however has the supreme advantage of 'emphasising strategies to reduce task demand' as opposed to the medical approach of 'improving capabilities' (Verbrugge, Rennert and Madans 1997). It has become clear from this research that the respondents endorsed the contribution that AT made in assisting them with everyday life activities and that AT promotes the independence that is so important to many older people with impairments.

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NOTES

- 1 The findings reported here are from a larger project, as described in the Acknowledgements.
- 2 Registered Social Landlord (RSL) is the recognised name for a social-housing landlord registered with and eligible for capital grants through *The Housing Corporation*, a non-departmental UK government agency sponsored by the Office of the Deputy Prime Minister. RSLs are mostly housing associations but also trusts, co-operatives and companies, and are the main providers of new social housing in the United Kingdom (very little 'public' or local authority housing is now built). Some specialise in housing for special-needs groups including older people. All are run as businesses but do not trade for profit.
- 3 All names are fictitious.

References

- Agree, E. M. 1999. The influence of personal care and assistive devices on the measurement of disability. *Social Science and Medicine*, **48**, 427–43.
- Agree, E. M. and Freedman, V. 2001. Incorporating assistive devices into community-based long-term care: an analysis of the potential of substitution and supplementation. *Journal of Aging and Health*, **12**, 3, 426–50.
- Agree, E. M. and Freedman, V. 2003. A comparison of assistive technology and personal care in alleviating disability and unmet need. *The Gerontologist*, **43**, 3, 335–44.
- Askham, J. 2001. The sociology of ageing. In Jacoby, R. and Oppenheimer, C. (eds), *Psychiatry and the Elderly*, 3rd edition. Oxford University Press, Oxford, 25–42.
- Audit Commission 2004. *Assistive Technology: Independence and Well-Being 4*. Audit Commission, London.
- Baltes, M. M. and Carstensen, L. L. 1996. The process of successful ageing. *Ageing & Society*, **16**, 4, 397–422.
- Bamford, C. 2001. Using postal questionnaires to collect outcomes information from users and carers. In Qureshi, H. (ed.), *Outcomes in Social Care Practice*. Social Policy Research Unit, University of York, York, 149–97.
- Brownsell, S., Bradley, D. and Porteus, J. 2003. *Assistive Technology and Telecare: Forging Solutions for Independent Living*. Policy, Bristol, Avon.

- Chamberlain, E., Evans, N., Neighbour, K. and Hughes, J. 2001. Equipment: is it the answer? An audit of equipment provision. *British Journal of Occupational Therapy*, **64**, 12, 595–600.
- Cowan, D. and Turner-Smith, A. 1999. The role of assistive technology in alternative models of care for older people. In *Royal Commission on Long Term Care*, Research Volume 2, Appendix 4, Stationery Office, London, 325–46.
- Curry, R. G., Tinoco, M. T. and Wardle, D. 2003. *Telecare: Using Information and Communication Technology to Support Independent Living by Older, Disabled And Vulnerable People*. Report commissioned by Department of Health. Obtainable from the author at E-mail address <rcurry@dialin.net>.
- Czaja, S. J. and Barr, R. A. 1989. Technology and the everyday life of older adults. *Annals of the American Academy of Political and Social Science*, **503**, 127–37.
- Department for Transport, Local Government, and the Regions (DTLR) 2001. *Smoke Alarms in Local Authority Housing. Guidance to Local Authority Chief Housing Officers and Others*. DTLR, London, September 6. Available online at <http://www.housing.odpm.gov.uk/information/fire/index.htm> [accessed 18 March 2004].
- Edwards, N. I. and Jones, D. A. 1998. Ownership and use of assistive devices amongst older people in the community. *Age and Ageing*, **27**, 463–8.
- Fisk, M. J. 2003. *Social Alarms to Telecare*. Policy, Bristol.
- Frain, J. P. and Carr, P. H. 1996. Is the typical modern house designed for future adaptation for disabled older people? *Age and Ageing*, **25**, 398–401.
- Gann, D., Barlow, J. and Venables, T. 1999. *Digital Futures: Making Homes Smarter*. Chartered Institute of Housing, Coventry, Warwickshire.
- Gann, D., Burley, R., Curry, D., Phippen, P., Porteus, J., Wells, O. and Williams, M. 2000. *Health Care and Smart Housing Technologies*. Pavilion, Brighton, Sussex.
- Gitlin, L. N., Luborsky, M. R. and Schemm, R. L. 1998. Emerging concerns of older stroke patients about assistive devices. *The Gerontologist*, **38**, 2, 169–80.
- Gitlin, L. N., Mann, W., Tomit, M. and Marcus, S. M. 2001. Factors associated with home environmental problems among community-living older people. *Disability and Rehabilitation*, **23**, 17, 777–87.
- Godfrey, M. and Callaghan, G. 2000. *Exploring Unmet Need*. Joseph Rowntree Foundation, York.
- Grundy, E. 2003. The epidemiology of aging. In Tallis, R. C. and Fillit, H. M. (eds), *Brocklehurst's Textbook of Geriatric Medicine and Gerontology*. Churchill Livingstone, Edinburgh, 3–20.
- Grundy, E., Ahlburg, D., Ali, M., Breeze, E. and Sloggett, A. 1999. *Disability in Great Britain: Results from the 1996/7 Disability Follow-up to the Family Resources Survey*. Research report 94, Corporate Document Services, Department of Social Security London.
- Hanson, J. 2001. From 'special needs' to 'lifestyle choices': articulating the demand for 'third age' housing. In Peace, S. M. and Holland, C. (eds), *Inclusive Housing in an Ageing Society*. Policy, Bristol, 29–54.
- Hartke, R. J., Prohaska, T. R. and Furner, S. E. 1998. Older adults and assistive devices. *Journal of Ageing and Health*, **10**, 1, 99–116.
- Heaton, J. and Bamford, C. 2001. Assessing the outcomes of equipment and adaptations: issues and approaches. *British Journal of Occupational Therapy*, **64**, 7, 346–56.
- Heywood, F. 2001. *Money Well Spent*. Policy, Bristol.
- Heywood, F., Oldman, C. and Means, R. 2002. *Housing and Home in Later Life*. Open University Press, Buckingham.
- Hoening, H., Taylor, D. and Sloan, F. 2001. Assistive technology is associated with reduced use of personal assistance among disabled older persons. *Journal of American Geriatrics Society*, **49**, 4, S13–4.

- Kellaher, L. 2001. Shaping everyday life: beyond design. In Peace S. M. and Holland, C. (eds), *Inclusive Housing in an Ageing Society*. Policy, Bristol, 215–34.
- Laing and Buisson 2000. *Domiciliary Care Markets*. Laing and Buisson, London, 65–8.
- Mann, W. E., Hurren, D., Tomita, M., Bengali, M. and Steinfeld, E. 1994. Environmental problems in homes of elders with disabilities. *Occupational Therapy Journal of Research*, **14**, 3, 191–211.
- Mann, W. C., Ottenbacher, K. J., Fraas, L., Tomita, M. and Granger, C. V. 1999. Effectiveness of assistive technology and environmental interventions in maintaining independence and reducing home care costs for the frail elderly. *Archives of Family Medicine*, **8**, May/June, 210–7.
- Martin, J., Meltzer, H. and Elliot, D. 1988. *The Prevalence of Disability Among Adults*. Report 1, *OPCS Survey of Disability in Great Britain*, Her Majesty's Stationery Office, London.
- Matheson, J. and Summerfield, C. 1999. *Social Focus on Older People*. Stationery Office, London.
- Matthews, A. and Mackenzie, M. 2000. *Smart Technology: Think about the Person*. Opening Doors for Older People Project, West Lothian Community Services, West Lothian, Scotland.
- McCafferty, P. 1994. *Living Independently*. Her Majesty's Stationery Office, London.
- McCreadie, C. 2003. From showers to sensors: older people's views. *INCLUDE 2003 proceedings*, 25–28 March 2003. CD Rom, Helen Hamlyn Research Centre, Royal College of Art, London.
- McCreadie, C. 2004. Devices and desires: identifying the acceptability of assistive technology to older people. In Keates, S., Clarkson, P. J., Langdon, P. M. and Robinson, P. (eds), *Designing a More Inclusive World*. Springer-Verlag, London, 91–100.
- Oldman, C. 2002. Later life and the social model of disability. *Ageing & Society*, **22**, 4, 791–806.
- Pragnell, M., Spence, L. and Moore, R. 2000. *The Market Potential for Smart Homes*. York Publishing Services, York.
- Qureshi, H. and Henwood, M. 2000. *Older People's Definitions Of Quality Services*. Joseph Rowntree Foundation, York.
- Roelands, M., Van Oost, P., Buysse, A. and Depoorter, A. M. 2002. Awareness among community-dwelling elderly of assistive devices for mobility and self-care and attitudes towards their use. *Social Science and Medicine*, **54**, 1441–51.
- Royal Commission on Long Term Care 1999. *With Respect to Old Age: Long Term Care: Rights and Responsibilities*. CM 4192-I, Stationery Office, London.
- Severs, M. 1999. Will the information technology revolution improve services to elderly people in the new millennium? *Age and Ageing*, **28**, supplement 1, 5–9.
- Sheffield Institute for Studies on Aging 1997–9. *EasyCare Elderly Assessment System*. UK version (1999–2002), Sheffield Institute for Studies on Ageing, University of Sheffield, Sheffield.
- Tang, P., Curry, R. and Gann, D. 2000. *Telecare: New Ideas For Care And Support At Home*. Policy, Bristol.
- Teikari, M., Sipilainen, P. and Kylmaaho, E. 1998. Home as a work environment: the physical working conditions of home service personnel. In Phillips, J., Means, R., Russell, L. and Sykes, R. (eds), *Broadening Our Vision Of Housing And Community Care*. Anchor Trust, Oxford, 29–38.
- Tetley, J., Hanson, E. and Clarke, A. 2000. Older people, telematics and care. In Warnes, A. M., Warren, L. and Nolan M. (eds), *Care Services in Later Life*. Jessica Kingsley, London, 243–58.
- Tinker, A. 2003. Assistive technology and its role in housing policies for older people. *Quality in Ageing: Policy, Practice and Research*, **4**, 1, 4–12.

- Tinker, A., McCreadie, C. and Lansley, P. 2003. Assistive technology: some lessons from The Netherlands. *Gerontechnology*, **2**, 4, 332–7.
- Tinker, A., McCreadie, C., Stuchbury, R., Turner-Smith, A., Cowan, D., Bialokoz, A., Lansley, P., Bright, K., Flanagan, S., Goodacre, K. and Holmans, A. 2004. At Home with AT: introducing assistive technology into the existing homes of older people: feasibility, acceptability, costs and outcomes. Brief report. King's College London and University of Reading. Available online at www.kcl.ac.uk/acig
- Verbrugge, L. M., Rennert, C. and Madans, J. H. 1997. The great efficacy of personal and equipment assistance in reducing disability. *American Journal of Public Health*, **87**, 3, 384–92.
- Wielandt, T. and Strong, J. 2000. Compliance with prescribed adaptive equipment: a literature review. *British Journal of Occupational Therapy*, **63**, 2, 65–74.
- Zimmer, Z. and Chappell, N. 1999. Receptivity to new technology among older adults. *Disability and Rehabilitation*, **21**, 5/6, 222–30.

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