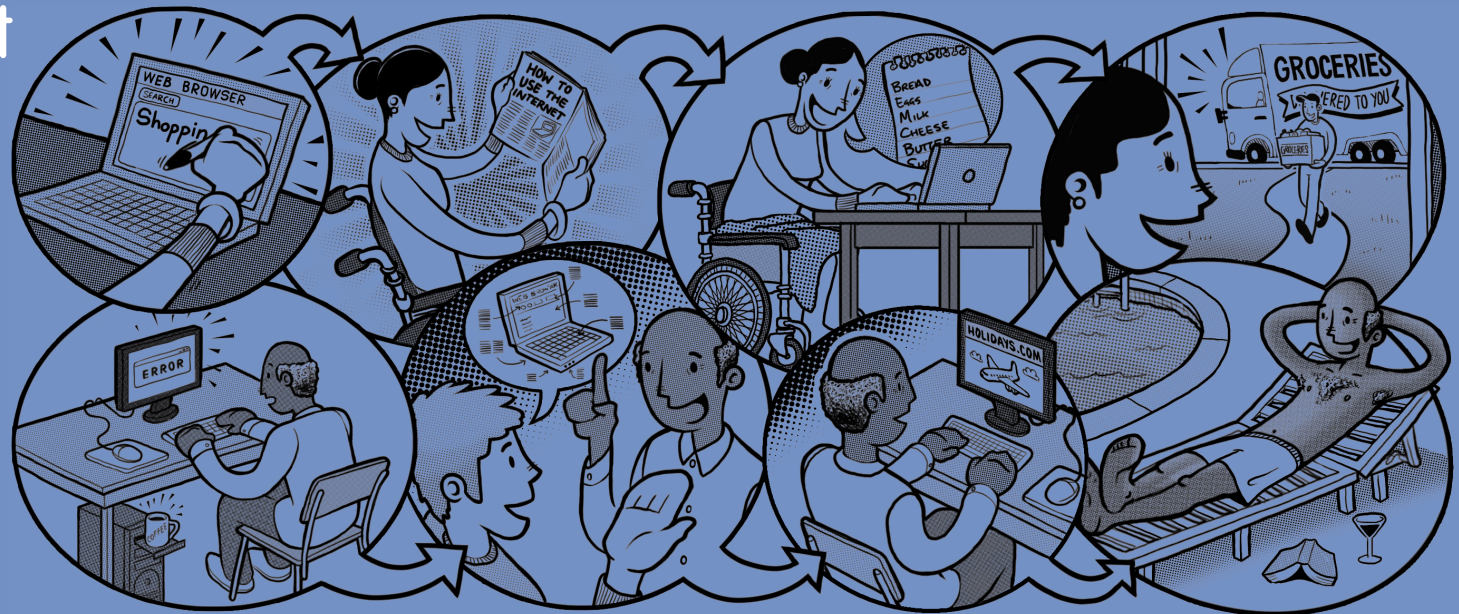# Ageing and the use of the internet

CURRENT ENGAGEMENT AND FUTURE NEEDS

A STATE OF THE ART REVIEW written for Nominet Trust by Professor Christine Milligan and Dr Don Passey

This document is designed to be read with **Adobe Acrobat**

Foreword

Over the past five years the number of people online, aged 65 and over, has remained relatively static, with between 25% and 35% using the internet (Oxford Internet Institute Survey 2011). As new online services become available and more benefits of being digitally connected are highlighted, this figure presents a real challenge to those working with this demographic group as there seems to be little impact aggregated to a national scale.

Yet the over-65 population describes a diverse group. There can be up to 40 years' life experience between those in early old age and those in late old age; it can describe people in good health and poor health; those who are physically or socially isolated or those living with, or supported by families. As such, a diverse range of approaches need to be put in place if we are to support them to benefit from using the internet. Similarly, when the online/offline figure is broken down into smaller age groups or correlated with other socio-economic characteristics (such as housing status, educational attainment, income levels etc) a clearer picture of internet use and the mechanisms of support for novice and advanced users becomes apparent.

This publication sets out the latest research into how the internet is, and can be, used to support those over 65 as well as highlighting the mechanisms, themes and social situations that best enable this group to benefit from the internet. By doing so, it sets out a number of ways in which we can look to develop new approaches to supporting people over the age of 65 to get online in a sustained and meaningful way.

Dan Sutch
Head of Development Research
Nominet Trust - October 2011

About the series

Nominet Trust State of the Art Reviews are undertaken by leading academics to collate and analyse the latest research at the intersection of the internet and society. Drawing on national and international work, these reviews aim to share the latest research to inform the work of the Trust, those applying to the Trust for support and our wider partner organisations.

We value your comments and suggestions for how to act on the recommendations in these Reviews, and how we can build the series, so that it is more useful to us all as we work towards a safer, more accessible internet, used for social good.

We look forward to your comments and suggestions at:

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Contents

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Introduction

Purpose and focus of this report

This report was commissioned in order to bring together a state of the art evidence base that details our understanding and current knowledge of older people and their engagement with, and uses of, the internet. The report considers the challenges and benefits of internet usage by older people, and looks at barriers to access as well as how these might be addressed. It should be noted that while our remit was to focus on older people defined as those aged 65 years and above, some relevant research evidence included in this report refers to older people as those aged 55 and over; where this is the case, we note this in the text.

Although the report focuses on practice and evidence from the UK, given the importance of the wider European Union (EU) context, this is also referred to, as is research evidence or useful examples from other countries that have potential translational value. In writing this report we have drawn on a wide range of literature, including other literature reviews and research syntheses undertaken at both UK and EU levels.

Innovative approaches and practices

The report is written for a wide audience that has interest in this field. Throughout we include vignettes of practice, highlighting supportive and innovative approaches that are being developed or in place. We do not claim that either the literature review or examples of practice are exhaustive. What we have included, however, are systematic reviews of literature around older people and ICTs and studies that contain the most frequently cited and/or what we believe to be the best examples of empirical research in these fields. Indeed, we would suggest that gaining an overview of existing practices, so that these can be shared more widely, will be a welcome development for all involved in this area – there seems much to be gained for all concerned.

For the vignettes we present, we have used examples that have been brought to our attention, as well as drawing on the content of a UK report from Independent Age (Older people, technology and community: the potential of technology to help older people renew or develop social contacts and to actively engage in their communities, n.d.) and two overarching documents from the European Commission (EC) Information Society and Media, which list EU projects that are currently running, focused on the topic ICT and Ageing Well (EU-funded deployment projects in the area of ICT for Ageing Well, 2010 and Overview of running EU-funded research projects in the area of ICT for Ageing Well, 2010a). Some of these projects involve partners in the UK, while others are running in other EU member states.

Our research approach

This report consists of a scoping review based on desk-based research; the data presented have been gathered from policy documents, practice and guidance papers, as well as from academic journal articles and statistical databases that are published and within the public domain. The evidence has been identified largely through online searches in bibliographic databases such as Athens, Metalib, Academic Search Complete, JStor and Web of Science; and a wide search using the Google search engine. We have also drawn on policy and internet-based sources including those providing access to national statistics and census data, the European Commission (EC) Eurostat, Eurobarometer and E-Inclusion websites; as well as information published on third sector websites (such as AgeUK), the Office of Communications (Ofcom), and companies including Intel and Microsoft. In undertaking our search, multiple words and phrases related to ageing, older people, the elderly, elders, technology, mobile telephones, computers and e-Inclusion were combined to yield maximum matches. We recognise the importance of integrating different forms of evidence that are generated using different types of research approaches. The report thus incorporates evidence from both qualitative and quantitative research. For example, while large-scale (quantitative) survey data are essential if we are to see the broad patterns of changing use, understanding the detail of factors that contribute to variables such as household composition and the

impact and experiences of isolation need to take account of the evidence gathered through more in-depth (qualitative) studies. These latter sources better explore and explain significance and implications; from this type of more focused approach, we can gain a greater understanding of the dynamics of choice and how barriers are negotiated, as well as gaining important insights into how local social networks affect what individual older people do and resources they have access to.

In line with our research brief, the report omits references to Assistive Technologies (ATs) (such as tele-care, tele-health domotics and smart homes) as these technologies address an important, but substantially different, area of technological support – one that is largely health or care related. ATs are largely designed to support those older people with physical or cognitive decline with activities of daily living, in order to enable them to remain within their own homes for as long as possible. Instead, this report focuses specifically on Information and Communication Technologies (ICTs), which includes uses of the internet, e-mail, social networking, standalone, laptop and mobile technologies. Exceptions include work around those ATs that have been designed to fulfil both a social as well as a health-related function.

Only English-language articles and reports are included in this review, current through to May 2011.

Acknowledgements

We would like to acknowledge the input of **Professor Mary Hamilton**, Literacy Research Centre, Lancaster University who has acted as a consultant and reviewer to this report. We would also like to thank **Shealagh Whytock** for her administrative support.

Executive Summary

This state of the art report details current understanding and knowledge of older people and their engagement with, and uses of, technological applications of digital technologies and the internet to support social purpose. The report considers the challenges and benefits to the usage of these applications by older people and looks at barriers to access and how these might be addressed. Whilst this report focuses on those aged 65 years and above, some evidence presented refers to those aged 55 and above; where this is the case, we note this in the text.

The report provides a range of complementary evidence that builds two related pictures: one that outlines current uses of the internet by older people by drawing on our existing knowledge and understanding; and one that provides an analytical picture of how engagement and wider adoption might be supported over the next three to five years.

Key Messages:

— Evidence suggests that increasing numbers of older people are using online facilities. While use of some applications (such as email) is increasing in uptake and popularity amongst older people, others, such as uses of mobile telephones for texting and setting up profiles on social networking sites, still have limited take-up.

— Older people's reasons for using computers and the internet lie in two main areas - social activity (using features of the technology that enable engagement with others, who can be contacted and how they will be involved); and cultural integration (using features of a technology to support existing needs of specific groups of older people).

— Older people's engagement with the internet is more reactive (ie using features and applications that are generated by younger people) than pro-active (actively engaging with the development of new applications). Many older people would benefit from greater knowledge, training and information about the potential of differing uses of the internet in order to gain more fully from uses of existing applications.

Older people's reasons for using computers and the internet lie in two main areas - social activity and cultural integration

— Figures suggest that engaging older people through television-based internet provision could potentially be of far more value to this age group than other forms of technology.

— Practices that underlie the adoption and uses of technologies by older people are: the involvement of lifelong learning (how work and ongoing training influence take-up and use); and intergenerational learning (how children, family and friends influence adoption and use).

— The above practices are supported by national policy that highlights the importance of promoting intergenerational learning and working to widen e-Inclusion for older people. However, evidence suggests that unless sensitively approached, younger people can also inhibit older people's learning in relation to technology. Older 'technology champions' may offer an alternative way to approach the coaching of older users.

— Technical aspects concerned with operating devices and features can still prove a barrier to increased usage of internet-related technologies by older people.

— There is room for improvement in designing user-friendly technologies for older people. In particular, there is a lack of recognition of the specific design needs of older people with differing levels of ability. It is thus important to ensure that key stakeholder groups, including older people, are involved in decision-making about directions and emphases of use and the usability of operational features. This could increase the value of emerging technologies for older people.

— There is an evidence base, supported by demographic data, that suggests there is a business case for developing more specific and age-related technology-based products and services. Carers of frail older people are also a potential market for future technology applications.

Evidence suggests that unless sensitively approached, younger people can also inhibit older people's learning in relation to technology. Older 'technology champions' may offer an alternative way to approach the coaching of older users

There is a lack of recognition of the specific design needs of older people with differing levels of ability. It is thus important to ensure that key stakeholder groups, including older people, are involved in decision-making about directions and emphases of use and the usability of operational features. This could increase the value of emerging technologies for older people

— Though levels of internet access may be lower for the older age groups than that of the wider population, increased take-up suggests older people are seeing potential uses that apply to their specific needs and circumstances. However, there is limited evidence about what is driving this growth, how it might be most effectively encouraged, and the extent to which economic resources might prove a barrier to this growth.

— In considering levels of use of specific applications amongst older people, the evidence suggests that any digital divide is more likely to be associated with specific technologies or certain practices, rather than with all technologies and all internet uses and practices.

— Finding criteria through which to view digital appropriateness for older people, rather than focusing on comparisons across different age groups, is likely to provide more valuable indicators of digital trends and shifts.

— The promotion of technology for use by older people is an emerging area, and partnerships to develop working practices concerned with wider uses are only now beginning to emerge. There is little evidence of targeted promotion and practices around ICT for older people.

— There is a lack of coherent evidence about practices operating at both local and regional levels. A wide review of existing practices operating across local authorities and the third sector[A] could provide detail to support future policy and development.

— There is limited information about access to, and uses of, the internet for those living in residential care settings.

Though levels of internet access may be lower for the older age groups than that of the wider population, increased take-up suggests older people are seeing potential uses that apply to their specific needs and circumstances

A
We use the term 'third sector' in this report to refer to voluntary, community, charitable and other non-profit organisations.

The growing engagement and widening adoption of digital technologies

Do we know what factors are critical to understanding how technologies become more adopted and embedded in everyday practice? What needs to happen for technology to be adopted and implemented successfully?
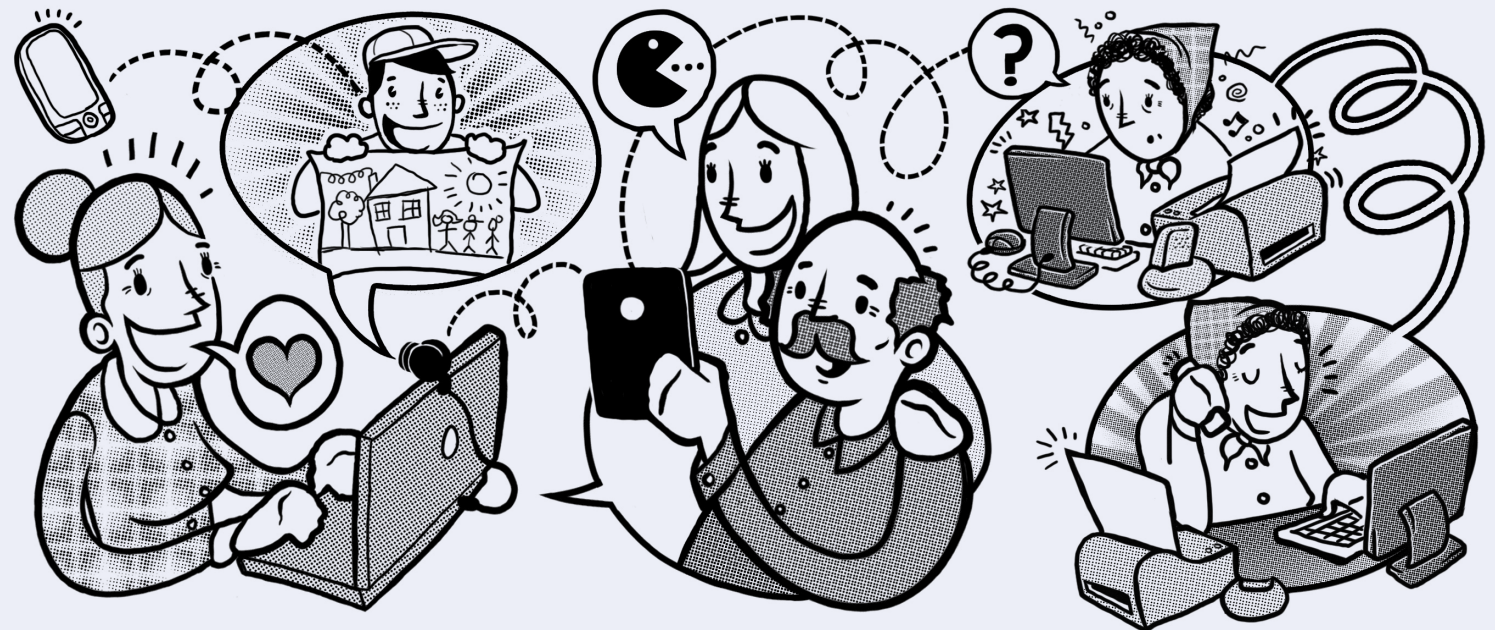
Framing our current position

In this report we seek to show current levels of uses of the internet by older people. We need to initially consider what these levels might then tell us. We need to consider how knowledge of these levels will accord with our 'concepts' or 'expectations' of further uptake. For example, is it reasonable to expect the levels reached to relate to a point of progression along a linear growth line? Or is it more reasonable to expect the growth line to follow a stepped or staged pattern? If a linear growth is expected, then knowing levels of use might tell us something about the time over which further development and uptake might need to be supported in the future. But if the growth is stepped rather than linear, then this will tell us more about patterns of support that might be needed to help us move from one step or stage to the next one. We know from studies with other age groups and with certain technologies that the adoption and diffusion of technologies into practice is unlikely to be described by a straight line. Factors affecting adoption and diffusion mean that the uptake is not likely to be linear, but is more likely to go through stages of progression. So, how might we identify the stage reached now, and what do we need to know now in order to support a further wider adoption of digital technologies by older people?

Rogers (1995) proposed a model that highlights five stages in the level or status of a diffusion of technologies into practice (focusing on factors that are critical to how technologies become embedded in people's everyday practice): **knowledge** (about the technologies and their applications), **persuasion** (to use them), **decision** (that they will be used), **implementation** (trying them out in practice), and **confirmation** (being reassured that they fulfil a purpose or need). He also identified five 'adopter' categories (indicating the stage of adoption of the technologies) that follow an S-shaped curve: **innovators** (small numbers of early users), **early adopters** (more users in this category), **early majority** (many users in this category), **later majority** (some users in this category), and **laggards** (a small number not using the technology). Importantly for this report it raises questions about the current position with regard to use of computers and the internet by older people; and where on these dimensions of adoption does the population of older people currently lie.

Factors affecting adoption and diffusion mean that the uptake is not likely to be linear, but is more likely to go through stages of progression. So, how might we identify the stage reached now, and what do we need to know now in order to support a further wider adoption of digital technologies by older people?

Framing our support for growing engagement and wider adoption

How far are we supporting the growing engagement and wider adoption of digital technologies by older people? Wang et al. (2011) propose a conceptual model that specifically looks at key factors influencing the widening of technological adoption by older people, which they call ADOPT (Accelerating Diffusion of Proven Technologies). Though primarily focusing on improved health outcomes, the factors identified in this model are also relevant and important in terms of improved social and wellbeing outcomes. Whilst recognising the importance of considering context and collaborators, the factors that they identified as those key features leading to positive support and diffusion include:

– designing user-friendly technology

– establishing technology value

– creating a business model

– promoting technology

– forming partnerships

– identifying technology champions

– coaching users.

How far have these key features of diffusion been put into place currently? In terms of the wider context for diffusion and adoption, Corbett and Rossman (1989) identified three pathways that all need to be satisfied if technology is to be implemented and adopted successfully: **the technical** (concerned with operational factors); **the cultural** (concerned with social matches and acceptability); and **the political** (concerned with value and other stakeholder influences). Passey (2010) added a fourth pathway: **the form and nature of**

Though primarily focusing on improved health outcomes, the factors identified in the ADOPT model are also relevant and important in terms of improved social and wellbeing outcomes

The four 'pathways' to technology implementation and adoption can be described as: the technical, the cultural, the political and the form and nature of learning activity

learning activity (describing how an activity is integrated within a wider learning context). For older people, this element can be applied in an amended form and considered as a 'social activity' pathway (concerned with the nature, purpose and form of the social activity involved). In terms of the diffusion and adoption of digital technologies by older people, it raises the question of the extent to which these pathways have influenced the current position.

The evidence in this report is considered through these factors, so that we can both identify what research tells us about the current position reached, and potential for development in this field over the next three to five years. We return to this discussion later in the report, but as an introduction to this intention, we first discuss the nature of the older population in the UK and the policy context within which the promotion of e-Inclusion amongst older people is located.

Our ageing society

What does the older population look like in terms of life expectancy and healthy life expectancy rates, age, gender, ethnicity, average gross income and geographical distribution? How are older people represented in our society?

The term 'older people' is applied to different age cohorts in different contexts and can range from 50 years of age upwards. However, this report's origin is to inform Nominet Trust's policy and research agenda over the next three to five years. The report thus focuses on the state of knowledge in this field as it relates to, and is likely to impact on, current cohorts of older people. It focuses specifically on those aged 65 years and above, unless explicitly stated otherwise. With increased life expectancy, those we categorise as 'older people' can span an age group that stretches from 65 years of age to 100 and above. With over 35 years of difference between the lower and upper ends of this age-span, it is important to recognise that the range of knowledge, ability and life experience will vary extensively. It is also important to recognise that chronological age is not the same as biological age – in other words a fit and active 85 year-old may be **chronologically** older but **biologically** younger and fitter than a 65 year-old with chronic health and mobility problems. It is important to bear these points in mind when thinking about what we mean by 'older people'.

While recognising the limitations of using chronological age as the core measure of 'old age', it is nevertheless true that those aged 65 and over make up an increasing proportion of our population. Office of National Statistics (ONS) figures indicate that in 2009, 16% of the UK population was aged 65 and over (around 1.7 million people) but that this figure will increase to 23% by mid-2033 (ONS, 2011). The biggest increase in the over 65s is amongst those over the age of 85, where numbers have more than doubled since the mid-1980s, to reach a figure of 1.4 million in 2009. By mid-2033 these numbers are projected to reach a total of some 3.5 million, at which time the 85+ age group will account for some 5% of the total UK population. Figure 1 illustrates the projected increase in our population by age and gender from mid-2008 to mid-2033.

What does our older population look like?

Life expectancy (LE) in the UK has reached its highest level on record for both males and females at 77.7 years of LE at birth for males and 81.9 years of LE at birth for females (ONS Statistical Bulletin, 2010). But while the ratio of women to men in the 65+ age group has

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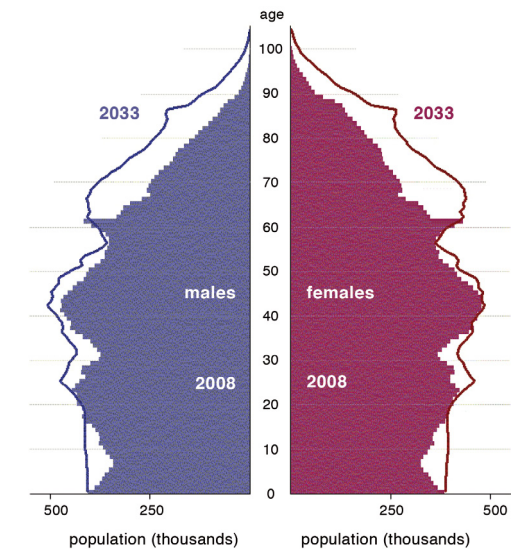

Figure 1
Population increase – projections for mid-2008 to mid-2033 by age and gender
Source: ONS (2011)

historically been substantially higher, as Table 1 illustrates, this ratio is falling. The current 100:129 sex ratio of men to women is projected to fall to 100: 118 men to women by 2034. So while women are still living longer than men, the gap in LE between men and women is declining (ONS, 2011).

Within the UK, the population structure and LE also varies by country. Table 1 shows the uneven distribution of the older population split across each of the four nations in 2009. England has the highest LE at birth at 78.0 years for males and 82.1 years for females, followed by Wales and Northern Ireland, while Scotland has the lowest LE at 75.3 years for males and 80.1 years for females. Life expectancy at age 65 is also higher for England than for the other UK countries (ONS, 2010). But even within these countries, data shows that people living in the most advantaged areas can expect to spend 10% more of their lives in favourable health states than those living in the most disadvantaged areas (ONS, 2010).

Females						
	65-69 years in thousands	70-74 years in thousands	75-79 years in thousands	80-84 years in thousands	85-90 years in thousands	90 years and over in thousands
England	1,218.1	1,073.0	920.4	732.5	516.7	270.7
Wales	80.9	69.1	58.6	47.4	33.5	17.0
Scotland	133.5	119.1	100.8	74.6	48.5	23.6
N. Ireland	40.1	33.8	28.7	22.7	13.5	6.5
UK total	1,472.6	1,295.0	1,108.5	877.2	612.2	317.8
Males						
	65-69 years in thousands	70-74 years in thousands	75-79 years in thousands	80-84 years in thousands	85-90 years in thousands	90 years and over in thousands
England	1,132.3	956.6	738.9	499.8	273.1	102.3
Wales	76.9	62.1	47.1	31.8	17.4	6.4
Scotland	118.6	98.8	73.5	46.2	23.4	7.9
N. Ireland	36.6	29.0	21.3	13.5	6.6	2.1
UK total	1,364.4	1,146.5	880.8	591.3	320.5	118.7
Total						
	65-69 years in thousands	70-74 years in thousands	75-79 years in thousands	80-84 years in thousands	85-90 years in thousands	90 years and over in thousands
England	2,350.4	2,029.6	1,659.3	1,232.3	789.8	373.1
Wales	157.8	131.3	105.7	79.2	50.9	23.4
Scotland	252.1	217.9	174.2	120.8	72.0	31.6
N. Ireland	76.7	62.8	50.1	36.2	20.0	8.6
UK total	2,837.0	2,441.6	1,989.3	1,468.5	932.7	436.7

Data shows that people living in the most advantaged areas can expect to spend 10% more of their lives in favourable health states than those living in the most disadvantaged areas
(ONS, 2010)

Table1
Mid-year estimates for 2009 for people 65 years of age and above across the UK

Older women are also more likely to live slightly more years in poor health from age 65 onwards than men. In 2002, the expected years lived in poor health from age 65 onwards was 4.5 years for men and 5.8 years for women (Evandrou, 2006). Older women across all ethnic groups are also more likely to be single and live alone compared to older men.

Currently only a small proportion of older people in the UK are from minority ethnic groups. These numbers are even smaller in Scotland and Northern Ireland. There are also noticeable differences in the ethnic composition of those older generations that do exist. This is mainly due to past migration patterns and the age structure of those migrants, together with past fertility patterns. Migrants from the Caribbean, for example, started to arrive in the UK in the immediate post-war period until the early 1960s. Migrants from India, Pakistan and Uganda arrived mainly during the 1960s and early 1970s. Whilst these migration patterns explain variations amongst older minority ethnic populations in the UK, in the future growing proportions of older people will come from these groups (Tomassini, 2005). Currently, however, the vast majority of the older population in the UK are white British.

Under current legislation the state pension age for women in the UK is rising from 60-65. From December 2018 the state pension age for both men and women will start to rise, to reach 66 years by 2020. The current government is also considering the timetable for future increases to the state pension age from 66-68 years of age (DirectGovUK, 2011). According to ONS (2011), average gross income for pensioners in the UK increased by 44% in real terms between 1994-5 and 2008-9. This increase is ahead of growth in average earnings. The average gross income for pensioner couples in 2008-9 was £564 per week, with single male pensioners receiving £304 per week and single female pensioners receiving £264 (ONS, 2011). This income is made up of occupational pensions, state pension income and benefits. However, it is important to note that average income conceals considerable variations between poorer and richer pensioners and on average, older pensioners have lower incomes than younger pensioners.

Despite increases in pensioner incomes, ONS estimated that in 2008-9, an estimated 1.8 million pensioners in the UK were living in poverty. Further, single older women are

disproportionately likely to figure amongst this group (ONS, 2010). Nevertheless, the number of pensioners in poverty has declined over the last decade, from an estimated 2.8 million in 1999-2000.

Where does our older population live?

The geographic distribution of our older population varies significantly across the UK. Rural and coastal areas in particular have the highest concentrations of older people. The three local authorities of Christchurch in Dorset, Rother in East Sussex and East Devon, for example, all have over 30% of their population above the state pension age (Soule et al., 2005). Some coastal areas in the North East and in Norfolk also have high proportions of older people (ONS, 2010), as do rural areas of Wales, Cumbria, South West Scotland and Argyll. Interestingly, areas in the South East of England that have been traditionally associated with retirement migration (for example, Worthing, Hastings, Eastbourne and Canterbury) have seen a negative growth rate for older people.

At the level of the individual, current policy focuses on 'ageing in place', that is, supporting older people to remain in their own homes for as long as possible. However, reflecting LE patterns, older women are more likely to live alone than older men (30:20 for 65-74 year-old people, rising to 63:35 for those 75+) (ONS, 2010). The largest percentage of older people in the UK lives in owner-occupied accommodation although this percentage decreases with advancing old age. Technological adaptations – from low level (such as hoists, rails and bath aids) to high level (tele-health, tele-care and environmental control systems) and smart homes – are increasingly being viewed as one 'solution' for maintaining older people's ability to remain longer in their own homes as their health and/or mobility declines (Milligan et al., 2010).

Partly as a consequence of the above, the numbers of older people living in communal residential care homes has declined. Less than 5% of people in the UK aged 65 and over live in communal homes, though this number increases to around 20% for those over the age of 85 (GHS, 2008). However, more older women than men are likely to be living in

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residential homes than men – reflecting firstly, that women are more likely than men to be widowed and so be without a spouse who could potentially care for them; and secondly, that there are higher levels of disability reported by women than men at older ages.

What do we think of our older population?

Clearly 'older people' are not a homogenous group – indeed their characteristics are as diverse as those of the wider population. Yet older people are often represented in terms of declining mental and physical capabilities, crumbling bodies, forgetfulness, lowered expectations about their ability to learn and increasing dependency (Katz, 2001; Richardson, Weaver and Zorn, 2005; Twigg, 2004). Whilst it may be true that those in ill-health and the 'oldest old' may more readily fit at least parts of this image, there is increasing recognition that as we live longer, the majority of older people (particularly in 'early old age') can be active, productive and engaged members of society. Their post-retirement years are often seen as presenting opportunities to take up new activities, engage in new learning opportunities, and/or undertake part-time or voluntary work (often involving the care of young family members such as grandchildren). Combined with today's consumer culture, we are seeing the emergence of more positive representations of older people as active, healthy, independent and youthful (Katz, 2001; Katz and Marshall, 2003; Westerhof et al., 2010). Pejorative and ageist terms that have been commonly used to describe older people are being replaced by new terms such as 'silver surfers' (computer literate older people) (AXA, 2007), 'golden ager' (reflecting a television sitcom based around a group of lively and active older women) and 'snowbirds' (those migrating to warmer climates to live out all or part of their retirement years), which arguably, paint a far more positive image of an older person's abilities to learn and actively enjoy their retirement years.

There is increasing recognition that as we live longer, the majority of older people (particularly in 'early old age') can be active, productive and engaged members of society. Their post-retirement years are often seen as presenting opportunities to take up new activities, engage in new learning opportunities, and/or undertake part-time or voluntary work

Setting the policy context

Why is e-Inclusion seen as an important tool for reducing inequalities in older age? Do we really know what works for whom and when? How applicable are the widely generalised definitions given to older people?

EU policy context

The EU's 2006 Riga Declaration on ICT defined e-Inclusion as:

"Inclusive ICT and the use of ICT to achieve wider inclusion objectives. It focuses on wider participation of all individuals and communities in all aspects of the information society. E-Inclusion policy therefore, aims at reducing gaps in ICT usage and promoting the use of ICT to overcome exclusion, and improve economic performance, employment opportunities, quality of life, social participation and cohesion" (Objective 4).

It goes on to note that this includes e-Inclusion in the field of active ageing, the geographical digital divide, accessibility, digital literacy and competences, cultural diversity and inclusive e-Government. It further recommends supporting innovative ICT solutions that can be applied widely in locations, including the home, and encouraging the provision of training from public, private and third sectors with a particular emphasis on improving the ICT skills of older people.

EU policy thus takes a positive stance with regard to supporting older people with internet use. Indeed, the EC (2011) recently noted that Europeans are living longer than ever due to economic growth and advances in health care. Average life expectancy is now over 80, and by 2020 around 25 % of the EU population will be over 65. The Information Society, it believes, holds the potential to support older people to live more independently and continue to enjoy a high quality of life. It goes on to point out current barriers that prevent the older generation from fully embracing ICT, and states its intent to develop actions to improve ICT uptake amongst the older population. In particular, it identifies two main areas where technologies could be developed and deployed to support older people. Firstly, it highlights applications in helping older people to overcome isolation and loneliness, by increasing possibilities for keeping in contact with friends and also extending social networks. As e-Government and e-Commerce become more important, the EC notes the importance of widening access and e-Literacy so that everyone can use these new technologies to access public and commercial services.

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Secondly, it points to the potential of 'smart home' technologies (that control heating, lighting, other electronic devices in the home, and even food stocks remotely), electronic alarm systems and tele-health facilities that have the potential to help older people to maintain their independence and live in their own homes for longer.

The first of these areas clearly involves the older person directly, in using the internet (as an active technology use), while the second might involve the older person directly, but can also involve remote monitoring and intervention (a passive technology use). As previously stated, we focus on the first of these two areas, but consider examples and practices in the second, where older people are actively involved with technological applications.

The EC recognises the need for more action to ensure that the benefits of the internet and technology use are matched to the needs of older people, noting that many older people face barriers that preclude their ability to take full advantage of ICT products, services and applications. Some barriers are physical, which suggests that ICT manufacturers need to take older people's needs into account. For example, a significant proportion of those over 50 years of age have severe hearing, vision or dexterity problems, making it difficult or impossible for them to use standard ICT equipment. Hence, the Commission maintains that more needs to be done to integrate older people into the Information Society, pointing to the need for improvements in policy and legislative conditions that can help the ICT industry in Europe to realize the economic opportunities created by this growing market (EC, 2011).

The UK policy context

In the UK, prior to the 2010 election, e-Inclusion was supported at national government level by a Minister for e-Inclusion. This position was not retained under the new coalition government that came into office in May 2010. Responsibility for these issues has now been transferred to the Cabinet Office and to individual government departments. The Cabinet Office, however, holds political responsibility for the UK's e-Government and

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The [European] Commission maintains that more needs to be done to integrate older people into the Information Society

e-Inclusion agenda. The independent regulator and competition authority for the UK communications industries (Ofcom) also has a primary duty to further the interests of citizens and consumers in communications matters. Ofcom are responsible for implementing regulatory interventions to safeguard access and inclusion in digital communications, particularly where they involve the most disadvantaged members of our society.

Though the post of Minister for e-Inclusion was abolished, the incoming government retained the role of UK Digital Champion (currently Martha Lane Fox) with a remit to advise government not just on how to provide better, more efficient online public services, but also to accelerate efforts to help more people benefit from the power of the internet (with a target set for 2012). Thirty million pounds of government funding was secured to support community-based web access and training, resulting in the launch of the Race Online 2012 partnership programme[B]. Race Online describes itself as a government funded but independent initiative. Through its 700-plus partners, the initiative has pledged to support more than 1.5 million additional people to get online by the end of 2012. Its Networked Nation manifesto sets out detailed plans for government, industry and third sector organisations to work towards helping everyone to get online and reap the benefits of being web-enabled, including four million of the most disadvantaged people in our society (including the unemployed and those aged over 65).

Pointing to the growth of services such as internet banking, communication and interactions with key agencies and services, discounts from online utility and shopping services, advice and support services from voluntary and government organisations, government ministers and the Race Online Taskforce maintain that the social and economic importance of e-Inclusion is now such that "the disadvantages of being offline are becoming so great, and growing at such a pace, that for reasons of social justice and economic necessity we must act now" (Race Online 2010 report, 2010, p.16).

Whilst it is clear that both the UK and EU have sought to develop policies in relation to e-Inclusion, Cullen et al. (2007) maintain that, as yet, e-Inclusion lacks a consolidated evidence base of what works, for whom and under what circumstances. The 'state of the

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B
Race Online 2012 is so called because 2012 is an Olympic Year.

art' is rapidly evolving and, as such, theories, concepts and the evidence base upon which political actors seek to draw in developing policy and guidance to support practice continue to be contested. Policy, they argue, is constrained by the absence of an underpinning research base. Fundamental gaps in understanding are thus inherent in current policy. For example, they maintain that the assumption that e-Inclusion is about specific target groups (such as older and disabled people or minority ethnic groups) ignores the heterogeneity of these groups who have widely divergent characteristics and needs. The lack of attention given to motivational factors that shape e-Inclusion and to cultural and contextual factors within regions and communities indicates that policy needs to take a far more fine-tuned approach to e-Inclusion at both national and trans-national levels.

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Older people and the internet

How and why do older people access the internet? Does it vary between the UK and other comparable EU countries?
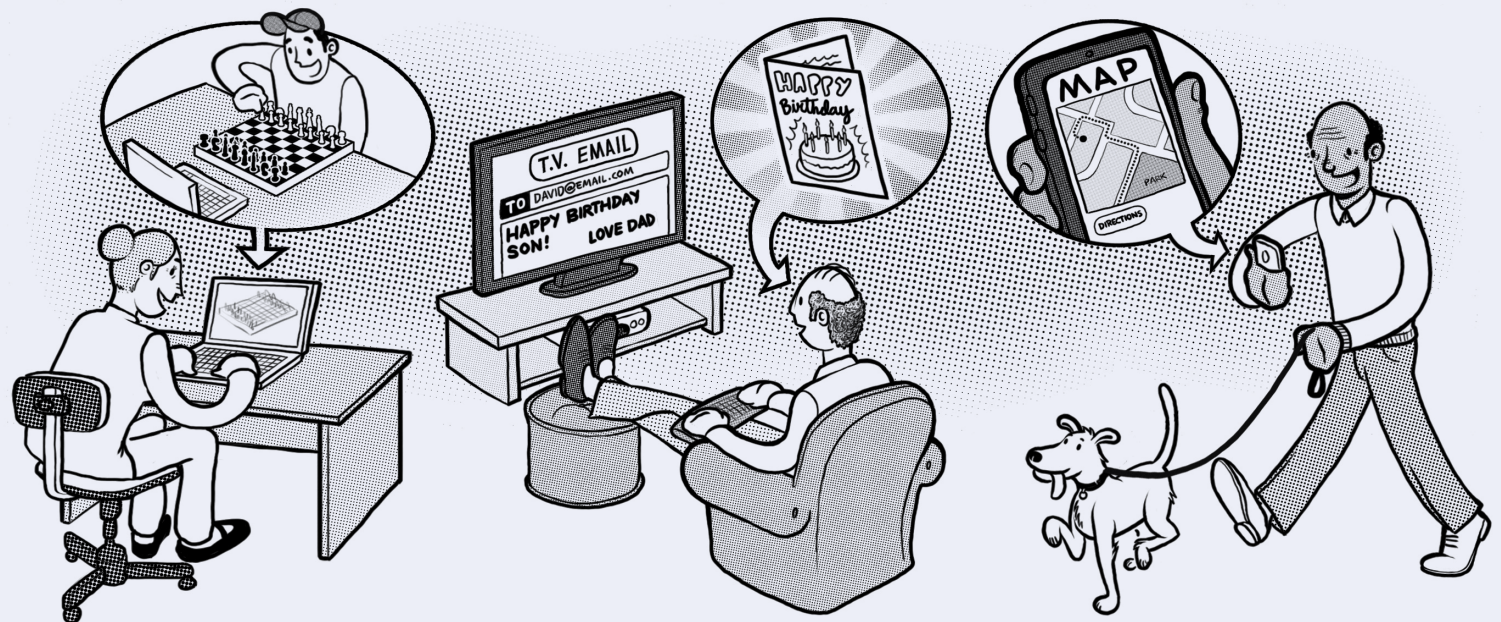
Population and statistical survey data within this report allow us to consider a range of factors (such as relationship of age to work, retirement and gender) so that we can explore in more detail aspects of engagement with, and uses of, the internet. The overall picture is not a simple one, so taking generalisations on board may be misleading in a number of respects.

In terms of internet access, according to an ONS (2010a) report, the UK is ranked sixth highest in the EU in terms of levels of home broadband access: Sweden ranked number 1, followed by the Netherlands, Denmark, Finland, and Luxembourg. Ofcom (2010) provides a useful graphical overview of internet access in the UK (see Figure 2). This overview allows home internet access in 2009 and 2010 to be considered in terms of the overall UK average and by age, socio-economic group and gender.

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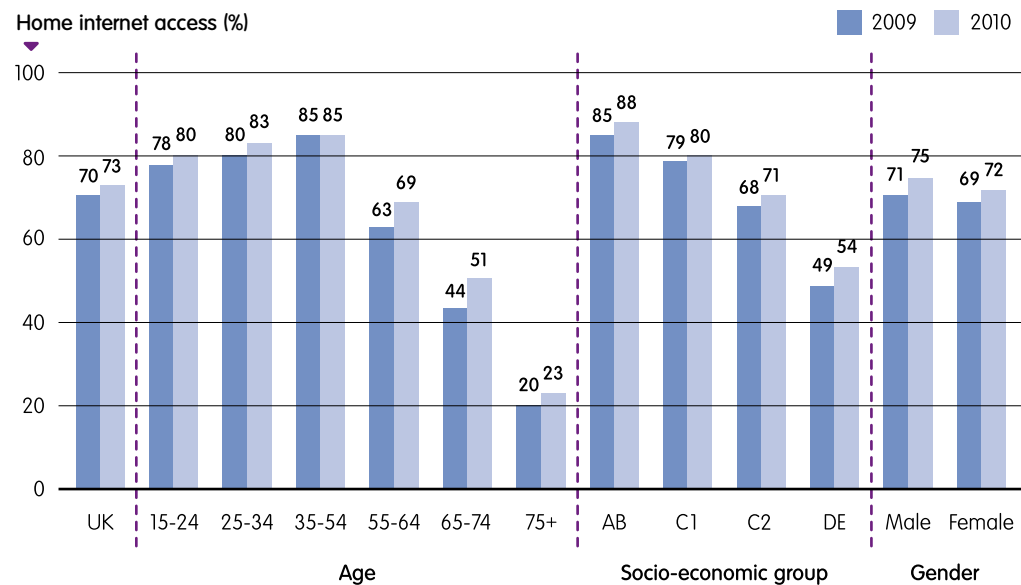

Figure 2
Home internet access by age, socio-economic group, and gender
Source: Ofcom (2010)

As the figure illustrates, not only are older people less likely than younger people to have accessed the internet, they also use it less frequently. Among 55-64 year-olds the figure for internet access within the home stands at 69%, but drops to only 51% for 65-74 year-olds, with less than a quarter (23%) of 75+ year-olds having internet access at home (Ofcom, 2010). However, these data need to be considered in the context of shifting current and potential future trends. Indeed, Ofcom (2010) note that internet access at home is growing faster for the older age groups than that of all other age groups. The highest absolute growth in take-up is amongst the 55-64 and the 65-74 age groups, which grew by 6% and 7% respectively. So, while levels of internet access may be lower for the older age groups, increased take-up indicates that older people are seeing wider potential uses that apply to their needs and circumstances.

These data also indicate that lower levels of internet access amongst those aged 65 and over are associated with lower income levels between different socio-economic groups. The Ofcom report (2010) also notes gender differences, in which older women account for only 3% of the female online universe, but older men account for 8% of the male online universe (p.255).

In thinking about aspects of age and socio-economic grouping, it is worth considering the relationship between age, retirement and work. One Eurostat report (2002) stated that:

> **"a relatively large proportion of men of 65 and over remained in work in Ireland (19%), Sweden (15%), Greece (12%) and the UK (11%), but in each case, the figure for women was only around 4-6%." (p.3)**

The report also noted marked variations in the importance of part-time working between countries. The great majority of both older women and men in the UK, the Netherlands, Sweden and Denmark work part-time (over 70% of women, 60% or more of men) but most worked less than 15 hours a week. Forms of work undertaken by this older age group included: basic services (48% of men and 44% of women); public and communal services (14% of men and 33% of women); industry (14% of men and 7% of women); agriculture (11% of men and 5% of women); construction (8% of men and 2% of women);

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and advanced services (6% of men and 8% of women). In relating retirement and work to income, the report noted that on average, income was lower for women than for men and that by comparison, income for the over 65 age group was over 25% lower than the average income of those aged under 65 in the UK, Greece, Germany and Ireland. The report echoed that of others in noting that older women are more at risk of poverty than older men, and stated that:

> "In Greece, Portugal and the UK, over a third of those of 65 and over had an income which put them at risk of poverty." (p.5)

Clearly this has implications for whether individuals over 65 have the economic resources with which to access the technology for internet use.

While statistics can give us an overview of some of the key issues related to our ageing population, we also need to consider other framing factors, such as ageism and the stereotyping of older people in both positive as well as negative ways (such as 'television watching', 'silver surfing' and 'entertaining grandchildren'), in order to frame and contextualise other relevant evidence. Picking up on points raised on page 21, it is important that we question and challenge these assertions or assumptions, in order to clarify what is known and what is not known. For example, Clapperton (2007) in an article in the Guardian newspaper stated that:

> "According to the stereotype, older people can't cope with technology. They can't hack the latest mobile phone or music player, they don't like looking at websites, they've never blogged. But in many cases the reality is that they have made the perfectly sensible decision that they don't need to."

Instead, the technologies they really need to get to grips with are far more basic. Seemingly simple things such as remote controls, non-mobile phones and even technologies to help open jam jar lids and read pill bottles where instructions are written in minute font sizes or embossed white plastic are of more immediate concern for older people experiencing physical or sight impairment. With the population ageing at an

increasing rate, the need for more consideration of technologies that will work across all age ranges, as well as those that will work well with older people, is becoming increasingly important. With this in mind, various agencies, including the third sector organisation AgeUK, have released a policy document on the potential of assistive technology – that is, products or services designed to enable disabled or older people to maintain their independence. Whilst the Guardian article might suggest that we need to accept that older people do not want to take change and uses of the internet on board, Nasmith and Parkinson (2008, p.673) refute this view noting:

> "There is a perception that 'Seniors' are reluctant to change, but a recent Royal New Zealand Foundation of the Blind (RNZFB) pilot project to test all internet-connected Digital Talking Book Player with 40 borrowers, most of whom were in their 70s and 80s, has shown the opposite."

This raises questions about how we rationalise or explain these differences or perceptions.

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Older people and access to technologies

The National Statistics Omnibus Survey (ONS, 2011) provides data that show levels of access to technologies, related to specific age groups and gender. Percentage access by age group is shown in Table 2.

Age group	2000		2001				2002				2003				2004				2005				2006
	Jul	Oct	Jan	Apr	Jul	Oct	Feb	Apr	Jul	Oct	Feb	Apr	Jul	Oct	Feb	Apr	Jul	Oct	Feb	May	July	Oct	Feb
16 to 24 years	69	82	85	82	88	87	82	89	89	94	95	87	93	97	88	92	91	97	94	94	95	95	91
25 to 44 years	60	60	66	69	69	69	74	74	74	79	81	78	80	83	80	81	78	85	85	88	83	86	83
45 to 54 years	49	50	50	54	59	58	58	60	65	68	64	65	67	69	72	67	65	70	69	72	72	79	75
55 to 64 years	33	28	39	31	38	37	41	40	44	47	45	49	45	51	46	48	50	53	49	54	52	56	58
65 years and over	9	10	12	16	11	11	12	12	14	17	15	19	16	21	20	17	19	18	22	22	19	19	21

Table 2
Percentage of adults in accessing the internet by age cohort in Great Britain
Source: National Statistics Omnibus Survey

As the report itself notes, care should be taken when interpreting this data due to the very small sample size of those in the older age groups. Across the period of this survey, the data indicate that the percentage of people aged 65 years and above who accessed the internet increased, although not to the same extent as other age groups. Even though the percentage was increasing, the ONS (2010) confirmed that the majority (60%) of those aged 65 and over had never accessed the internet, compared with just 1% of those aged 16-24. The report further noted that the over 65s made up almost two-thirds (64%) of those who had never accessed the internet, and comprised those households that were the least likely to have internet access. Fewer than 4:10 (37%) of one-person households over state pension age had internet access in 2008, compared with just under 8:10 (79%)

of one-person households under state pension age. Statistics giving indicators of retirement and internet access provided in an ONS report (2010b) stated that:

> "Among retired households, 32% had internet access at home in two-adult households and 9 % in one-adult households" (see http://www.statistics.gov.uk/cci/nugget.asp?id=868).

The picture from these data indicates that the numbers of older people with access to the internet has increased over time, but that their level of internet access is still considerably less than that of younger age groups, and that one-person households have lower levels of internet access compared to two-adult households.

The rise in internet access in recent years has not been constant across all homes. Access to technologies and uses of the internet can be dependent on a range of circumstances that can include the influence of other family members as well as ease of access where an individual is living. Certainly there has been a measurable rise in the percentage of homes with broadband access over the past few years, but while rates of internet access rose for all types of households in the UK between 2000-1 and 2008, the increase was only 26% for one-person households over state pension age compared to about 40% for most other types of households over the period (ONS, 2010a).

Geographical location (or factors within geographical locations) may also affect access; the highest levels of internet access across the UK were in London at 83% and the South East at 79%. The lowest levels of internet access were in the North East (59%) and Scotland (64%) (ONS, 2010a). It should be noted, however, that these figures cover all age groups, and not just those aged 65 and over.

Finally, we have limited information about access to, and uses of, the internet for those living in residential care settings. Access and use, however, are likely to depend upon the provision of appropriate facilities within the residential care setting. Given the larger numbers of women living in residential care settings in comparison to men, the limited internet access in these settings is particularly likely to affect older women. As the 2001

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Census reported, 6% of women aged 65 and over in the UK were living in communal establishments, compared to 3% of men in the same age group; and almost a quarter of women aged 85 and over (23%) lived in communal establishments compared to 12% of men of this age.

Types of technologies used by older people

internet access can be gained through a range of different devices – standalone and laptop computers may be commonly used for access, but increasingly mobile devices and televisions are being used to gain internet access by certain age groups. Uses of different forms of technologies by older people, therefore, need to be considered in this context.

An ONS (2010a) summary of findings from Ofcom considered forms of media activities that would be missed most by those in the 16-26 year-old age group, compared to those over 65 years of age. As Table 3 illustrates, there is a clear division between age groups, with the older age groups clearly most likely to miss 'older' technologies such as radio, television and the printed media compared to the 'newer' technologies such as mobile telephones and the internet that would be most missed by the younger age groups.

Technology	16-26 year olds (%)	65 years and above (%)
Television	36	60
Radio	2	18
Internet	18	3
Mobile phones	32	1
Newspapers/magazines	1	11

Table 3

Comparison of media technologies that would be most missed
by 16-26 year-olds compared to those 65 years and above

Source: ONS 2010a

In terms of how these different media might relate to internet access, these figures suggest that engaging older people through television-based internet provision could be potentially of far more value to this older age group (as well as potentially supporting a range of younger users, as clearly many younger people also use televisions widely). This direction is already being explored in some initiatives; as the Independent Age (n.d.) report states:

> "The Digital Switchover Programme, and the support it gives to older people, provides the opportunity to promote use of the internet over TV and to provide access to many older people without computers." (p.13)

Vignette 1 is an example of a project that is exploiting uses of television by older people by offering them additional applications (including internet access and email) through associated features on their remote controls.

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Vignette One

T-Seniority: Expanding the benefits of information society to older people through digital TV channels

T-Seniority is an EU-funded pilot project designed to improve the quality of life of the ageing population and ensure their efficient health and social care by specifying and demonstrating innovative ICT enabled products and services. The pilot involves some 2,850 participants from across Spain, Italy, Greece, the UK (Kirklees), France, Cyprus and Finland. The participants are drawn from older people and those reluctant to use conventional PCs and mobile phones, but who are acquainted with TV remote controls. The T-Seniority project involves designing a service that moves beyond one-to-one communication, to allow communication from one individual to many in real-time. Additionally, it provides greater ability for participants to access personalised, select content – information generated can be accessed via the internet, SMS, or e-mail, for example.

The T-Seniority project involves designing a service that moves beyond one-to-one communication, to allow communication from one individual to many in real-time

Though not strictly within the remit of this report, a wide range of tele-care and tele-health technologies have been designed and implemented for older people with chronic health problems or to support their family carers. Though there is a vast literature in this field it generally highlights three distinct generations of applications.

First generation tele-care most often refers to community alarm services such as push-button pendants or pull-cord alarms. These are typically linked by telephone to a call handler such as a community warden – who will trigger a response, usually from a family carer, friend or neighbour who acts as a key-holder.

The second generation comprises enhanced equipment that can monitor the home environment, vital signs and physiological measures, and lifestyle. For example, home safety detectors (such as those monitoring flood, fire or gas), fall detectors and user-activated pendent alarms, bed and door sensors, all largely activated through land-line

telephone systems to a monitoring call-centre. These sensors can collect and transmit data continuously about movement and activity within and out of the home, including the use of appliances.

Third generation tele-care involves the use of improving and increasingly available wireless, broadband and audio-visual technology that offers potential for virtual or tele-consultations between the service user and a doctor, nurse or support worker. This generation of technology is of more relevance to this report as some aspects of these technologies are designed to address social isolation through social networking or through the use of 'affective technologies' designed to meet the emotional needs of lone-dwelling older people. Vignette 2 illustrates an example of developments of the former.

Third generation tele-care involves the use of improving and increasingly available wireless, broadband and audio-visual technology that offers potential for virtual or tele-consultations between the service user and a doctor, nurse or support worker

Vignette two
DREAMING™ - Elderly-friendly alarm handling and monitoring

This EU-funded project involves some 350 users in sites across Denmark, Estonia, Germany, Italy, Spain, and Sweden. Though primarily a tele-care development, e-Inclusion services are provided as part of the project. This is based on a videoconferencing solution specifically designed for use by older people through means of a TV set. Older people are the main users and beneficiaries of the DREAMING™ services and use the medical devices and the videoconferencing service directly. Caregivers help older people when their manual skills and/or intellectual faculties decline. Social workers will be activated if and when there is a need for intervention. The main use of the videoconferencing service is for caregivers to keep in touch with the older people they look after when they cannot assist them in person. Though primarily a health-related service designed to help maintain the cognitive skills of the older participants and improved quality of life for them and their families, the project anticipates it will also improve social interaction through videoconferencing.

Systems now being developed can integrate different levels and forms of functionality, which include elements that enable social interaction as well as uses of technology that encourage direct use by older people in supportive activities. Etchemendy et al. (2011) describe and evaluate the impacts of a system (called the Butler system) that has three components:

– an assessment application to enable "early detection, as well as improvement and monitoring, of the users' emotional states (including anxiety and depression) as well as their physical states" (p.276)

– a therapeutic application offering two tools - one "facilitates the training of positive emotions such as relaxation and joy using two virtual reality environments containing different emotional induction procedures that have been validated by the scientific community" (p.276), and a second is "the Therapeutic Book of Life (TBL)" used by a clinician to enable a support program

– a playful application containing "several recreational tools designed to enhance socialisation, learning, entertainment and curiosity. For example, users can send and receive e-mail, have videoconferences, create personalised blogs (called Books of Life) or multimedia photo albums, listen to music and meet new people through the network of friends in the system" (p.276).

In evaluating the system's efficacy at improving mood states and degree of acceptance, the authors maintained that the use of the Butler system increased positive emotions (joy and relaxation) significantly. Simultaneously, negative emotion scores (sadness and anxiety) were significantly reduced each time a participant used the system.
Whilst first and second generation tele-care and tele-health are largely delivered around land-based telephone systems, it is clear that in terms of the third generation tele-care developments and practices, access to and uses of the internet could support a wide range of potential support mechanisms for the individual and for individuals who are living in different 'home' settings.

Whilst first and second generation tele-care and tele-health are largely delivered around land-based telephone systems, it is clear that in terms of the third generation tele-care developments and practices, access to and uses of the internet could support a wide range of potential support mechanisms for the individual and for individuals who are living in different 'home' settings

Internet use and social interactions amongst older people

Older people can gain a wide range of benefits from access to and use of the internet – from information access and browsing interests, through to completing government and agency information returns, for shopping and banking online, to specific email exchange, or setting up blogs and wikis to share information and discuss online (Richards, 2006). While levels of use of a number of different forms of access have been explored in a recent ONS report (ONS, 2010a) (including tele-working practices, buying or ordering goods or services over the internet, internet banking, access to e-Government sites, tax or revenue returns, and finding health information), these data are not broken down by age. An AgeUK (2010) report notes that as many as 22% of people aged 65 or over purchased goods over the internet in 2009-10. Of these, 44% purchased holiday accommodation, 40% purchased books, magazines, and newspapers, 38% purchased clothes and sports goods and 37% purchased household goods. The purchase of transport, tickets and car hire over the internet was also prominent. Over the same period of time, 20% of those aged 65 and above downloaded films and music from the internet, rather than receiving them by post. This again suggests that older people may be far more 'IT literate' than is often suggested, and that their levels of 'IT literacy' may be linked to their perception of the usefulness of an application to their everyday lives.

Levels of internet use by 'older' groups, and the extent to which older people are involved in social interactions through the internet, using email, or social networking sites, are potentially important indicators not only of levels of current practice, but also of future possibilities for developing wider usage and potential support needs. Some currently available data raises issues with regard to defining an e-Inclusion of older people. Eurostat (2010) allows comparisons of the different forms of usage between the 55-74 year-old age group and the 16-24 year-old age group across all 27 EU member states (EU27). This is summarised in Table 4.

This again suggests that older people may be far more 'IT literate' than is often suggested, and that their levels of 'IT literacy' may be linked to their perception of the usefulness of an application to their everyday lives

Internet usage	16-24 year olds (%)	55-74 year olds(%)
Use the internet on average at least once a week	90	37
Send or receive e-mail	90	85
Post messages to chat sites, blogs or social networking sites	80	20
Use the internet for phone or video calls	35	20
Use the internet to read news and newspapers	45	50
Use the internet for learning purposes	80	35
Search for information on courses	50	20
Follow e-learning courses	10	5

Table 4
Uses of the internet by age group (percent) in the EU27 member states
Source: Eurostat (2010

It is clear that these figures indicate that any digital divide is much more likely to be associated with specific technologies or certain practices, rather than it being associated with all technologies and with all internet uses and practices

If each comparison in Table 4 is considered, it is clear that these figures indicate that any digital divide is much more likely to be associated with specific technologies or certain practices, rather than it being associated with **all** technologies and with **all** internet uses and practices. The high levels of use of the internet by the 55-74 year-old age group for email, and for reading news and newspapers, for example, suggests that there is no digital divide in these areas.

Across the widest population group, social interactions using text messaging and email are common practices. Indeed in 2010 the ONS reported that the older population had 'caught up' with younger age groups in terms of email use in little more than a three year period (2007-10). In these areas of application, technologies are supporting e-Inclusion, irrespective of age. But whilst email use by older people is high, the picture shifts significantly when considering older people's use of text messaging as a form of social interaction. Ling (2008), reviewing the literature on uses of texting by older people, concluded that:

> "There is relatively widespread ownership of mobile phones, but texting does not have the same central place in their lives." (p.339)

The ONS (2007) reported that in 2005 only 17% of those aged 65 had sent a text message compared to over 94% of adults aged from 16-24, and that this figure was also less than in the population overall.

Main features and current uses

In what ways do older people use technologies and what are their key reasons for using or not using them? How does the ageing process affect people's physical, sensory and cognitive abilities? How might developers work to improve the design and acceptability of these technologies to better meet the needs of older people?

Ways older people use technologies

In this section we draw on the evidence base to consider how older people use technologies, as well as the key reasons for their uses of these technologies. It is also important to consider how older peoples' adoption of newer forms of technologies can become integrated with those older technologies that are already used by them in their daily lives (a point raised by Hamilton, with Gerrard et al., forthcoming). Thinking about the provision of internet access through desktop computers alone does not accommodate the potential uses that might be gained by older people through television access. It is also important to consider different forms of meaningful engagement (purpose linked to uses), uses for social good, and how these can be identified and categorised for older people (such as the use of technologies for shopping, health information, local government information or advice, social networking, support, and various aspects of self- or supportive-learning).

It would certainly be incorrect to assume that all older people do not use internet-based facilities, though barriers do exist that can prevent or delay early uptake. In a study of the usage of online banking services by people over 65 years of age in Finland, Mattila et al. (2003) found that 54.5% of their respondents (N-220) fell into the 'late adopters' group with regard to uses of e-Banking (compared to 29.7% of younger age groups). The authors noted a number of barriers that prevented faster and wider uptake including: a preference for personal service and a printed receipt; difficulties in using computers and the internet in general; and security issues. Factors found to significantly influence the use of internet banking were attitude towards computers, marital status, gender, education, income, profession and household size. To address these barriers the authors suggested incorporating personal service with e-Banking through the development of three-dimensional web pages with voice recognition, and the option of calling a personal bank employee via a video connection.

In terms of using online communities and social networking sites, three studies reported simultaneously by Karahasanovic et al. (2009) noted that whilst older people rarely publish and share audio-visual content on the internet, even if they are members of an

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online community, they may be embracing the expressive aspects of new media to a greater degree than is generally believed. Further, they note, that older people who are already members of online communities in significant numbers express themselves politically, are keen to engage with visual and auditory content, and work together on creating narratives that are based in their cultural or background experiences. In summary, they maintain that older people are generally positive about new technologies, but need support in overcoming their anxieties of use.

Social networking sites specifically aimed at those groups aged over 65 years of age are now becoming visible on the internet, associated with certain web sites (see Vignette 3).

Vignette three
Eons.com

The Eons.com website allows users to register and become actively involved in social networking groups that are designed for specified membership – including one called 'Senior 65 and up'. The website states that this group is: "For those sixty somethings and older out there who want to connect with others of that description for fun, games, memories, music and the sharing of ideas, jokes, great graphics, well, just about anything that tickles their fancy." Guidelines are simply stated: "Members need to be nearly 65 (within a couple of years) or older. All members are asked to be polite with their posts and never act in a confrontational manner."

(Further details can be found at:
http://www.eons.com/groups/about/semiors-65-and-up)

Social networking is an application commonly used by young people. As a part of this application they set up an online social networking site profile. Setting up a profile involves tasks that many young people are readily familiar with; the wider use of social networking sites also addresses their interests and social needs. In terms of this

application, the ONS (2010a) reported that nearly 80% of the 16-24 year-old age group in 2009 had used this application, compared to less than 10% of the 65 and over age group. However, by comparison, Ofcom (2010) reported that: "Older internet users, aged 55-64 and 65+, were more likely to use the internet 'to find out or learn things' and 'for contact with other people', suggesting that older users take a much more functional approach than younger people to the internet" (p.251). The contrast between the comparative levels of these applications shows clearly the point that older people may not replicate the same patterns of use as younger people, or indeed share their same desires or purposes for internet access and uses.

"Older internet users, aged 55-64 and 65+, were more likely to use the internet 'to find out or learn things' and 'for contact with other people', suggesting that older users take a much more functional approach than younger people to the internet" Ofcom (2010)

Purpose of internet use	55-74 year-olds (%)
To find out or learn things	71
To contact with other people	57
To keep up to date with the news	34
To relax	26
To pass the time	22
For fun	20
Play games online or interactively	14
Keep up to date with sports	13
Download music files or movies	12
Watch video clips or webcasts	10
Listen to the radio	9
Watch television	8
Upload or add content	4

Table 5
Purpose of internet use (as a percentage) of those aged 55-74 years
Source: Ofcom (2010)

These data indicate that older people may well favour certain applications, and that comparing their levels of use across all applications with other age ranges may not in itself necessarily provide an indicator of their 'digital awareness or use'. Finding criteria through which to view digital appropriateness for older people is likely to provide more valuable indicators of digital trends and shifts, rather than only using comparisons with different age groups.

Physical, cognitive and behavioural aspects of using the technologies

The ageing process is often accompanied by physical, cognitive and/or behavioural change that can either support or limit the use of technologies by older people. In a review of ways to improve the acceptability of mobile technologies for older people, Holzinger et al. (2007) suggested that developers needed to consider the development of mobile applications with low complexity to address the 'slowing down' of cognitive performance with age, and accommodate changes in learning time (the time to perform a task), speed of performance, error rate, retention over time and subjective satisfaction. Further, they need to incorporate features with high 'learnability' and high recognisability to maintain motivation. They also identified the need for features that could accommodate physical abilities that may decrease with age (visual acuity, visual accommodation, colour vision, contrast detection, dark adaptation, accommodation of glare, motion perception, peripheral vision, auditory acuity, auditory localisation, and selection of audition in noise) and the need for an increase in illumination with age.

Taking account of these sorts of issues can be critical to older people's decisions to engage with these technologies. Kurniawan's (2008) study of the features of mobile phones, for example, noted that older people tend to be passive users of mobile phones, and that they can experience fear of the consequences of using unfamiliar technology. The most preferred design features, he suggested, are those that support people with declining functional abilities. Gender differences in preferred design features were also observed, with women focusing on haptic aids (such as touch pads, vibrations, and features concerned with touch and motion) and men on perceptual aids (such as

Finding criteria through which to view digital appropriateness for older people is likely to provide more valuable indicators of digital trends and shifts, rather than only using comparisons with different age groups

Holzinger et al also identified the need for features that could accommodate physical abilities that may decrease with age… Taking account of these sorts of issues can be critical to older people's decisions to engage with these technologies.

lighting and imagery, sounds, and features concerned with visual and auditory outputs). We return to the use of mobile telephones by older people later in this report, but here flag this technology as what we might call an 'attribute-laden' technology. By this we mean that uses, and levels of uses, can be dependent on a range of different attributes that can impact the individual according to their likes and dislikes, their interests and situation. This may be either through a single attribute (such as not liking vibration), or through a number of related attributes (such as not being able to identify specific pads, as well as not easily recognising letters on screens that are too small).

The importance of individual likes and dislikes, and impacts of technology uses on social contexts is a point that is illustrated by Isomursu et al. (2008) in an in-depth study, looking at how lone-dwelling older people who were unable to cook or shop for themselves, responded to use of a mobile technology-based service that allowed them to request and order meals from a home care service. Most participants were confined to their homes or immediate environs and most required aids to move around, had memory disorders to varying extents and required support with activities of daily living. Participants used a mobile telephone to order their meals by touching a tag on a meal menu. Despite some difficulties in recruitment, due to older people's reluctance to use a mobile telephone, the authors reported that the touch-based user interface was easy to learn, its use did not require prior knowledge or experience of the technology, and could be used easily by those with impaired motor skills. It was also noted that the touch-based user interface allowed an interaction that reduced cognitive load by decreasing memory load for users. Of itself, of course, this type of system would not necessarily lead to enhanced social interaction levels. It is important to recognise, therefore, that while some technologies can be of benefit in supporting the physical, cognitive or behavioural needs of older people, social benefits and interactions are not necessarily enhanced. This may be an important dimension to consider when technologies are implemented and evaluated in terms of the needs and benefits of technologies to support older people.

Design for all

Whether certain specialised technologies have been, or need to be, developed in order for older people to benefit from their uses more is a key question. There is clearly a need to consider the heterogeneous nature of the older population; whilst many older people – particularly in their 'early old age' are extremely fit and able, others can experience hearing loss, mobility impairments, physical and/or cognitive decline – particularly in their later years. Clearly there are implications for how older people with differing levels of physical and cognitive ability and mobility use technologies, and this is certainly the case for uses of mobile technologies in these contexts. In 2001 Abascal and Civit noted that the increased popularity of mobile phones opened a vast range of new opportunities for older people with different levels of physical impairments due to the ageing process; yet a decade later the EC (2011) still notes a failure to consider ageing when designing mainstream products and a distinct lack of industry awareness about older users' capabilities. Even when assistive technologies are developed to help vulnerable groups, they note that a lack of interoperability can hamper uptake. So, whilst the potential for technologies is heralded in some quarters, the lack of specific design for older people with differing levels of ability remains an ongoing issue.

The age at which levels of access and use decrease, and implications for the future

In order to ensure that physical and behavioural attributes, as well as design needs, are considered appropriately for older people, demographic and associated attribute characteristics data can help to identify patterns where 'dips' or decreases in levels of access or use occur. However, these decreases or dips need to be considered in terms of specific groups of applications or technologies, rather than an overall 'technology-dip'. Additionally there is a need to identify the time span needed to reach a more 'uniform' awareness and practice across all ages (since, as younger people with high levels of internet and mobile technology use become older, they may then continue these levels

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of use and application as they age). There is also a need to consider the times when certain attributes become more prominent.

It is also important that factors that negatively affect people who are middle-aged (45-65 years of age) are considered in terms of uses of technologies and the internet, in order to ensure that systems do not create or exacerbate physical problems that can manifest in older age. For example, in a study of middle-aged users of technologies and the internet in Finland, Korpinen and Pääkkönen (2010) found that:

> "the usage of desktop computers (in women's data) or the internet (in men's data) at work had an association with the pain in the hips and lower back. In the future, when new technical equipment is developed, it is important that the working environment is ergonomic also at home and the services should be easy enough to use for the persons, who have little experience or knowledge of computers and the internet." (p.90)

While some factors may lead to 'dips' in adoption and use, two practices that underlie the adoption and uses of technologies by older people are: the involvement of lifelong learning (how work and ongoing training influence take-up and use, discussed by Naumanen and Tukiainen, 2010); and intergenerational learning (how children, family and friends influence adoption and use, discussed by Hamilton et al., forthcoming). We consider each of these in turn.

Lifelong learning

In terms of the wide picture of internet take-up by older people, Ofcom (2010) indicate that there has been a recent rapid growth in what they call the 'active online universe' of older people. The report notes that internet take-up grew by 7% among 65-74 year olds and 6% among 55-64 year-olds compared to just 3% amongst the general population. Despite strong growth in take-up amongst 55-74 year-olds however, among the oldest consumers (those aged 75+), growth mirrored that of the wider population at just 3%.

There is, however, limited evidence to identify what is driving the growth of internet take-up amongst 55-74 year-olds and how it might be most effectively encouraged.

The contribution of approaches that embrace practices concerned with lifelong learning are certainly worthy of exploration in this context. Lifelong learning involves all learning activity undertaken throughout the life course, including both formal and informal learning. Key questions concerned with lifelong learning are:

— What are the practices that enable this to flourish?

— Is there any evidence that these practices are supporting e-Inclusion in older groups?

— How is the University of the Third Age and local and regional courses for 'older' people supporting e-Inclusion practices?

— What data are there about take-up of e-Inclusion-related courses by 'older' groups of people?

Naumanen and Tukiainen (2010), considering adoption and use by older people of computers and the internet through a lifelong learning approach, argue that those over 65 years "are in danger of lagging behind" (p.273). They highlight a lack of learning culture in older people, but report positive findings from their studies that have looked at cognition and influences of contextual factors when lifelong learning approaches have been implemented in three different ways - computer clubs for older people, courses, and home teaching. Their results indicate that involvement and outcomes arise most strongly when 'informal club-based' practices are supported by peers, planned with them, and tailored to 'needs, motivation, and ability'. Shapira et al. (2007) further conducted a study that explored the impacts of a course, run with small groups of older people in day-care centres or in nursing homes, in which they learned how to operate a computer and the internet. The study involved 22 older people with a mean age of 80 years, and a comparison group of 26 older people with the same characteristics engaged in other activities. Selected tests were used with both groups to measure

physical functioning, life satisfaction, depression, loneliness and self-control, prior to the courses run, and four months after they had finished. The effects of control variables and pre-intervention differences on participants were statistically controlled. In the case of the intervention group, there was a statistically significant difference in measures of life satisfaction, depression, loneliness and self-control, but none in the case of physical functioning. Indeed, deterioration arose in the comparison group. The authors concluded that:

"Computer and internet use seems to contribute to older adults' wellbeing and sense of empowerment by affecting their interpersonal interactions, promoting their cognitive functioning and contributing to their experience of control and independence" (p.477).

Developing lifelong learning approaches in older people may well depend on a commitment or support from others beyond the population of older people. The concept of befriending is highlighted as an important factor in terms of developing supportive uses of technologies in some situations. Reducing isolation (which will be considered later in more detail) is an important driver in engaging use of social devices for technologies, but for some older people without close relatives or friends, befriending may be an important prerequisite factor. One study (Cattan, Kime and Bagnall, 2011) evaluated the impacts of a project set up by Help the Aged, in partnership with the insurance company Zurich, which funded eight pilot telephone support projects across the UK. This "low level, low cost and low risk intervention, with volunteers offering emotional support for housebound older people from their workplace or from their own home" (p.199) led to outcomes associated with important key values for the older people – "Life is worth living; Sense of belonging; Knowing there's a friend out there" (p.201). There is certainly a clear need to consider the attitudes and influence of those who work with older people in seeking to develop the wider adoption of technologies for older people. Indeed, in a study that explored general practitioners' views about adoption of a mobile distance-spanning technology, Wälivaara, Andersson and Axelsson (2011) concluded that:

Developing lifelong learning approaches in older people may well depend on a commitment or support from others beyond the population of older people. The concept of befriending is highlighted as an important factor in terms of developing supportive uses of technologies in some situations

There is certainly a clear need to consider the attitudes and influence of those who work with older people in seeking to develop the wider adoption of technologies for older people

"It is important to not only describe the care and nursing staff as barriers and gatekeepers to the introduction of new technology in health care. Caution is expressed from a professional perspective based on knowledge, ethical consideration and experience. Understanding GPs' and RNs' reasoning about the use of technology in health care must form the basis for implementing technology." (p.124)

A Joseph Rowntree Foundation report (2004), from a study reviewing uses of the internet by older people and their carers in sheltered housing units concluded that the benefits were inhibited by:

"skill shortages – most community support officers lack basic internet skills; time shortages, which impede the acquisition of online competences through routine practice at work or via specialist training. Time taken for training is time allocated for providing professional care support to older customers; the unavailability of relevant training; lack of awareness of the relevance of online information services to the provision of care support. A work culture of using online facilities does not currently exist in the care sector." (p.4)

Godfrey and Johnson (2009), reporting a study that looked at older people's access to information on the internet, found that informal networks can be supported effectively by involving 'technology literate mediators' in seeking information, giving advice and advocacy. The authors emphasised the need to involve mediators when designing information and support systems. They suggested using digital 'circles of support' for social networks, where mediators can collaborate with others both to create and to share material that is self-authored.

Intergenerational learning

Some uses of the internet by older people are associated with aspects of intergenerational learning. As stated in a report by Age Concern and Help the Aged (n.d.):

Informal networks can be supported effectively by involving 'technology literate mediators' in seeking information, giving advice and advocacy

"Despite a low level of understanding about how the internet works, knowledge of its potential benefits is surprisingly high. Some are already accessing these benefits indirectly through friends and family using the internet on their behalf." (p.6)

The report went on to note that most older people gained their knowledge of what the internet does from their children/grandchildren and/or partners and from watching them use the internet for certain functions.

While there are some good examples of intergenerational learning practices that have supported the older group in developing uses of the internet, unless sensitively approached, younger people can also inhibit older people's learning in relation to technology. For example, the Age Concern and Help the Aged report noted that participants' inability to use a computer or the internet can make them feel embarrassed in front of others – particularly those younger family members who may be impatient at this lack of knowledge. This is exacerbated by a sense that, being older and having had more 'life experience', the older person should somehow **know** how to use it – a sentiment that is particularly prevalent among those in their mid-years (55-64), who feel that they should already have learnt how to use it.

In relation to intergenerational learning, some key questions remain:

– What are the practices that enable this to flourish?

– Is there any evidence that these practices are developing with regard to supporting e-Inclusion in older groups?

– Is there evidence of impacts and influences of children on parents, or on grandparents, or on great grandparents?

While there are some good examples of intergenerational learning practices that have supported the older group in developing uses of the internet, unless sensitively approached, younger people can also inhibit older people's learning in relation to technology

Barriers and challenges

What are the major barriers and challenges to increased uptake and usage of technology and the internet? Can training and support help?

While the numbers of older users of the internet are increasing over time, some barriers still remain. In this section we draw on the research evidence to discuss these barriers and challenges. Blaschke et al. (2009) point to five main sets of barriers:

1. age-related issues: such as impaired vision, problems with manual dexterity and mobility, memory and cognition challenges, and limitations with activities of daily life (Czaja and Lee, 2003)

2. the characteristics of existing technology: including complex screens and small print, a standard computer keyboard format, usability issues with system designs, computer jargon, and the fact that some technologies are complex to use or simply do not work well (Melenhorst et al., 2001)

3. attitudinal issues: particularly lack of recognition of any perceived benefit; the belief that technology is 'dangerous', expensive, complicated and difficult to learn; combined with low confidence in their ability to handle computers (Eastman and Iyer, 2004; Marquie et al., 2002; Selwyn, 2004)

4. training and support issues: including financial barriers to accessing training and the absence of training opportunities – particularly those with suitably qualified trainers who are sensitive to the needs of older people; and adequate support for the learning process. There is also recognition that frail older people will need considerably more support than younger, more physically able older people (Eastman and Iyer, 2004; Irizarry et al., 2002; Osman et al., 2005)

5. cost issues; for example, a survey reported by The Economist (2008) noted that in only 44 out of 70 nations studied did the cost of monthly DSL (Digital Subscriber Line or the high-speed internet) access amount to 2.5% or less of the median household income, the point considered 'affordable'.

One study exploring factors affecting computer and internet adoption and usage amongst older people in Bahrain further noted that previous experience, motivation, and

computer anxiety were the most critical factors influencing acceptance and use (Al-Ammary, 2010). But as Age Concern and Help the Aged (n.d.) note:

> **"There is wide variation in the extent to which people are interested in using the internet. The digitally excluded are more open than the digitally dismissive, as might be expected. Among the dismissive, there are a minority of 'refuseniks' who feel very strongly that the internet is not for them and would be unlikely to be persuaded otherwise." (p.6)**

Knowledge and skills

It is important to understand the range of knowledge and skills that older people have in relation to uses of technologies – including concerns and issues focused around 'fear of the unknown'. Research evidence suggests that the main barriers to use of computers and the internet by older people appears to be a lack of understanding and confidence in 'how it works'. Older people can struggle to understand how to use the actual equipment and need explanations about 'what to press and when'. As suggested above, some older people also express fears and anxieties that they might 'do something wrong', as well as having concerns about the security of the internet (Kanter and Rosenbaum, 2003; Age Concern/Help the Aged, n.d).

It has been suggested that for some older people, the skills and knowledge gap in relation to the internet may be contributing to inertia (Age Concern/Help the Aged, n.d). For example, some participants maintained that they had never even seen anyone use the internet, whilst others had no experience of typing or word processing. However, as an Ofcom (2010) survey conducted in 2009 noted, of those internet users aged 65 and above, the vast majority (74%) felt confident in using the internet, whilst only 14% were not confident users. The remainder felt neither confident nor lacking confidence, with only 1% maintaining they did not know.

Research evidence suggests that the main barriers to use of computers and the internet by older people appears to be a lack of understanding and confidence in 'how it works'

Other research examining aspects of ICT-related training for older adults has been far more positive, suggesting that older adults are open to learning new ICT tools and perceive them as having positive benefits (Campbell, 2004, Clark and Straka, 2000; Namazi and McClintic, 2003). Older participants within these studies however, did acknowledge that they may need additional practice and support (Nair et al., 2007).

Dickinson and Gregor (2006) point out that positive and negative impacts are generally tied to the training and other social and interactive aspects rather than the technology itself. Furthermore, because the technology and how it is used can vary considerably (including the nature of training, length of time available, and location), drawing general conclusions is problematic.

In thinking about these issues it is also important, of course, to ask what kind of ICT skills older people require. The current focus on the supply of e-Skills through targeted digital literacy projects needs to be accompanied by a suitable assessment of the demand side for such skills. In particular, Cullen et al. (2007) point to the particular effectiveness of assessments that take a bottom-up approach for 'hard to reach' groups. In developing training that is appropriate and relevant, Oinas-Kukkonen et al. (2010) further argue that end-user training needs to be considered and integrated when systems are being developed, if such training is to be fully effective.

A number of projects have been set up by statutory and voluntary organisations that are designed to develop older people's skills in using the internet, such as the Edinburgh-based 'Moose in the Hoose' project designed to increase e-Inclusion for older people attending day centres and living in residential care homes.

Dickinson and Gregor (2006) point out that positive and negative impacts are generally tied to the training and other social and interactive aspects rather than the technology itself

Vignette four
The Moose in the Hoose project

ACE IT Computer Training in Edinburgh has introduced this project, aimed "at introducing the benefits of computers and the internet to those living in Care Homes and attending Day Care Centres across Edinburgh." Half-day training courses are run for organisations who work or volunteer with older people. The training courses are designed to allow volunteers to develop skills using Skype, webcams and creating life story books. The volunteers are then placed in existing care homes and work with older people to reduce their social isolation by using email and the internet. Currently volunteers are working in seven care homes.

Internet safety

As already noted, some older people have concerns about internet security, internet safety and the uses of technologies (Age Concern and Help the Aged, n.d.). In particular concerns about internet fraud have been raised, largely based on feedback from friends or family or having read such stories in the press. Combined with the lack of understanding and confidence about how the internet 'works', this can contribute to feelings of vulnerability and anxiety in using the internet. These concerns were clearly evident in Phang et al.'s (2006) study of older people's (aged 55 plus) responses to using online banking. Perceived usefulness, perceived ease of use, and perceptions of internet safety were all significantly related to the participants' intentions of whether or not to use the system. While this study was not undertaken in the UK, it seems evident from the literature that older people in the UK can experience similar concerns over web safety, and that this clearly relates to the need for greater knowledge and skills in using the internet in order to increase their confidence in both themselves as internet users, and in the internet itself.

Perceived usefulness, perceived ease of use, and perceptions of internet safety were all significantly related to the participants' intentions of whether or not to use the system

Setting up specific sites that eliminate or reduce certain risks can be a useful way forward. Some older people might find it easier to engage initially with sites that offer such facilities. Gaining experience from interactions in such sites might then give increased confidence to support engagement with accessing and using other sites. Saga Zone, set up by the well-known company Saga, is one such site (see Vignette 5).

Vignette five
Saga Zone

The intention and ethos of Saga Zone is set out on the forum page: "Here you'll find a lively host of people to talk to online about a huge range of interesting subjects. Simply click on a forum to join in. Do remember our values: always be friendly, courteous and polite – and be respectful of others even if we have different views. We all want Saga Zone to be a friendly place." The section on terms and conditions of use states more clearly how the site is set out to provide a service with some levels of web safety: "The Service is provided by us free of charge for anyone aged 50 and over and who has properly registered with us online. By using the Service or the Site, you represent and warrant that you are 50 or older and that you agree to and abide by all of the terms and conditions of this Agreement, the Privacy Policy and House Rules. No fee will be charged for the Service: no fee will be required to find and contact other users. The efficiency of this free Service will be enhanced by your willingness to contribute details about yourself as well as about your interests in specific areas of the site upon registration and your willingness to participate in user generated activities and exchange. However, this Service does not give you free access to other users' email addresses, as all addresses are kept confidential and mail between users must be routed via our site."

(Further details can be found at: **www.sagazone.co.uk/forums**)

Cost and accessibility

Older people raise concerns about both the cost and accessibility of technologies. Age Concern (2011) point, in particular, to issues of accessibility and mobile technologies, noting that:

> **"At the moment many older and disabled people have trouble using mobile phones and levels of mobile take-up are substantially lower among these groups; this places them at a significant disadvantage in a society increasingly reliant on mobile services." (p.4)**

In part this may be due to design issues that are not conducive to those with sight or hearing impairments or those who may have difficulty working with small devices due to physical conditions such as arthritis that are more prevalent in older age.

While the use of email has not been identified through survey returns as an area where there is a recognisable digital divide between younger and older people, this is clearly not the case with regard to mobile phones. There are a number of factors that are known to influence this; in part this is linked to income disparities and socio-demographic patterns of use. ONS (2004) reported, for example, that ownership of mobile phones varies with age. Whilst nearly 90% of people between the ages of 15-34 owned or used a mobile phone in February 2003, this proportion declined with age. In the same period, less than a quarter of those aged 75 and over owned or used a mobile phone. However, in the two year period between 2001-03, the largest increases occurred among the older age groups; the proportion of people aged 75 and over owning a mobile phone nearly doubled. Mobile phone ownership, however, is also affected by income. Ownership within households in the middle income bracket (£17,500 to £30,000 a year) has increased the most in recent years and in February 2003 people in this income bracket were as likely as people in households in the high income bracket (over £30,000 a year) to own a mobile phone (88% and 90% respectively). Those with lower incomes (less than £17,500) are much less likely to own or use a mobile phone (62% in February 2003). The importance of this factor was confirmed by a recent ONS report (2010a) that noted that:

"Adults without an internet connection at home are more likely to be older (particularly those over retirement age), have no formal educational qualifications or have lower annual household incomes." (p.3)

However, the Age Concern and Help the Aged (n.d.) report has suggested that cost is not always the most dominant factor, and whilst affordability may be an issue for those with the lowest incomes, some older participants in their research noted that the price of computers and internet packages has come down. This infers that accessibility to mobile technologies and the internet may now be less about cost than other barriers.

Usability

Older people raise different issues and concerns with regard to 'usability' of technologies. How 'usability' for older people is perceived by the retail world appears, in some cases, to be an issue itself. The ways that older people's skills might be supported, or, indeed how they might be more directly and actively involved in addressing these issues, are separate as well as related factors. When older and disabled people are looking for a mobile telephone, they can have limited knowledge about what usability features are available and may not know what to look for. While some older people use the internet for information when looking for a new telephone, it is clear that the searches they describe do not go much further than identifying the main retailers (Age Concern, 2011). As noted above, information on usability is not always available or easy to find on websites. Further, only one mainstream retailer, Orange, stocks mobile telephones that are specifically designed for older and disabled people (the Doro). Finding information on the full range of telephones specially designed for older and disabled people is thus hard to access. One further problem identified in the Age Concern report is that older people often consider these difficulties as being their fault rather than them being due to poor telephone design or poor accessibility to information. This means they are unlikely to spend time seeking a more suitable telephone, and are likely to believe there is little difference between telephones.

One further problem identified in the Age Concern report is that older people often consider these difficulties as being their fault rather than them being due to poor telephone design or poor accessibility to information

Omori et al.'s (2002) study comparing a number of features of use of mobile phones across a range of ages, concluded that visual functions and a short vertical length of characters displayed on screen were related both to slow reading speed and increased numbers of errors. Fezzani et al. (2008) further looked at the impacts of motor difficulty amongst older people when pointing with a wireless pen on a digitiser tablet, concluding that ease of use of a pointing device is an important factor for older people – one that impacts cognitively as well as on their motor processes. They concluded that to address these issues, the size of active objects on an interface needs to be accommodated by designers without fail, so that screen resolution offers the highest possible clarity. The need to identify the changes that can be made to the design and function of mobile phones to make them both more appealing to mainstream users, whilst at the same time increasing their usability for older and disabled users (hence increasing uptake), was emphasised in a recent report from the Communications Consumer Panel (2011). This report raised a number of specific points that manufacturers should take on board, including: providing grip points on slider and flip telephones to make them easier to open; ensuring icons and on-screen instructions are clear and intuitive; ensuring keys used to orientate menu structures are differentiated from number keys (for example, through shape, texture, and/or colour); avoiding the use of red for highlighting things on the screen; ensuring that on/off buttons are large enough to press easily and are either not flush to the casing or are distinguishable from the casing by colour; providing an option to scroll extra large text; ensuring markings on charger heads clearly indicate which way they should be orientated; and providing clearly written instructions in plain language (p.38).

This evidence all points to a clear need to engage key stakeholders in the design process at an early stage in order to address the accessibility of information on mobile technologies, as well as the usability of these devices. With all projections pointing to a rapid increase in our older population, developers and retailers need to recognise the importance of this growing body of consumers and work with them to fulfil their needs.

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With all projections pointing to a rapid increase in our older population, developers and retailers need to recognise the importance of this growing body of consumers and work with them to fulfil their needs

Memory loss in older age

In this section we address the ageing process and memory loss, and the implications for the use of technologies. Supporting older people who are experiencing memory loss has been the development focus of a number of technology-based projects. Some technologies do not involve any, or much, direct use by older people – for example, tele-care monitoring systems such as wireless sensor networks (Yan et al., 2010); in-home intelligence systems (Zhou et al., 2011); or GPS tracking devices designed for those with cognitive impairments (especially dementia) (Landau et al., 2010). There is much debate about the ethics of this kind of surveillance monitoring device, the potential to further isolate older people, and who these services are actually designed for – for example the older person with dementia, the family caregiver or clinician (Milligan et al., 2011). Indeed, in some mainland European countries (for example Denmark) such devices can only be purchased as private systems as they are deemed by government to contravene basic human rights. Interestingly these views vary across the EU, with the UK taking a less stringent stance on this. Vignette 6 outlines a project that has developed a technology to support older people with 'navigation points' or 'alerts' across the day using a form of global positioning system (GPS) device fixed within a mobile telephone to help track individuals with dementia. Although this is a tele-care device, it involves more direct use by older people, and has the potential to support a range of experiences and skills that have wider applications in accessing technology.

Vignette six
CogKnow

This project, sub-titled 'Helping people with mild dementia navigate their day', was initially funded by the EU. It ran between September 2006 and August 2009. From the project, Cogknow Day Navigator has been developed, which is described as "a complete assistive system for persons with mild dementia, to be launched 2011 in Europe via a partner network in each country. Its functions are based on a scientific inventory of the top priority unmet needs of persons with dementia and extensive field testing with users in Sweden, The Netherlands and Northern Ireland."

(Further details can be found at: **www.cogknow.eu**)

There are technologies currently under development to support those with memory loss and which enable and encourage social interactions. The technologies rely, however, on interactions with those who are involved in care, rather than necessarily supporting social interactions for older people themselves. Vignette 7 exemplifies this point.

Vignette 7

ISISEMD - Intelligent System for Independent living and SElf-care of seniors with cognitive problems or Mild Dementia

This EU-funded project states that it "will provide a pilot for a set of innovative, intelligent, scalable services that will support the independent living of elderly people in general and in particular the group of elderly people with cognitive problems or mild dementia." The pilot will involve 80 senior citizen homes, in four countries (Denmark, Northern Ireland, Finland, and Greece), with 20 senior citizens from each home, in addition to 20 relatives, and 10 professional care givers. It is stated that services to be deployed are: "intelligent scalable supporting services, within the home in the context of ambient assisted living for the elderly or those with pre or mild dementia; networking technologies, aimed at achieving communication between in-home sensors, devices and terminals; context-aware technologies, including perceptual processing, wearable computing and techniques involving the collection of local-environment data; ambient, context-aware service integration, including home control, the monitoring and recognition of user activities as well as services facilitating communication with friends, relatives and caretakers; user-friendly interfaces including capabilities for natural interaction; and intelligent additional services for relations and caregivers, aimed at keeping relatives informed about the activities of their loved ones and alerting care-givers in case of emergency."

In a review of applications of smartphone technologies to support older people with Alzheimer's disease, Armstrong et al. (2010) called for more research and development work into specific functions, such as: memory aid, reminiscence, exercise diary, directions and locator, medication reminders, medication diary, relaxation aids, activity monitoring, activity assistance, social networking, and personal organiser functionalities. Others, such as Mihailidis et al. (2010) have explored how technologies might be developed to support new forms of support for those with dementia. Drawing on data from a survey of 133 art therapists, the researchers were able to conclude that technological solutions provided

"an acceptable and viable option for the promotion of engagement in therapeutic creative activities by older adults with dementia. From the survey it was identified that this new technology should focus on painting and drawing activities, as these were the creative activities that survey respondents felt older adults with dementia would enjoy the most." (p.299)

Based on these conclusions, the research team have gone on to develop three different prototypes that would support their use as art therapy devices.

Communication

To date, there is little evidence that communication about technologies and their uses has been specifically targeted at older people. Indeed, in a study exploring ways that older people use strategies to find information on websites, Curzon et al. (2005) concluded that features and design of interfaces needed not only to complement strategies that older people already use, but also to use landmarks to a much greater extent. Six years later, older people continue to raise concerns about the internet and the ways that its uses are communicated to others, as well as the forms of interfaces provided for public services. In part this can be created by the retail environment itself, which can feel alienating to older and disabled consumers (Age Concern, 2011). These environments are often seen by older people as being geared towards the young and technically proficient; retailers can be perceived as being unlikely to have the time or inclination to explain the basics to the uninitiated. Age Concern and Help the Aged (n.d.) have suggested actively promoting the relevant benefits of computers and mobile technologies to older people, potentially as part of a broader awareness campaign. Having marketing materials designed for the appropriate age group has also been highlighted as an aspect to consider:

"Responses to the 'vox pop' DVD of older internet users shown in the groups suggest that role models could play an important part in building confidence and enthusiasm." (p.7)

To date, there is little evidence that communication about technologies and their uses has been specifically targeted at older people

Drivers and influences

What factors are driving the increased usage of some applications and areas of technology and the internet? How can official agencies influence e-Inclusion through policies and the implementations of supportive practices?
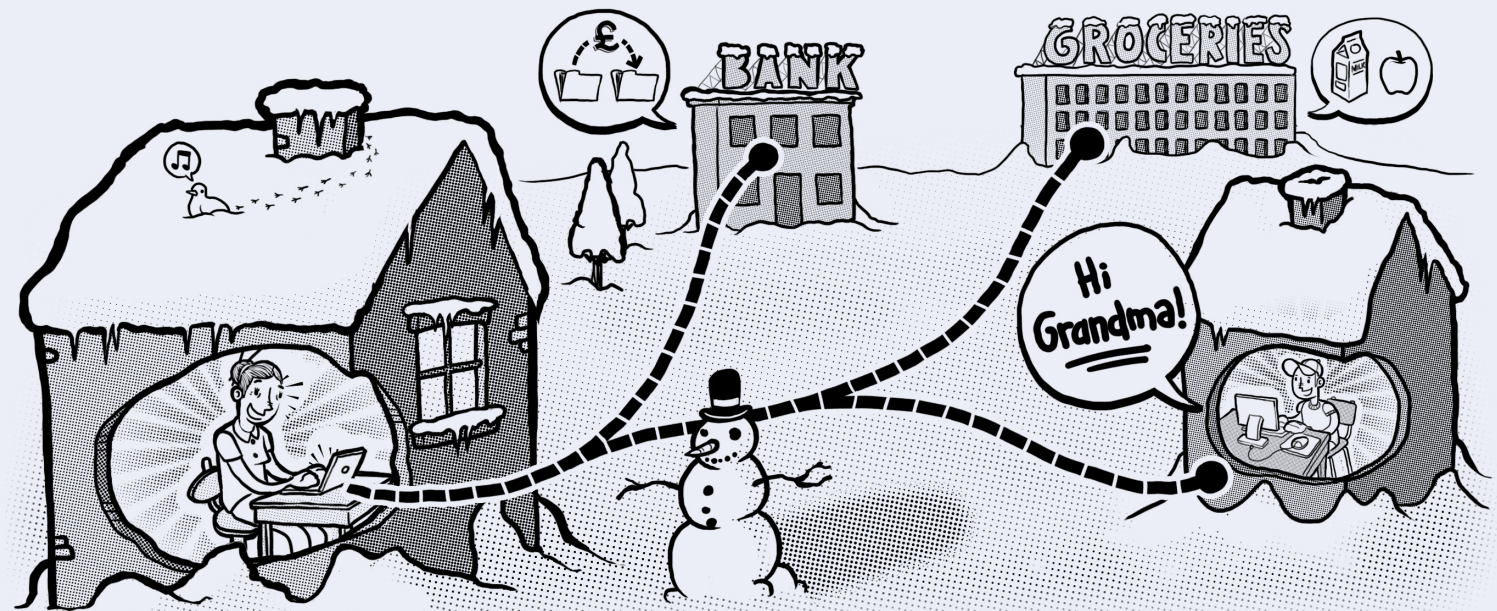
Inclusion, independence and empowerment

Uses of the internet by older people are clearly increasing in terms of some applications and areas, and in this section we consider some of the factors that are driving this shift. These drivers include empowerment, the use of social learning environments, and communication, and are as important to older people as they are to any group of the population. In a review of research on the use of ICT, Blaschke et al. (2009) noted that the evidence suggests that ICT may positively impact on the quality of life for older people by improving social support and psycho-social wellbeing (see also Eastman and Iyer, 2004; Adler, 2006; Czaja and Lee, 2003; White et al., 2002). For homebound older people, internet access can improve connections with the outside world and help them gain a level of independence, and avoid or reduce feelings of social isolation (Bradley and Poppen, 2003; White et al., 1999).

Evidence presented by researchers, policy makers and practitioners indicates that factors such as isolation, low mobility, being home-bound and in care homes can impact and influence both internet adoption and use in varied ways. Being able to use the internet to gain contact with others and to address situations that would otherwise lead to levels of isolation does appear to influence engagement with technologies by some older people. Research by Age Concern and Help the Aged (n.d.) indicates that there are some critical junctures and circumstances that can trigger older people's use of the internet. Examples include taking up a specific interest or hobby, entering retirement, becoming housebound, losing a partner or having friends or relatives move abroad.

Aspects of distance and supportive learning in this context are important. As noted above, in the UK, more than half of all women aged 65 and above live alone. The figure for men is substantially lower at around 25% or less. These statistics suggest that there is perhaps an issue around gender, older people and their responses to independence and to isolation that e-Inclusion and technology might help to address.

Whilst older people may well be familiar with the benefits that the internet and computers can offer, their understanding of how they work is often very low. Mikkonen et

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al. (2002), for example, found that while most older people are ready to accept new forms of mobile communication services, ease of use and actual need of the services are important criteria for acceptance. Hence they note that older people are prepared to use these devices as long as they facilitate their ability to live independently. The examples of most frequently mentioned uses of the internet and computers cited in Table 4 (page 40) and Table 5 (page 46) clearly relate to practices that are likely to support independent living. Triggers for engaging with specific uses of the internet included: being introduced to the internet while still at work or at the point of retirement; incurring health or mobility issues; family moving away; and loss of a partner. These triggers and uses clearly relate to older people's desires for empowerment and independence and/or avoidance of isolation.

Some research studies have looked specifically at uses of the internet that empower older people in terms of addressing aspects of isolation. Feist et al.'s (2010) study of older people (aged 55+) living in rural Australia, for example, concluded that new technologies hold real potential for increasing connectedness for older rural people. An earlier study by Gilly and Zeithaml (1985) also concluded that consumer-related technologies such as scanner-equipment in grocery stores, electronic funds transfer, automated teller machines and custom telephone calling services held real potential for empowering independence amongst older people.

internet access can bring particular benefits to older people not only by reducing social isolation, but also by increasing access to cheaper goods and services and providing more opportunities to support their ability to live independently. Despite this, as already noted, older people remain the largest group without access to the internet at home. With home internet access increasingly ubiquitous (currently present in 73% of households), it is likely that those who do not have access will suffer growing economic disadvantage. For example: it is cheaper to pay bills online; many retailers will only deliver items that have been bought online; and an increasing number of companies only give their website or email address as a method of contact. As noted on pages 29 to 30, older people are most likely to be amongst some of the poorest members of our society – with older women being particularly disadvantaged, so unless the age gap in access and ability to

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use the internet is addressed, older people are likely to suffer growing economic disadvantage.

Being able to support older people with ICT effectively clearly depends on our understanding of their needs in terms of empowerment and maintaining independence, as well as on the potential that technologies can afford. Vignette 8 provides an example of a project that is seeking to create overviews that will support these forms of actions.

Vignette eight

BRAID - Bridging Research in Ageing and ICT Development

This EU project is running from March 2010 to February 2012. Its aim is to: "develop a comprehensive RTD roadmap for active ageing by consolidating existing roadmaps and by describing and launching a stakeholder co-ordination and consultation mechanism. It will characterise key research challenges and produce a vision for a comprehensive approach in supporting the wellbeing and socio-economic integration of increasing numbers of senior citizens in Europe."

Impacts or influences of government departments and partnerships

Official agencies can influence internet usage and adoption, both through an implementation of practices concerned with policy and support, and the establishment of support workers or champions in this area. Indeed, as discussed in the section on 'Our ageing society', not only are the UK and EU governments playing a key role in motivating and enabling older people to use computers/the internet, but so too are the private sector and third (non-profit) sectors. The Race Online partnership in the UK is a clear example of this.

Warman (2010), in a Daily Telegraph article, referred to the importance of national policy in influencing and moving forward actions to address aspects of the digital divide in

Official agencies can influence internet usage and adoption, both through an implementation of practices concerned with policy and support, and the establishment of support workers or champions in this area

relation to older people, and to the role of key individuals such as the UK Digital Champion, noting that:

> "Nearly half of the over-75s reported difficulties in using computers and mobile phones, while a third of 65-74 year-olds said they too struggled with mobile technology. The number of broadband connections in Britain grew by 3% in the last year, but by 9% among 65-74 year-olds and 8% for over-75s. Nearly one in six, however, still say they do not intend to get web access in the next year. A fifth said the same in 2009." (reported 8th December 2010)

In the same article, Helena Herklots, Services Director at AgeUK, noted that "digital inclusion has a key role to play in battling social exclusion." Further, in highlighting the huge range of benefits to older people in using the internet, the UK Digital Champion Martha Lane Fox has urged younger people to help older friends and relatives to get online. This highlights the importance of promoting intergenerational learning and working in relation to e-Inclusion for older people, but we would emphasise the caveats to this noted on page 53-54.

Co-ordinating (and sharing) support for research and development in this field, at national, European and wider international levels, could clearly have important implications and outcomes. The EU Capsil project (International Support of a Common Awareness and Knowledge Platform for Studying and Enabling Independent Living) that ran between January 2008 and December 2009, recognised a general desire across Europe and beyond to help older people remain independent for a longer time. However, they also recognised that while many ICT solutions are being developed within the EU, USA, and Japan, they tend to be fragmented and heterogeneous. The Capsil research team thus pointed to the need for closer working relationships between universities and industrial partners at an international scale in order to maximise knowledge exchange and opportunities to develop appropriate technical solutions to support independent living.

This highlights the importance of promoting intergenerational learning and working in relation to e-Inclusion for older people, but we would emphasise the caveats to this noted on page 53-54

Impacts or influences of regional, local or third sector support and partnerships

The evidence that does exist about the current involvement and influence of regional and local groups reveals a patchy picture, as, indeed, a review of good practice in supporting older people to engage with and use computers and the internet to address social isolation. Independent Age (n.d.) found that not only was provision patchy, but projects were often short-lived. Further, projects tend to focus on getting older people online rather than providing them with ongoing support to stay online. The report further noted that there were very few examples of projects with a specific focus on using technology to address social isolation, though it identified four examples of sustained good practice – Digital Unite, CareOnLine, INtouch Kirklees and Angus Gold (the latter three are all public sector projects, although Angus Gold started life in the voluntary sector). The report went on to say that while local authorities and primary care trusts in the UK were making significant investments in technology, few had made the connection between access to technology and the broader issue of helping older people stay healthy, happy, independent and engaged in society (p.7). With the exception of tele-care, local authorities appear to be at an early stage in their thinking about older people and the supportive roles and uses of technology. Birmingham City Council, for example, in their 2010-26 Commissioning Strategy consultation document, plainly states their intention for:

> **"The development of a programme of information and access to affordable IT equipment and training for older people." (2009, p.12)**

The current lack of any coherent picture of local authority and voluntary sector provision suggests that a wide review at this level could provide useful insights for future developments in policy and practice.

Perhaps one of the most significant partnerships focused on e-Inclusion in the UK is Race Online – a partnership between the state, private and third (voluntary and community) sectors (see page 24-26). Active encouragement of third sector participation in these types of partnerships has historically been very effective in reaching out to

Projects tend to focus on getting older people online rather than providing them with ongoing support to stay online

excluded groups (Cullen et al., 2007). The take-up of internet access and usage by older people can be affected by actions of both local and third sector organisations and partnerships (see example in Vignette 9). This can include the implementation of practices concerned with self-help and workshop groups, and the provision of local training and awareness raising events. Third sector organisations can be critical in this respect. AgeUK for example, notes in its policy statement that it is committed to supporting and championing the effective use of technology by older people in ways that meet their needs, capabilities and aspirations. In doing so, it is committed to ensuring that technological progress does not exclude or magnify the existing exclusion of many older people. In its response to the Preparing for Old Age enquiry, Independent Age, also emphasised the potential role of technology in promoting inclusion amongst older people, though cautioned that not all older people could afford internet access or wanted to engage with it.

Vignette nine
Leeds LinkAge Plus

As part of a national programme in England set up to test out different approaches to increasing service accessibility and 'joined-up' provision for older people, this initiative is a collaborative endeavour between the local authority, and voluntary and community organisations in the City of Leeds. Leeds is an ethnically diverse city in the North of England with a population of around 700,000 people. The project was aimed at ensuring that older people have access to a range of high quality and co-ordinated services. To this end, the local authority sought to develop a digital 'information store' to act as a repository and resource for knowledge about services at local level relevant to older people. Alongside this, it sought to establish a range of mechanisms designed to facilitate access to, and use of, the store including a network of service access gateways, peer mentors and the provision of training and support to older people to act as accredited community advocates or 'infomediaries'.

The private sector too can play a critical role in supporting e-Inclusion amongst older people. Indeed, given the current and projected increase in our ageing society – not just in the UK, but globally, the private sector will have a vested interest in promoting digital literacy amongst what will be a growing consumer market. One example of business collaboration in the private sector is the Alliance for Digital Inclusion (Vignette 10).

Vignette ten
The Alliance for Digital Inclusion (ADI)

This is a collaboration of businesses, working together to promote digital inclusion. Current members are AOL UK, BT, Cisco Systems UK, IBM UK, Intel UK & Ireland, Microsoft UK and T-Mobile. It is implementing an e-Inclusion Charter, targeted at promoting e-Inclusion practices aimed particularly at disabled people and older people. The Charter aims to encourage stakeholders to sign up to and support a set of objectives and actions based on the following: "Disabled and older people should have the same rights to participate in the Information Society as other citizens. Information and Communication Technology (ICT) such as personal computers, mobile phones and interactive TV should be tools that help overcome barriers they face in education, the workplace and social life."

Source: Cullen, Hadjivassiliou, Junge and Fischer (2007)

In their research study findings, Hamilton et al. (in press) refer to the importance of different forms of sponsors, and that this can include commercial sponsors. They mention that sponsors can offer help with setting up equipment, buying equipment, offering reassurance and advice, explaining new technologies and pointing out new possibilities. They highlight that commercial sponsors can offer financial incentives as well as advice and make new technologies available, drawing older peoples' attention to new technological possibilities.

Given the current and projected increase in our ageing society – not just in the UK, but globally, the private sector will have a vested interest in promoting digital literacy amongst what will be a growing consumer market

Gaps and key issues

What do we know? Where are the gaps?

Despite the claim that ICTs for older people are 'a social necessity and an economic opportunity' (Commission of the European Communities, 2007, p.3), as Blaschke et al. (2009) note, we are still some way from knowing what types of ICT work well with what types of older users, under what conditions and for how long. The research literature provides some indications, but there are few accumulated lessons that can be generalised across age, gender and nationality groups. Despite a relatively large number of studies, they have not been conclusive, making it difficult to send a clear message to the practice community. Further, even the research that does exist faces a reality that can perhaps never be overcome – and that is that developments in technology are moving forward at such a pace that by the time adequate research evidence has been accrued, the technology will have moved on. A related issue is that as the population ages, a larger proportion of older people will have gained a familiarity with technology over the life-course, leading to a wide range of different perspectives on the value and limitations of technology in their lives.

Key Issues

– Many older people currently need more knowledge and information about ICTs and uses of the internet. Technology champions drawn from the older population have not really been identified at this time, however emerging research can inform best practice in the coaching of users.

Increasing numbers of older people in the UK are persuaded that uses of **some** online facilities are of value to them, and the numbers of older people using the internet is increasing. However, older people are mainly responding to the situation and potential opened up by others, rather than acting on it in proactive ways.

Many older people currently need more knowledge and information about ICTs and uses of the internet. Technology champions drawn from the older population have not really been identified at this time, however emerging research can inform best practice in the coaching of users.

— From the perspective of the five 'adopter categories' outlined on page 12, the point at which older people are persuaded to adopt the technologies depends on the facilities that are considered. For some facilities, such as the use of email, there is now an early majority of 'adopters', for others, such as texting on mobile telephones, there are some 'early adopters'. However, other facilities, such as setting up profiles on social networking sites still have few 'innovators'.

— The design of user-friendly technology for older people could be much further developed than it is currently. Involvement of older people in decision-making about design, directions and emphases of use and usable operational features would ascribe greater value to emerging technologies for older people. Partnerships to develop such working practices are beginning to emerge but are not common and often not long-standing.

— From the potential of a business model, we have only recently seen a more sustained promotion of technology for use by older people. Yet the ageing population in the UK not only poses a challenge, but also presents opportunities for small to medium-sized enterprises (Wolff, 2002). Importantly, however, technologies clearly need to support older people's burgeoning social needs, to empower and enhance their independence; at the same time we need to ensure that they do not exclude or drive out social aspects of involvement.

— From the perspective of the implementation pathways outlined on page 13-14, older people's concerns lie in two main areas: social activity (what the technology is used for, who can be contacted and how they will be involved); and cultural (how it works to support the needs of specific groups of older people). While the technical area (operational factors) can still present a range of barriers for some older people, the political area (values and other stakeholder influences) is of only limited concern to most older people, or not all.

Involvement of older people in decision-making about design, directions and emphases of use and usable operational features would ascribe greater value to emerging technologies for older people

Technologies clearly need to support older people's burgeoning social needs, to empower and enhance their independence; at the same time we need to ensure that they do not exclude or drive out social aspects of involvement

Recommendations

What are the key research questions arising from this review?
How do we move forward practically in terms of policy and
practice; and design and development?
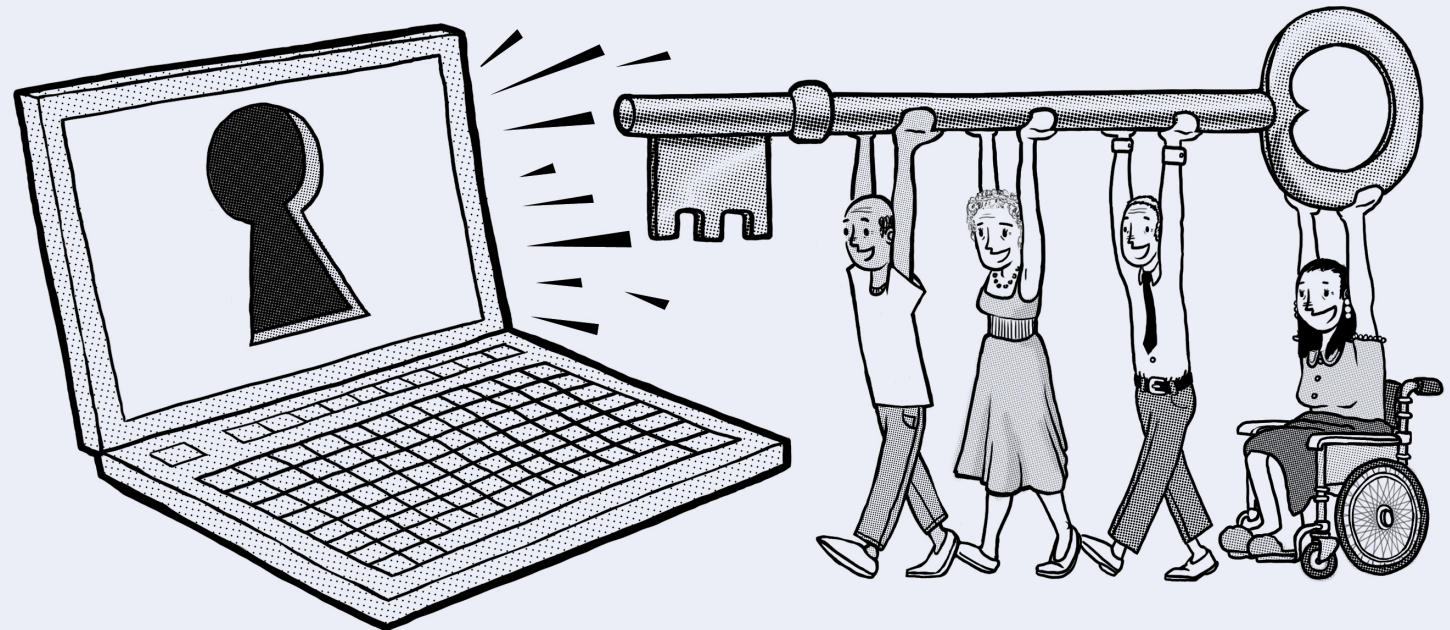
Key research questions

— Little evidence has been gathered on the particular ICT user needs of older people, so a key question is: what kinds of ICT skills do older people require? This question needs to take into account the heterogeneity of our older population, their different socio-cultural contexts, digital skills and needs.

— How do ICT skills impact on the quality of life of older people? This needs to take account of active ageing, continuing learning, social networking, as well as access to tele-health and tele-care services.

— How can we promote intergenerational learning as well as peer mentoring to support e-Inclusion amongst older people?

— How can we accurately measure the impact of e-Skills amongst older people on wider social outcomes (for example, reduced social isolation, empowerment and increased independence)?

— How can we increase the perceived relevance of e-Inclusion amongst older people?

— How can the design and 'usability' of ICT be made more appropriate for the needs of older users?

— What developments and practices exist to support older people in gaining technological skills locally, regionally and nationally?

In moving forward practically, we highlight and echo recommendations made by others.

— We need to develop and support practices that adopt practical ways of motivating and helping older people to access and use computers and the internet, including awareness-raising, training, ongoing help and subsidies to support these activities.

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– We need to support the greater involvement of older people as champions and role models.

– In an ageing society, designers and developers need to recognise the potential of developing a market for technical products designed for older people. There are important business opportunities that have yet to be fully and effectively realised. As Kohlbacher and Hang (2011) note,

"a firm can create new opportunities for the development of disruptive innovations ... the silver market is an excellent field of application for low-end disruptions as elderly customers will increasingly demand just-good-enough performance – easy and safe to use – and affordable products and services ... new products and services they had not demanded or had not been able to demand before." (p.96)

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About Nominet Trust

The internet enables us all to think radically differently, to stimulate new forms of collaboration and to mobilise new communities of interest to take action for social good. It offers us phenomenal opportunities to inspire the creativity and compassion of millions of users in addressing social needs.

At Nominet Trust, we harness new possibilities presented by the internet to seek out, galvanise and nurture the untapped potential of grass-roots social action that empowers people to change the world and their own lives in beneficial ways.

As a UK-based social investor and catalyst, we intend to bring together, to thoughtfully invest in and to support people who use the internet to make society better.

Nominet Trust supports internet-based projects that contribute to a safe, accessible online world, which offers opportunities to improve lives and communities.

All of our social investments are informed by research into current thinking and best practice. These investments are, in turn, evaluated to identify good practice. This good practice also feeds into further research on how to advance the internet as a tool to mobilise positive social change, which subsequently informs new investments.

To find out more about our work or how you can apply for funding, please visit:

www.nominettrust.org.uk

About our work

As a UK-based social investor, Nominet Trust supports internet-based projects that contribute to a safe, accessible online world, which offers opportunities to improve lives and communities.

As such, we offer support and funding for organisations and projects working to:

Increase access to the internet – providing people with the motivation, skills and tools to get online and stay online.

Improve online safety – educating people about the potential risks faced from being online and demonstrating how they can avoid coming to any harm.

Use the internet for social action – promoting the positive impact of the internet on lives and communities and using it in imaginative ways to address specific social problems.

Do you need support for your idea?
If you have an idea for a new initiative or would like support for an existing internet project then please get in touch.

We are particularly interested in initiatives that develop tools or models that can be replicated or scaled-up to benefit others.

To find out more about how you can apply for funding, visit us at:

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