Stimulating Ageing-related Housing Research from the Bottom Up

Peter Lansley* and Verity Smith
The University of Reading, England

*Corresponding email: p.r.lansley@reading.ac.uk

Summary
The last decade has seen the development of a novel and effective approach to facilitating design and engineering research to address the needs of disabled and older people especially in housing and related areas. This has had some dramatic successes, with major inputs to the development of British Standards, building regulations and the requirements of government organisations on providers of social housing and improvements to professional practice as well as directly contributing to the lives of disabled and older people. The approach has been built on a recognition of the importance of an interdisciplinary approach, the involvement of the agencies which work with disabled and older people and appreciating the expertise and knowledge of disabled and older people and their potential contribution to the research process.

Keywords - research policy, quality-of-life, older people, interdisciplinarity

Introduction
The issues faced by disabled people and older people because of the design of their homes and the relationship between their homes and the broader built environment was largely neglected as a topic for research throughout the 1980s and 1990s. Even though the situation has improved, except in areas of specialist housing, support continues to be patchy. However, since 1998 there has been an important series of housing research projects funded by EPSRC, principally through its EQUAL Initiative. These have influenced both policy and practice in the adaptation of existing housing and the design of new housing as well as neighbourhoods and environments.

The EQUAL Initiative was established to encourage a new style of design, engineering and technology research. Specifically, it is interdisciplinary and strongly user-focused, and concerned with enhancing the independence and quality of life of disabled and older people. It has emphasised collaboration with the many organisations which work with disabled and older people, and recognition of the expertise which disabled and older people can contribute to research. The focus of EQUAL is on issues arising from the design and operation of the built environment (homes, public buildings, streets, and transport systems), product design and technology-assisted rehabilitation (especially those which can be used in the home), as well as on the challenges for those with severe physical, sensory and cognitive impairments (again with particular reference to the home).

SPARC, a short-term programme funded by EPSRC and BBSRC, is extending EQUAL by encouraging newcomers, both early-career and established academics, from across the full range of fields in design, engineering and biology and, to a limited extent, from the social sciences and medicine, to become involved with ageing research. It offers pump-priming awards to newcomers and supports award holders with mentoring, editorial assistance and access to national and international platforms. SPARC organises national workshops to showcase the latest research to all stakeholders and it lobbies policy makers and the media about the importance and value of ageing-related research. Central to both EQUAL and SPARC is the aim to improve the quality of housing and the built environment, and to support
the activities of the individual in their home and their working and leisure environments.

**Background**

A considerable body of evidence has shown that the physical health and mental wellbeing of older people depends critically on them being able to remain as independent as possible and especially continuing to live in their own homes. Yet many disabled and older people are not able to remain in their own homes even though they would be capable of doing so, because of the need for adaptations to the home, or the provision of assistive technologies, or a requirement for routine care services. Nevertheless, the desirability of enabling disabled and older people to remain in their own homes is very strong, for the individuals concerned, for society and for the tax payer. Accordingly, enabling greater independence and more people to "stay put" is a priority for government.

In the search for ways of enhancing the independence of disabled and older people in their own homes, policy makers have paid much attention to intelligent assistive technologies such as smart homes, telecare and telemedicine, as well as communication and navigation technologies and, for example, computer-assisted methods to support rehabilitation after accident or illness. Whilst some of these specialist technologies can be effective in emancipating the individual from a dependence on family, friends and formal care services, and can delay entry to an institutional care setting, the disabling features of a poorly designed living environment are frequently overlooked. All too commonly the design of the home, public access to buildings, the urban environment and transport systems, as well as consumer products, fail to incorporate an appreciation of the needs of disabled and older people. And, all too frequently the attention of policy makers and practitioners has been captured by the promise of new technology for solving the problems of independent living rather than the need to address the problems arising from the design of the existing housing stock. Yet for many situations it is possible to design environments and products, and to manage these, so as to accommodate widely differing capabilities, thus reducing the proportion of individuals who require specialist technology to support their independence. Success in achieving such a desirable end often builds on novel perspectives of the social model of disability and ageing. In turn this builds on interdisciplinary, multi-professional and end-user perspectives of the challenges faced by disabled and older people. Where these perspectives can be successfully integrated significant outcomes can be achieved for both policy makers and practitioners as well as for older people. A well-known example is that of the Life Time Homes movement supported by the Joseph Rowntree Foundation (Carroll et al, 1999). EQUAL and SPARC also encourage the adoption of a broader perspective on the lives and needs of disabled and older people (Lansley, 2001).

**National Research Policy**

The roots of EQUAL lie with the UK Government White Paper *Realising Our Potential* (CM 2250, 1993) which, as well as being concerned with national competitiveness, demanded more research to improve the quality of life of the citizen. Other official reports followed emphasising the need to consider more carefully quality of life issues and especially those arising from an ageing population, the need to enhance independence and health, to compress morbidity and to reduce the burden on hospitals, residential care homes and domiciliary care services.

In order to respond to the White Paper EPSRC sought advice from a wide range of stakeholders, but particularly organisations which represented the interests of older people, especially charities. Their advice led to two clear priorities:

- aiding individuals to pursue their normal routines in the face of declining physical, sensory or cognitive health or following discharge from hospital or from a period of incapacity; and,
- helping older people in their daily lives, promoting social inclusion and engagement, especially through preventative measures, so that their safety and health was not
compromised, thus reducing the need for health care as a result of accidents and avoidable illness.

Additional issues raised included:
- the inadequacy of existing research methodologies, developed largely within the realm of clinical and social gerontology; and,
- the severe limitations of policy research which could not demonstrate the potential value of new approaches to routine practice or provide assessments of potential risks and rewards of these new approaches.

Finally, in response to the limitations of existing methodologies, there was a demand that through EQUAL, EPSRC should only support research projects which were:
- interdisciplinary,
- collaborative with organisations and professions concerned with providing services and products to disabled or older people or which represented their interests, and
- involved disabled or older people as experts rather than as just subjects for research.

During the consultations it became increasingly obvious that many of the issues of research interest were shared by both older people and disabled people and quite often by the population at large, so quite rapidly the focus on ageing was replaced by an altogether more helpful and broader concern with social inclusion.

A New Area
In the mid-1990s, there was limited experience amongst engineering and technology experts of addressing issues concerned with the quality of life and few researchers in the fields eventually focused on by EQUAL, particularly in housing design. However, there were some non-academic researchers, often full time professional designers, with a strong application orientation, who had been concerned with solving problems and developing guidelines from their experience of designing for disabled and older people, or more generally designing for inclusion. Some of their work had been very influential and, when captured in publications, had received international recognition, for example, Goldsmith in the field of disability (Goldsmith, 1963) and Bone in the field of accessibility (Bone, 1996). Practitioners who had already been ploughing a rather lonely furrow were to become valuable collaborators with the academic researchers.

In essence, an initial challenge for EQUAL was to build a new research community capable of undertaking substantial high quality research which could meet the exacting standards, not just of academic peer review systems, but which survived the scrutiny of practitioners and the common sense evaluations of end users – particularly disabled and older people.

The Programme of Research
In late 1997 EPSRC issued a modest first call for proposals focused on the relationship between disabled and older people and the built environment. A second call in late 1998 introduced industrial and product design by adding the theme of “design for all”. A third call in 2000 was aimed at a broader range of scientists and engineers through the theme of rehabilitation. Finally, in 2001 there was a further call for very large projects involving research consortia, again focused on independence and quality of life. Some of the resulting projects received further support in 2006/7.

The first three calls elicited nearly 200 proposals and the fourth call about 80 expressions of interest, from across a very wide range of disciplines. As a result of the first three calls, 34 projects with a total bid value of £5.4m were funded. The fourth call was for the development of research consortia, five of which were funded with each receiving over £500,000, with three of these receiving typically a further £0.75m - £1.5m. The EQUAL projects and consortia along with examples of their outcomes are briefly described in Table 1.
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<th>Theme</th>
<th>Examples of Projects</th>
<th>Examples of Outputs</th>
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<td><strong>The Existing Home</strong></td>
<td>Profiling use of the home from domesticity to caring; Realisation of lifetime homes standards; Modular adaptations - kitchens and bathrooms; Smart homes; Advanced sensors; Communication systems for distributed sheltered housing; Telecare.</td>
<td>Policy: Inputs on housing design, telemedicine and long term care for housing providers, local and central government. Practice: Design and production advice on modular building extensions for industry. Prototype: Smart home devices and business cases for telecare for service providers.</td>
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<td><strong>Improving Accessibility</strong></td>
<td>Using GIS for urban navigation; Using smart cards for urban navigation and within buildings; User perspectives on navigation and mobility in complex spaces; Accessible rural public transport.</td>
<td>Practice: Viable operational rural transport systems; best practice guides Prototype: Urban navigation systems for disabled people - some suitable for commercial development.</td>
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<td><strong>Design for All - Buildings and Environment</strong></td>
<td>Designing buildings using VR motion platform for wheelchair users; Best practice and better briefing for building designers; Getting out of doors.</td>
<td>Practice: Accessibility design guidance for clients, architects and urban planners. Prototype: Novel &quot;roll through&quot; VR systems for wheelchair testing of building designs;</td>
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<td><strong>Design for All - General and Other</strong></td>
<td>Improved design methods; Better design data sets; Integration of biomechanical and psychological parameters of performance in CAD systems; Hand object interaction and packaging; Hospital portal for use by patients.</td>
<td>Policy: Business cases for inclusive design and for meeting the markets created by the needs of older people. Practice: Inclusive design data sets, design methodologies, technologies and advice for designers; Inputs to British Standards on management of inclusive design; Specific data and advice for packaging manufacturers and the retail sector. Prototype: Inclusively designed accessible hospital portal.</td>
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<td><strong>Sensory Impairment - Hearing and Sight Loss</strong></td>
<td>Hearing: Hearing loss in the built environment; Design, colour and communication in the built environment; Acoustic guidelines for class room design; Self administered hearing test. Vision: Glare disability and glaucoma; Auditory navigation for emergency egress; Auditory location finder in urban spaces; Better document production by blind people.</td>
<td>Policy: Input to building regulations and British Standards. Practice: Design data and advice for building clients and architects. Prototype: Navigation and emergency egress systems; Audio cassette system for home based test for deafness; Wizards to aid blind people in the production of computer documents.</td>
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<td><strong>Cognitive Impairment - Dementia, Stroke, Learning Difficulties</strong></td>
<td>Dementia: Design of care homes for dementia patients; Design of the external environment for people with dementia; Smart homes and mild dementia; Supporting reminiscence in dementia patients. Other: Cognitive-motor skills following stroke; Smart rehabilitation in the home; Input devices for people with learning difficulties.</td>
<td>Policy: Advice on design and management of dementia care homes for health care providers, central and local government. Practice: Development and integration of assistive technologies for housing providers; Prototype: Novel IT systems for eliciting reminiscence and supporting carers; exercise devices for stroke patients and those with learning difficulties for use by physiotherapists, other health workers, carers and individuals.</td>
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Table 1. Summary of EQUAL Project Themes and Outputs
Themes
The home has been the central feature, for example, the ways in which older people can remain in their own homes rather than enter into formal care settings (for example, through adaptations and the incorporation of new technology, and through better design of new homes), how the services they receive can be enhanced (for example, through the supplementation and substitution of formal care services by advanced communication technology), how care homes can be designed and managed to improve well-being, and how homes are used through the life course. This work has stimulated the interest of social housing providers, health and social services professionals, private sector care providers and designers in industry, all of which will play important roles in the development and eventual widespread application of new methods and technologies.

Many people are able to live in their own homes as a result of adaptations and the provision of fixed and personal assistive technologies. However, true independence requires being able to go out of doors, to enjoy their neighbourhood and to use the transport system. Some projects have developed best practice guidance on accessibility, as well design tools such as advanced CAD and visualisation systems for building clients, urban planners, architects and transport organisations. Others have focused on communication and navigation systems to enable individuals with physical, visual or hearing impairments to negotiate urban environments and public access buildings.

Independence also requires an ability to use everyday domestic items, appliances and consumer products. There are major challenges for many disabled and older people, for example, opening a milk carton, lifting a saucepan, dressing, and taking a bath. These activities can benefit from the better design of products, gadgets and assistive technologies. In these areas several projects have successfully developed design tools and data sets as well as design guidance for product designers.

Over half of the projects were largely concerned with the design of the environment, products and services. The others focused on the needs of those individuals with particularly severe health conditions and disabilities, for example the experience of the built environment of older people with impaired hearing and sight loss, especially the ability to communicate and navigate in the built environment, not least in emergencies. Dementia, memory loss and stroke formed the focus for other projects which variously aimed to improve wellbeing and safety and to assist with the management of recovery or, where inevitable, decline, often within the context of the home. In total about a third of the projects were broadly concerned with housing design and another third with either the immediate environment of the home or activities inside the home.

Outcomes
One result of the requirement for interdisciplinarity, collaboration and strong user involvement, was to produce findings which stood up to challenges from a wide spectrum of stakeholders. Collaboration often initially benefited those organisations directly involved with the projects, and the disabled and older people they have served, but in most cases the benefits were available to others, through both direct contact with the research teams and conventional forms of dissemination. Typical examples are that the projects provided a new understanding of how the services might be applied or managed to facilitate the adoption of prototype devices, procedures and systems. In a few projects, for example, those concerned with smart homes, navigation systems and dementia, devices and designs are now being used in routine practice by health care organisations. In particular, state of the art reviews and guides on good practice are being widely used by health service and design practitioners, in some cases both nationally and internationally. Some guides and data sets have been used to inform British and European standards and building regulations, particularly from the work concerned with building design. For some other projects the outputs have been used in more of a conceptual manner, for example, to inform government
policy on long term care and housing for older people and the design of the urban environment.

These are significant achievements. Research findings are usually very slow in making an impression on, say, building regulations and British Standards. In the case of some EQUAL projects, however, the impact has been immediate. Standards and regulatory organisations have sought and valued advice. For example, faced with increasing demand for more social housing, specifically for older and frail tenants, the Housing Corporation was able to draw heavily on the findings from the projects to establish better guidance to housing associations which were seeking grants for new housing projects. Other organisations have had to reappraise their positions. For example, work on the care and wellbeing of people with dementia has challenged much of the guidance on care home design issued by government, whilst advice on the selection of colour and contrast to aid people with visual impairment has been adopted by national transport organisations in the design of new buses and trains. Significantly, several of project teams have also been well placed to undertake applied research commissions and consultancy work for government, industry and charities as well as pursuing their fundamental research interests, providing further opportunities for getting their findings into practice.

To summarise, the EQUAL projects have influenced the development of national policy, provided inputs to regulation, assisted the professions and supported those who commission and design homes, public buildings and urban spaces as well as products and services. Once research findings have made their way into regulations, standards and design guides they have a systemic effect on the quality of life of disabled and older people which may outlast the influence which comes purely from policy guidance. So these may be seen as significant achievements.

A New Community

The close rapport of the users and collaborators with the researchers has led to a research community which is at ease and confident in its dealings with professionals and other stakeholders as well as with disabled and older people. Between 2001 and 2004, this rapport was further supported by the activities of the EQUAL Research Network, which was established to ensure that researchers remained close to disabled and older people and intermediaries, policy makers and practitioners through regular all-stakeholder workshops held throughout the UK (EQUAL Research Network, 2003).

As the virtues of the initiative became recognised, so projects in the spirit of EQUAL were to be found in the research mainstream. Also, there was growth in the number of opportunities for applied research, as agencies came to appreciate the potential impact on society and the economy of an ageing population and more generally wished to embrace the need for a more inclusive society. But the absence of a substantial focused programme has meant there has been little further underpinning to these other more diverse activities.

However, despite this interest and the growth the number of research teams and their enthusiasm for disability and ageing research, the research community has remained small. In the main this has been due to a serious hiatus in funding for disability and ageing research between 2001 and 2005, which resulted in a failure to capitalise on the earlier investment in building a new research community. During this period research council funding virtually disappeared, and that for disability-related research had not returned even by 2008.

SPARC was an attempt to counter the worst of these negative influences, by ensuring some continuity for ageing research, especially for newcomers and early career academics, although not for disability research for which research council support could not be secured. SPARC has continued to build the new culture of research and has extended this mission into biological research. However, in research programme terms, it is a tiny activity which is
very thinly spread. Despite this limitation, much of the work which concerns the built environment, including that which is concerned with older people who live in their own homes, is producing outputs which are of a value far out of proportion to the funding available.

Conclusions

The EQUAL Initiative provides a valuable focal point for discussion of the nature of design, engineering and technology research concerned with the needs of older and disabled people. Because the home is central to the lives of every individual so the development of housing research is central to this discussion. The initiative has illustrated the value of pursuing key policy issues concerning disabled and older people through an approach to research which both describes the challenges faced by disabled and older people, which thus informs policy, and offers possible solutions and ways forward, so indicating the choices for those who put policy into practice. In so doing a radically new research culture has emerged, with a strong interest in putting findings into practice. That culture recognises the importance of the different stakeholders in disability-related and ageing-related issues and the value of interdisciplinary, collaborative, user-focused research. Not surprisingly this has led to a highly supportive environment, because the underlying concern of the projects and their conduct has enabled them to meet expectations based on highly rigorous standards emanating from quite different perspectives. This has provided a valuable and sympathetic environment for the development of a new generation of researchers.

There have, however, been a number of ways in which the performance of EQUAL has been severely hampered. Whilst some projects have had a surprising degree of influence over regulations, standards and codes of practice and other findings have been used by policy makers, it has been much more difficult to interest government departments in the broader contribution and potential of design orientated research for improving wellbeing and quality of life. Often the issues raised have not fitted the remits of government departments or have challenged the skills to be found within those departments or could not be accommodated within politically-driven time scales to which departments work.

The situation might have been better had it not been for a misguided attempt to co-ordinate ageing research in the early 2000s. The setting-up of The National Collaboration for Ageing Research (NCAR) in 2001 and the drawing together of the major funders of ageing research into the Funders Forum for Ageing Research did more harm than good, creating the funding crisis referred to earlier. These effectively prevented the development of a stronger interdisciplinary research culture in ageing. As a consequence it has not been possible to achieve continuity of funding support for what is still a small research activity. This has limited the opportunities for researchers to complement and enrich government policy thinking about meeting the needs of disabled and older people, with objective information about the feasibility of new approaches and their implementation.

Unlike housing research where contributing to regulations, codes, standards and best practice guides have played an important part, a difficult issue for those projects concerned with the development of new products, rather than design approaches or systems, has been to move from the production of prototypes to capturing the interest of manufacturers to take these into production. These projects encounter the same problems as many other engineering research projects but with an additional difficulty of convincing manufacturers about the value of the market for products and services for disabled and older people. However, some projects, especially those concerned with inclusive design, have accepted this challenge head-on and have developed convincing evidence for the business case for disabled and older people, as consumers and as workers.

Much of the output from EQUAL has implications for the care of disabled and older people in the community and can directly inform national and local initiatives relating to the care of
disabled and older people. Some of the work has contributed to an understanding of whether the individual home can be designed or modified so that individuals can enjoy a good quality of life and reduced dependence on formal care services. A number of the projects, especially those relating to the home and to sensory and cognitive issues, provide a strong and positive indication of what might be achieved in the future in terms of supporting wellbeing and independence.

All of this has been achieved by enabling stakeholders, but especially disabled and older people, to play a major role in identifying priorities for research and in pursuing the resulting projects.

This model for disability and ageing research adopted for EQUAL and SPARC has been particularly successful at a time when other research council ageing initiatives have struggled to attract talented researchers and to have an impact on policy and practice. This is largely due to a very determined attempt to ensure that all projects have been interdisciplinary, have closely involved key stakeholders and have treated older people as expert contributors rather than as subjects for research. One result has been a significant contribution to the provision of safer and healthier homes which older people can enjoy for much longer.

References