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Ageing well in the Information Society

An i2010 Initiative

Action Plan on Information and Communication Technologies and Ageing

{COM(2007) 332 final}

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1. EXECUTIVE SUMMARY

This paper supports the Communication on ICT and ageing ("Ageing Well in the Information Society in Europe"), which presents a response to the **Riga e-Inclusion Ministerial Declaration** and the **Communication on the Demographic Future of Europe.**

It is a huge success of science, health and social care that Europeans are getting older. At the same time, the ageing society poses significant challenges to Europe's economy and society.

Firstly, at the **individual** level these challenges include to enable older people to continue participating in and contributing to economic and social life – where they wish to do so – and to reduce social isolation and exclusion. Europe can much benefit from the knowledge and experience of elderly people, even more so in a knowledge society.

Secondly, for **economy and society at large** the challenges include containing the rising cost of care, while safeguarding the quality of social and health care and respect for human dignity, improving services by better integration and innovation. The economic challenges also includes keeping people productive in work when getting older, in view of the rising dependency ratio.

Thirdly, for **businesses** the challenges include better understanding user needs and adapting design and marketing to the requirements of elderly people, in order to unlock the market potentials, not only in Europe but increasingly globally.

The information society policy can contribute to dealing with ageing as a **social necessity and as an economic opportunity**. Elderly people have a large buying power with persons over 65 representing some 20% of GDP. However, they also still have a low participation in the information society with only 10% of persons over 65 having Internet access. Age also often comes with some form of impairment where technology either can be a help or a barrier.

The information society should enable older people – where they wish to do so - to fully participate in the society and the economy and to be active and empowered citizens and consumers, thereby contributing to a positive perception of ageing in Europe.

Three life situations – possibly present at the same time - are addressed in this paper:

- active ageing at **work**: staying longer active and productive in high-quality work

- daily life at **home**: living longer an independent and healthy daily life
- being a member of the **community**: continuing to participate actively in society.

The paper analyses the individual, larger-scale economic and social aspects, and the business dimensions of ICT and ageing and suggests a range of policy responses in the form of an **action plan** to overcome regulatory, technical, skills and other barriers and to fully exploit the opportunities in ICT and ageing in Europe. These actions are suggestions for the **i2010 flagship initiative** "on caring for people in an ageing society addressing technologies for wellbeing, independent living and health", announced in i2010, or for short "the i2010 initiative for ageing well in the information society", and as the first major contribution to the 2008 EU e-Inclusion Initiative. Actions are suggested in 4 inter-related areas:

(1) Raising awareness and building common strategies, including cooperation in a partnership for innovation with stakeholders, awareness raising events, benchmarking exercises and Ministerial level exchanges under forthcoming Presidencies.

(2) Putting enabling conditions in place including the assessment of regulatory options to overcome fragmentation in reimbursement of ICT solutions for ageing; interoperability in eHealth; and raising skills in age-friendly design and accessibility of ICT;

(3) Promoting widespread take-up by good practice exchange and demonstration trials of independent living in smart homes, telecare for chronic diseases through the Competitiveness and Innovation programme, pilot projects by regions a.o. using Structural Funds for, and innovative public procurement contributing to user acceptance, interoperability, viable business models and sustainable large-scale implementation;

(4) Preparing for the future by significantly stepping up joint research and widely disseminating research results, including the launch of the new 7th Framework Programme Article 169 Assisted Living Initiative and strengthened involvement of European Technology Platforms.

ICT and Ageing at a Glance

Demographics and macro-economic change

- Europe's society is ageing. By 1995 70 million people over the age of 60 were living in the EU, almost 20 % of total population. By 2020, this figure will rise to 25 %. The number of people over 80 years of age will more than double.
- 55 of 211 regions of the EU-15 already saw a fall in population during the second half of the 1990s. This is also the case in most of the regions of the new Member States (35 out of 55 regions), because of natural decrease and net emigration.[2]
- Age related spending will rapidly rise. Spending on pensions, health and long-term care will increase by between 4 and 8 % of GDP in coming decades.

- In many cases, disability affects large parts of society and the elderly cohorts. 21% of persons over 50 experience severe vision, hearing or dexterity problems.

Market opportunities of ICT for ageing – considerable and growing

- Persons over 65 possess wealth and revenues of over 3000 B€. In Germany, the 50+ generation (30 million people) have an income of 643 B€ p.a., 30 B€ more than those 30-50 years old.

- A tripling of the market for smart homes applications between 2005 and 2020, from 13 million people up to 37 million (applications to cope with reduced mobility or age-related impairments to assist in shopping, dressing, moving independently)[1].

- 68,5 million people in 2005 with several forms of age-related impairment, growing to 84,3 million in 2020;

- In the Netherlands alone, seniors would spend €500 million per year above what they are currently spending if targeted by appropriate products and services.

- One of the largest UK retail companies, Tesco, spent €50,000 on creating a more accessible website. That small investment has opened up an untapped new market of 1.9 million customers with a return on investment in excess of €2 million.

ICT can help to contains the costs of care

- Early patient discharge from hospital due to the introduction of mobile health monitoring would save €1,5 billion for Germany on a yearly basis[2].

- In the UK tele-care technology has been shown to significantly reduce the gross annual cost of care: institutional care costs £ 21.840 per place, while tele-care supported living costs £7.121 including 24 hours response and ten hours of care[3].

ICT for social inclusion of elderly persons

- ICT for social contacts and community participation becomes increasingly common (email, phone or video calls, online communities) but elderly people still tend to lag behind. By doubling their Internet use from the current 10% for persons over 65 and by easy and accessible technology and services (e.g. PC, interactive digital television, mobile phone) much can be contributed to overcoming social isolation, increasing inclusion in daily activities such as shopping, transport, leisure and for democratic and community participation.

1 European Commission - Various Studies on Policy Implications of Demographic Changes in National and Community Policies ('Walter' studies), The Demographic Change – Impacts of New Technologies and Information Society, 2005

2 http://europa.eu.int/information_society/events/ict_riga_2006/doc/presentations/ps6-saeteroey.pdf

3 Kelly 2005; Bowes and McCoghan 2002, 2003, 2005 and University of Stirling evaluating a case study on the West Lothian Home Safety Service

Once connected these groups tend to become even more intense users than others a.o. of online health and communications.

2. AGEING WELL IN THE INFORMATION SOCIETY: A SOCIAL NECESSITY AND AN ECONOMIC OPPORTUNITY

2.1.

Addressing the needs of elderly people in the information society is a social necessity. The question is not whether we have to pay for this – that is a given – It's whether we can also profit from it, making it into an economic opportunity.

A social necessity to mobilise ICT to help answering the demographic challenges

The European society is ageing[4]. By 1995 70 million people over the age of 60 were living in the Union, almost 20% of total population. By 2020, this figure will rise to 25%. The number of people of 80 years and older will more than double. These trends have several implications: there will be more older people in absolute as well as relative terms, there will be considerably more older "old" people, there will be fewer family carers (i.e. informal carers), and there will be a smaller productive workforce to contribute to the financing of health and social services.

The Union's population is set to grow just slightly up until 2025, largely due to immigration, before starting to drop: 458 million in 2005, 470 million in 2025 (+ 2%), then 469 million in 2030. Yet 55 of the 211 regions of the EU-15 have already seen a fall in population during the second half of the 1990s. This is also the case in most of the regions of the new Member States (35 out of 55 regions), due to natural decrease and net emigration[5](Annex I).

Eurostat base scenario, EU-25 (in thousands)	*2005-2050*	*2005-2010*	*2010-2030*	*2030-2050*
Total population	-2.1% (-9642)	+1.2% (+5444)	+1.1% (+4980)	-4.3% (-20066)
Children (0-14)	-19.4% (-14415)	-3.2% (-2391)	-8.9% (-6411)	-8.6% (-5612)
Young people (15-24)	-25.0% (-14441)	-4.3% (-2488)	-12.3% (-6815)	-10.6% (-5139)
Young adults (25-39)	-25.8% (-25683)	-4.1% (-4037)	-16.0% (-15271)	-8.0% (-6375)
Adults (40-54)	-19.5% (+19125)	+4.2% (+4170)	-10.0% (+10267)	-14.1% (-13027)
Older workers (55-64)	+8.7%	+9.6%	+15.5%	-14.1%
	(+4538)	(+5024)	(+8832)	(+9318)
Elderly people (65-79)	+44.1% (+25458)	+3.4% (+1938)	+37.4% (+22301)	+1.5% (+1219)
Very elderly people (80+)	+180.5% (+34026)	+17.1% (+3229)	+57.1% (+12610)	+52.4% (18187)

This trend is even stronger when just the total working age population (15-64 years) is considered: between 2005 and 2030, it is due to fall by 21 million. The demographic dependency ratio[6] will rise from 49% in 2005 to 66% in 2030**.**

Ageing societies are not only a problem in Europe but in other industrial countries as well. 1 shows the development of the average age in the word till 2050.

4 See also Annex I

5 Regions NUTS 2. Source: Third report on cohesion, February 2004.

6 The ratio of the population aged 0 to 14 and over 65 to the population aged between 15 and 64 years.

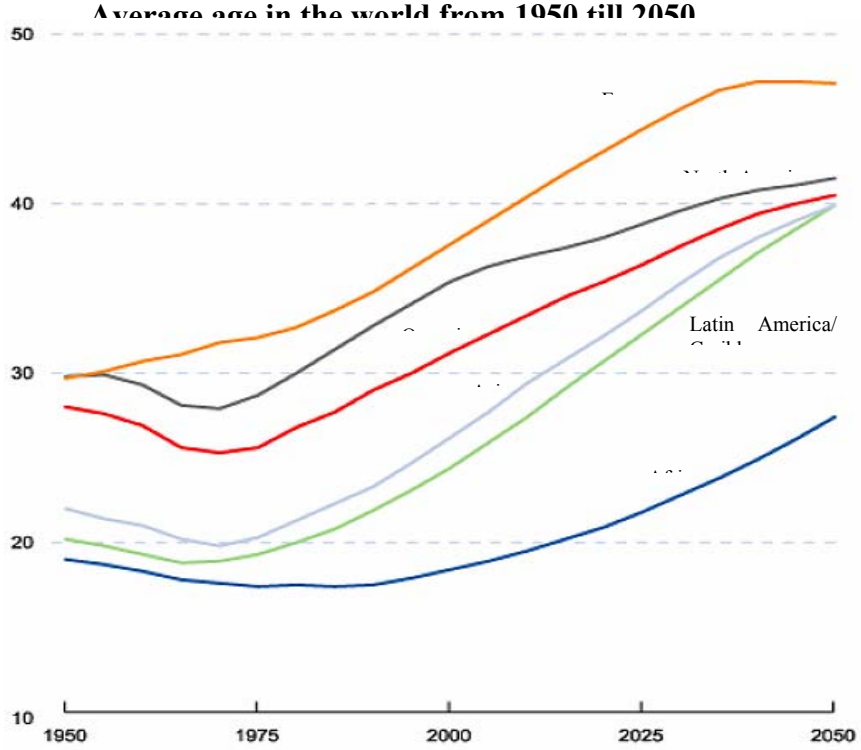

Figure 1: Average age world wide from 1950 till 2050[7]

These trends pose significant challenges to the financing and organisation of health and social care services. There will be an increased demand for social, home and long-term care services and increase in costs. It is estimated for the EU-25 that age-related public spending will rise by 3-4 GDP points between 2004 and 2050, representing an increase of 10% in public spending. In some countries 20% of the workforce would have to be in health and social care, with unaltered policies. This will be increasingly less affordable as with an overall shrinking workforce the average annual growth rate in GDP for EU-25 will fall systematically

7ZDWA: Figure of the United Nations Populations Prospects – The 2004 Revision. http://www.zdwa.de/zdwa/artikel/diagramme/20051205_17781826_diagW3DnavidW2664.php, last visited: January 2006

from 2.4% over the period 2004-2010 to only 1.2% between 2030 and 2050[8]. Such challenges have already been acknowledged in demographics policy and in health policy, as has the supporting role that ICT policy and initiatives can play to ease this situation[9],[10].

ICT can help to contain the cost of care and improve quality of life at the same time. The examples in the previous chapter illustrate this point. A specific case in point is the potential value of ICT to realise interoperable exchange of health related data between healthcare institutions. Studies[11] in the US estimated that net savings from the national implementation of fully standardised interoperability between health care providers and five other types of organisations (such as specialists, laboratories, insurance funds) may yield up to around $75 billion annually of savings, or about 5 percent of the projected $1.7 trillion spent on United States' health care in 2003. Interoperability of eHealth systems is also expected to have an impact on eradicating treatments that do not improve health status, are redundant, or are not appropriate for patients' conditions which are estimated, by other studies, at costing between 20-30% of American health care spending, or up to $US300 billion each year.[12]

2.2. The economic opportunities in ICT for elderly people

Older and disabled citizens already make up around 20% of Europe's population and represent a significant market segment. Other major countries are facing the same trends, some at the same speed, such as the USA, others even faster, such as Japan. Terms such as "silver market" or "golden market segment" have been adopted, primarily in consumer industries.

The 50+ age group has an income and wealth equal to about 1/3 or Europe's GDP, representing some €3000 billion[13]. In Germany, the 30 million members of the 50+ generation have a net annual income of €643 billion, that is, €30 billion more than the 30- to 50-year-olds[14]. According to another study[15] the current 45-60 cohorts in Germany inherited endowments in 2004 of about €200B with a significant consumer power prospected for the future. Older people therefore represent, collectively, a very important market potential. Moreover, half of older people would be quite willing to spend their wealth, provided they are properly informed about products and services that meet their needs.

The potential gains are significant. By fostering inclusion of older adults through better ICT services for independent living and active ageing at work, it has been estimated that in the USA cumulative economic benefits would amount to $620 billion during the next 25 years -

8 The demographic future of Europe – from challenge to opportunity, COM(2006)571, 12 Oct 2006.

9 COM(2004) 356 (final) e-Health – making healthcare better for European citizens: An action plan for a European e-Health Area;

10 Health Telematics Working Group of the High Level Committee on Health: Final Report, 04/2003, HLCH/2003/1/7

11 The Value Of Health Care Information Exchange And Interoperability: There is a business case to be made for spending money on a fully standardized nationwide system. by Jan Walker, Eric Pan, Douglas Johnston, Julia Adler-Milstein, David W. Bates, and Blackford Middleton – Health Affairs: Web Exclusive, January 19, 2005 (http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.10v1)

12 Wennberg, et al Geography and the Debate Over Medicare Reform, Health Affairs. 02/13/02. W96-W114; Wennberg et al Use of hospital, physician visits and hospice case during the last six months of like among cohorts loyal to highly respected hospitals in the United States. BMJ, March 13, 2004; Fisher et al The implications of regional variations in Medicare spending, Part 1: The content, quality and accessibility of care. Annals of Internal Medicine. 2003; 138:273-287; Fisher et al, The implications of regional variations in Medicare spending, Part 2: The content, quality and accessibility of care. Annals of Internal Medicine. 2003; 138:288-298

13 Silver Economy, www.silvereconomy-europe.org

14 Source: Siemens.

15 Gassmann, Reepmeyer, 2006

comparable to the federal government's expected spend on homeland security measures[16, 17] (Annex II). This would materialise through savings in delivering medical services, lower costs of institutionalized living, and additional output generated by more seniors and individuals with disabilities in the labour force. If accompanied by proactive investment in broadband infrastructure and by measures aimed at bridging digital divides, these three benefits could reach $927 billion in cost savings and output gains in 2005 dollars[18], equivalent to half of what the US currently spends annually for medical care for all its citizens ($1.8 trillion).

As regards the economic opportunity, there is also the wider recognition of the importance to mobilise ICT for healthy ageing at work. Indeed, modern economic progress has been built on good health – longer, healthier, and more productive lives[19].

In principle, Europe is in an excellent position to become a *lead market* in age-related products and services (as already identified as an opportunity in the Aho Group report[20], see below). Industrial and technological capabilities can be combined with a large European domestic market of the older population, possessing collectively significant financial means. European industry could see huge business opportunities if the older population are appropriately targeted, e.g. by fostering easy-to-access technologies and services designed around the needs of the ageing end user. In particular, the challenges faced by healthcare systems, like ageing population and patient safety, are likely to be important triggers to stimulate the growth of the health sector.

For example, it is widely recognised that ICTs contribute to enhancing patient safety[21], and can be instrumental in facilitating remote patient monitoring, which is important given the growing need of continuous care. Significant cost savings in patient management can be achieved with such remote monitoring solutions that also allow patients to receive care in the comfort of their own home environments. Moreover, ICT can improve access to patient files, speed up patient-processing times, and facilitate safer care. These tools can also respond to citizens' demands, - in fact, whatever their age, whether young or old, - for better information on health matters and more participation in the healthcare process. Innovative eHealth solutions can empower citizens to become actively involved in managing their lifestyle and health status, and encourage a shift towards proactive, predictive and preventive healthcare.

16 New Millennium Research Council, 2005 – Great Expectations: Potential Economic Benefits to the Nation from Accelerated Broadband Deployment to Older Americans and Americans with Disabilities

17 The study also distinguishes between a base scenario of natural penetration of ICT into society and service providers and a more pro-active "policy scenario" including policies accelerating broadband penetration.

18 With future benefits discounted for the "time value of money" over the 25 year period, 2005 to 2030

19 Enabling good health for all: A reflection process for a new EU health strategy, 15 July 2004, http://europa.eu.int/comm/health/ph_overview/strategy/health_strategy_en.htm

20 Aho Group report "Investing in an Innovative Europe", 20 Jan 2006, http://ec.europa.eu/invest-in-research/action/2006_ahogroup_en.htm

21 "Patient Safety make it happening – Luxemburg declaration", 2005; "The Value Of Health Care Information Exchange And Interoperability: There is a business case to be made for spending money on a fully standardized nationwide system." by Jan Walker, Eric Pan, Douglas Johnston, Julia Adler-Milstein, David W. Bates, and Blackford Middleton – Health Affairs: Web Exclusive, January 19, 2005 (http://content.healthaffairs.org/cgi/reprint/hlthaff.w5.10v1); "Geography and the Debate Over Medicare Reform, Health Affairs" Wennberg, et al. 02/13/02. W96-W114; "Use of hospital, physician visits and hospice case during the last six months of like among cohorts loyal to highly respected hospitals in the United States" Wennberg et al BMJ, March 13, 2004; "The implications of regional variations in Medicare spending, Part 1: The content, quality and accessibility of care." Fisher et al Annals of Internal Medicine. 2003; 138:273-287; "The implications of regional variations in Medicare spending, Part 2: The content, quality and accessibility of care" Fisher et al, Annals of Internal Medicine. 2003; 138:288-298

However, the European mainstream industry has so far not exploited the full potential for products and services targeted at the mass-market of older people. ***While ageing is becoming a mainstream phenomenon, industry and providers do not yet sufficiently capture the needs of the ageing society in mainstream products and services***. Nor has the specialised assistive technologies industry managed to enter the mass-market of older people. A good number of European SMEs are well profiled in specific niche markets for assistive technologies and possess detailed information about user needs. Fostering their cooperation with larger European companies and research centres, might guarantee a strategic encounter between assistive technologies and mass-market products and services. The market for assistive technologies currently presents a high degree of fragmentation, compounded by transparency, regulatory and technical barriers. Half of older consumer state that they cannot find the ICT products and services that meet their needs[22]. These barriers are further analysed in chapter 4.

Currently, it is probably the USA that is leading in exploiting and creating market opportunities offered by the ageing society. These are stimulated, amongst others, by the Older Americans Act, the Americans with Disabilities Act of 1990 and the Rehabilitation Act of 1996. Opportunities in the USA are also mobilised through other initiatives, such as the support to tele-health services in rural areas by the Universal Services Administrative Corporation. Congress is discussing a Bill to put in place a taskforce that will recommend how the USA can fully exploit new technologies for ageing and secure global leadership in this market and another bill is under discussion to reimburse tele-health under Medicare. In the USA social service delivery is more often dealt with by the private sector than in Europe, which may also influence the speed of development.

2.3. The European policy context for ICT and ageing

The concerns about ageing – and increasingly also the identification of the opportunities of this demographic change - is reflected in several policy initiatives, that provide the broader framework for the specific ICT and ageing policy proposed in this paper.

2.3.1. Demographic change

The October 2006 Communication on "*The demographic future of Europe – from challenge to opportunity*"[23], identified five ways to address the 'demographic timebomb': helping to balance work-family-private life; improving work opportunities for older people; increasing productivity and competitiveness by valuing the contributions of older employees; harnessing the positive impact of migration for the job market; and ensuring sustainable public finances for social protection in the long-term.

22 European Senior Watch Observatory and Inventory, 2002
http://www.seniorwatch.de/reports/SWA_final_report_fin.pdf , 2002

23 http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1359&format=HTML&aged=0&language=EN&guiLanguage=en

The review of the Sustainable Development Strategy[24] also stresses significant economic and social exclusion challenges as a result of its ageing society. It urges governments to prepare Europe's economy and society for the demographic shift by boosting productivity and employment participation – in particular that of ageing workers and women – and the implementation of effective lifelong learning strategies. It also asks for the modernisation of Europe's social protection systems, notably in the areas of pensions and long-term care as key to the promotion of active and healthy ageing.

The 2006 **Spring European Council**[25] stressed that "in view of the demographic change in the European Union employment rates have to be increased and the reconciliation of work and family life has to be promoted. To tackle these demographic challenges, it will be necessary to support family-friendly policies and equal opportunities, to enhance the solidarity between the generations, improve affordable care for people in need of care, life-long learning and an increased activity rate of young people, older workers and disadvantaged groups".

2.3.2. Growth and Competitiveness

The **Report on the Lisbon Strategy**[26]**,** the contribution of the Commission for the **Hampton Court Meeting**[27] and the Aho Report stress the need for European people to work longer, and encourage Member States to adopt strategies for active ageing in order to make the labour market more attractive for older workers. They also urge Member States to adapt pension, health and long-term care to meet changing needs and offer adequate protection and universal access to quality care. They have clearly identified the lead market opportunity in health, driven by ageing. Subsequently the Commission Communication on Innovation has reinforced this analysis and amongst others raised attention for the potential of innovative public procurement in the field of health and ageing – precisely because of the strong interplay between public and private sector.

2.3.3. Social and employment policies

The Council Directive on equal treatment in employment and occupation[28] is based on the anti-discrimination Article 13 of the EU Treaty, and thereby forbidding discrimination on age (inter-alia) in employment. It also provides the obligation of reasonable accommodation in the workplace for persons with disabilities, which is relevant for ICT solutions for active ageing at work.

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24 Communication from the Commission to the Council and the European Parliament "on the review of the sustainable development strategy – A platform for action", 13 December 2005, COM(2005) 658 final, available at: http://europa.eu.int/eur-lex/lex/LexUriServ/site/en/com/2005/com2005_0658en01.pdf

25 http://ec.europa.eu/councils/bx20060323/index_en.htm

26 European Commission - "Time to Move Up A Gear" The European Commission's 2006 Annual Progress Report on Growth and Jobs, 2006 http://ec.europa.eu/growthandjobs/annual-report_en.htm

27 European Commission - European values in the globalised world - Contribution of the Commission to the October Meeting of Heads of State and Government (Hampton Court) - COM(2005) 525 final

28 Council Directive 200/78/EC of 27 Nov 2000

2.3.4. EU policies for health services

High-quality health services are a priority issue for European citizens, with rights to healthcare are recognised in the Charter of Fundamental Rights of the EU. Following the European Court of Justice, Treaty provisions on free movement also apply to health services. In order to increase clarity over what Community law means in general terms for health services the Commission has launched a consultation[29] towards a Community framework for safe, high quality and efficient health services. The framework would reinforce cooperation between Member States and provide certainty over the application of Community law to health services and healthcare. This also addresses cross-border care and related to interoperability in eHealth. The consultation also addresses health innovation.

2.3.5. Information Society policies and the i2010 initiative

The 2006 **Spring European Council**[30] stated that "focused, effective and integrated ICT policies at both European and national levels are essential to achieving the Lisbon goals of economic growth and productivity. As such, the European Council calls on the Commission and the Member States to implement the new i2010 Strategy vigorously".

ICT and ageing is firmly embedded in i2010: the 2005 Communication from the Commission "i2010, a European Information Society for growth and employment" defines as one of its three objectives "an Information Society that is inclusive, provides high quality public services and promotes quality of life". In this framework, the Commission announced **i2010 flagship** ICT initiatives on key social challenges. One of these flagships focuses on the *needs of the ageing society*, more specifically *on caring for people in an ageing society and addressing technologies for wellbeing, independent living and health*. The general aim of this flagship is to harness the potential that ICT has to improve the autonomy and quality of life of older people while promoting containment of future costs of social and health care in addition to creation of new opportunities for European industry. This paper provides the analysis underpinning this **i2010 flagship on ICT and ageing**.

29 SEC(2006)1195, 26 Sept. 2006, "Consultation regarding Community action on health services".

30 http://ec.europa.eu/councils/bx20060323/index_en.htm

In i2010 and previously in eEurope the EU has already been carrying out actions in recent years, which are relevant to ageing. In particular, ***research, standardisation and to some extent regulatory actions*** have been carried out in the areas of eInclusion (eAccessibility and ICT for ageing), eHealth and eGovernment addressing issues around home as well as institutional care and assistance, assistive technologies, ICT enhanced work environments, ICT products and services that are easy to access for older people. Efforts are currently ongoing with the aim to enhance the diffusion of research results in this area for a coherent and sustainable uptake of these technologies at the EU level.[31] Research will be extended in the 7th Framework Programme.

e-Accessibility (or *electronic accessibility*) encompasses activities related to the achievement of an accessible information society, in particular for persons with disabilities and older people. Approaches are essentially based on mainstreaming accessibility in ICT tools & services through the Design-for-All principle (also called universal design) and availability of adequate assistive technology.

"Design for all" (or *universal design*) is an approach to the design of products, services and environments to be usable by as many people as possible regardless of age, ability or situation. It links directly to the political concept of an inclusive society and its importance has been recognized by governments, business and industry. "Design for all" (or universal design) strives to be a broad-spectrum solution that helps everyone, not just people with disabilities.

Independent living means that daily activities can be continued in the person's own living environment (including outdoors), with assistance by the person's

The 2004 eHealth Action Plan[32] outlines actions in interoperability of eHealth systems. Interoperability offers the prospect of important gains in terms of:

- **Access**: facilitating information for both patients and health professionals, improving contacts with the range of health occupations, and avoiding useless transportation,
- **Quality**: making both pertinent health and clinical information available for prevention and diagnostics, avoiding treatment error due to lack of information, and
- **Cost**: avoiding duplication of examinations, e.g., laboratory and radiology, ensuring good supporting administration, and ensuring efficiency and effectiveness of provision of services.

The 2005 Manchester Ministerial Declaration on Transforming Public Services and the 2006 eGovernment Action Plan[33] stress the importance of inclusive public services – of which elderly people are important users – and set objectives for inclusive eGovernment for 2010. Subsequently the Riga Declaration (see below) provided the specific target of 100% accessible public websites by 2010.

31 In the 6th Framework Programme the Commission has launched a several projects including large scale demonstrators on ICT and ageing, large Integrated Projects on wearable technologies for people with heart conditions and a Strategic Objective on Ambient Assisted Living for the Ageing Society with the aim is to support projects proposing highly innovative ICT-based solutions supporting elderly people.

32 European Commission - e-Health: making healthcare better for European citizens: An action plan for a European e-Health Area, COM (2004) 356 final

33 European Commission - i2010 eGovernment Action Plan: Accelerating eGovernment in Europe for the Benefit of All, COM(2006) 173 final

The 2005 *Communication on Electronic Accessibility (eAccessibility)* aimed at raising the profile of eAccessibility and leveraging a range of activities and cooperation with stakeholders to enhance the accessibility of ICTs. Its goal is to foster industry self regulation and encourage coordination among the Mmeber Sates, to evaluate the evolution of accessibility based on the measures proposed and come up with additional measures in 2 years time including new legislation if deemed necessary. One set of activities is geared towards securing a prominent place and concrete commitments for eAccessibility as a policy objective in high-level policy frameworks and strategy documents such as the i2010 initiative, the eEurope 2005 Action Plan or the eEurope 2002 eAccessibility targets.

Other efforts focus on the technology research and development process and have included successful cooperation with web standardization bodies, industries and user associations in developing accessibility standards and accessibility marks. A third set of initiatives focuses on eAccessibility implementation, measurement and benchmarking issues, in order to monitor and further incentivise progress for realizing policy goals.[34]

Accessibility of electronic communications in the review of the eCommunications Framework, and audio-visual services in the revision of the Television Without Frontiers Directive are two key ongoing ICT-specific policy developments of high relevance for elderly people

The *2006 Riga e-Inclusion Ministerial Declaration*[35] has set the scene for a comprehensive policy on e-Inclusion, addressing the six areas of ICT and ageing, geographic digital divide, eAccessibility, digital literacy and competences, cultural diversity and e-Inclusion, and inclusive public services. This paper provides support for a response to 'Riga' as regards ageing.

34For an overview of EC initiatives under this scheme see http://europa.eu.int/information_society/policy/accessibility/index_en.htm

35 Riga Ministerial Conference on ICT for an Inclusive Society and Riga Ministerial Declaration, June 2006, see http://europa.eu.int/information_society/events/ict_riga_2006/index_en.htm.

Policy for ICT and ageing addressing key elements of the Riga Declaration:

Riga §8: […] differences in Internet usage between current average use by the EU population and use by older people [..] should be reduced to a half, from 2005 to 2010: EU-level benchmarking and Member States awareness raising and training actions.

Riga §9: Exploiting the full potential of the internal market of ICT services and products for elderly people, amongst others by addressing demand fragmentation by promoting interoperability through standards and common specifications where appropriate. Barriers to innovative ICT solutions for social security and health reimbursement schemes need to be addressed, particularly at the national level: eHealth interoperability, stock taking of differences of reimbursement schemes and defining a target date for their removal, awareness raising and good practice, interoperable pilots.

Riga §10: Improving the employability, working conditions and work-life balance of older workers to improve productivity by supporting innovative ICT solutions which can be easily used everywhere including at home, and encouraging the provision of training from the public, private sectors and from civil society, making special efforts on ICT skills for older people: active ageing at work in R&D, ICT training at national level, a high-level debate on ICT and active ageing at work, stakeholder cooperation (supported by a thematic network in the CIP programme).

Riga §11: Enhancing active participation in the society and economy and self-expression, through innovative ICT-enabled access to goods and services, and relevant content, to facilitate interactions with public and private entities, entertainment, and social contacts: innovative ageing related projects in FP6 and FP7.

Riga §12: Realising increased quality of life, autonomy and safety, while respecting privacy and ethical requirements. This can be done through independent living initiatives, the promotion of assistive technologies, and ICT-enabled services for integrated social and healthcare, including personal emergency and location-based services. The ambient assisted living initiative of the 7th Framework Programme is an important initiative in this respect: launch of large-scale new Article 169 Ambient Assisted Living initiative, FP6/7 advanced independent living R&D, CIP pilots on smart home for independent living and telecare for chronic diseases.

2.4. Three areas of challenges and opportunities - three life situations

Three areas of key challenges and opportunities need to be addressed, corresponding to life situations or activities (all three can be present at the same time for a single person):

(1) ***Independent living: in social and health care – how to enhance the quality of life and the quality of health and social care provision for older people, while keeping these services financially sustainable or even reducing their costs?*** The increasing demand for social and health care services will generate additional costs that a lower growth cannot sustain. Projections suggest that age-related spending on pensions, health and long-term care will increase by between 4 and 8 % of GDP in coming decades. Longer life expectancy poses challenges for health treatment, the effectiveness and financial viability of pension schemes, and the opportunity (sometimes formulated as a right[36]) to pursue enhanced forms of healthy and independent living. The challenge is to enable the delivery

36 Viz. recent discussions in Spain.

of health care and independent living services more efficiently – thus raising productivity - as well as more effectively e.g. by integrating formal and informal care, and health and social care. Investment inputs in ICT can deliver the necessary improvement in efficiency and productivity of these services and help to assure their provision to future generations. ICT can ensure sound, reliable health information for older adults and effective provision of continuity of care via telemedicine and social care in the home[37],[38],[39].

(2) ***Active ageing at work[40]: in the labour market – how to provide the opportunities for older people to use their skills and be retained at work?*** With the "baby boomers" heading for retirement, there will be the need to retain older people in the labour market, more productively and flexibly. We already need to exceed the employment rate target of 70% in the Lisbon Strategy to compensate for the expected reduction in the working age population. Employment participation will have to increase, and the retirement age will have to continue to rise. Yet the low levels of employment and/or reduced productivity of 55 to 64 year old people creates substantial pressure on the long term sustainability of public finance. Some employers are unwilling to keep older people at work. This is reinforced by structural incentives to take early retirement, as well as barriers to returning to work or continuing to work while affording a better work-life balance. Unemployment often affects older workers more than others. Jobs in traditional industries are made precarious by increasing competition. Adapting to new knowledge-intensive jobs may be difficult, and coping with new generations of innovative technologies becomes harder and harder. ICT solutions could help to keep older workers in the labour market productively, thus retaining their knowledge and skills. This requires new work patterns with better work-life balance and life long learning, and a positive impact on motivation and quality of work.

(3) ***Social participation: how to increase the level of social participation by older members of our society?*** Increasingly, in the population in general individuals access services, arrange product delivery directly through the internet, and produce their own content. While this provides extensive evidence of the potential of ICT for social interaction and economic participation, older people tend to lag behind in their adoption of new technologies, including access to the Internet. Innovations are more easily and quickly adopted by urban, skilled and financially well off communities and then spread to more peripheral, lower-skilled or lower-income social categories – and in this context, also tend to be taken up only later by the ageing population. Moreover, experience shows that age-related (and social-related) digital divides tend to cumulate over time rather than automatically disappear. Given the pace of development and the different technological waves in the ICTs, there are strong reasons to believe that ***cumulative digital divides*** will persist and risk to become a permanent phenomenon if no counter-measures are taken, thus translating into ***social stratification***. ICT-enabled services need to meet access, accessibility, affordability, and usability requirements, If they do so, they can much facilitate active engagement in social interaction for the ageing population.

37Health Telematics Working Group of the High Level Committee on Health: Final Report, 04/2003, HLCH/2003/1/7

38Communication on eEurope 2002: Quality criteria for Health related Websites europa.eu.int/information_society/eeurope/ehealth/doc/communication_acte_en_fin.pdf

39Study currently under consideration: SMART 2006/0055 Best practices in Europe on 'ICT enabled independent living for elderly

40 According to WHO (Active Ageing, A Policy Framework, 2002), active ageing is the process of optimising opportunities for health, participation and security in order to enhance quality of life as people age. In this section, we deliberately specify the scope of the concept of active ageing "at work" as one of the domains of investigation together with social integration of the elderly and independent living and health

3. ASSESSING ICT AND AGEING: A LIFE SITUATION PERSPECTIVE ON USERS, PRODUCTS/SERVICES, PROVIDERS

3.1. Life situation perspective

Keeping in mind that older people are not a homogeneous group (due to different degrees of disabilities, frailness, education, income, interests), it is helpful to group challenges and opportunities around three life situations[41]:

- 'home': living independently and in healthy conditions at home or on the move;
- 'work': engaging into work activities;
- 'community': actively participating in society.

All three life situations obviously can be present and relevant for a person at the same time.

The related product / service delivery chains can be characterised as follows (see diagrams below):

ICT for prolonged independent and healthy living involves mainly professionals (doctors, nurses, social workers), assessing health and social conditions and – in cooperation with other technical specialists - advising on services and equipment for prolonged independent or assisted living. Products and services for healthy independent living are likely to be provided via formal service providers, although informal networks, e.g. the family, can also play a key role in daily assistance and monitoring of health and care condition. The ICT industry is therefore often not in direct contact with the elderly user. However, this may change in the future (e.g. by providing consumer-oriented home well-being solutions that fall outside medical certification.

There are three types of products/services involved in ICT for independent living: health products/services, social services, and personal daily living assistance. Health and social services (e.g. tele-monitoring, assistance for housing or finance) involve professional staff. Assisted daily living (ADL) is provided with the help of assistive devices under user control (e.g. intelligent wheelchair), or with the help of the immediate social networks such as family or neighbours. Purchase/maintenance of assistive devices often involves professionals.

In terms of financial coverage insurers will eventually be involved, receiving their revenues partially directly from users or through general taxation, depending on national

41 Leys, M. and De Rouck, S. (2005). 'Active Ageing and Independent Living Services: Core Propositions Leading to a Conceptual Framework' as in IPTS, 2006

insurance schemes and laws. Considered as a market, independent living as of today has several similarities to the healthcare market (a quasi-market) with potentially a large public sector involvement[42].

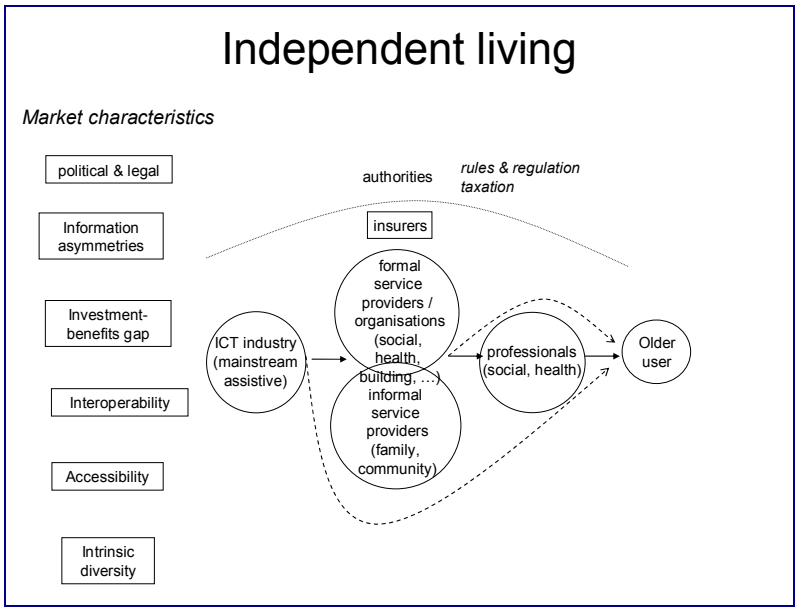


Figure 2 Simplified delivery chain for products/services for independent living

(5) **ICT for active ageing at work** involves employers as a main actor. Assessment of needs and solutions may involve a professional service that is either part of the company or contracted by the employer (e.g. in-house Human Resource Management or medical assessment centres). Solutions are purchased by the employer rather than the end-user, the employee. Insurance schemes and possibly public schemes for workplace adaptation may play a role in reimbursement and in promoting innovation and adaptation of work-spaces. From the employer perspective there is a certain degree of public policy conditioning (e.g. by imposing anti-age-discrimination workplace conditions). However, provision should be expected to function largely as in a regular business-to-business or professional market, where employers seek improved productivity, efficiency, and effectiveness when purchasing ICT-enabled adapted work-environments.

42 See e.g. Julian Le Grand, Motivation, Agency and Public Policy: Of Knights and Knaves, Pawns and Queens Oxford: Oxford University Press

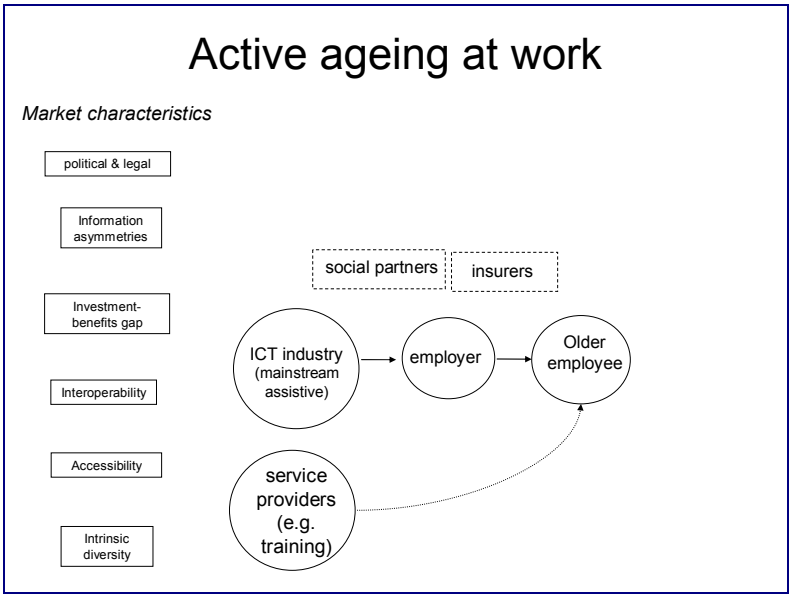


Figure 3 Simplified delivery chain for product/services for active ageing at work

(6) **ICT products and services for social participation** can in principle be directly purchases by the user as a 'normal' consumer. Still, it is likely that in many instances the user needs assistance from his/her social network (family, community) to get adequate solutions installed and maintained. Personal motivation, skills and income levels – which are often age-related - play a key role. Local initiatives can come into play to stimulate ICT-enabled community initiatives e.g. through digital literacy programs and reimbursement schemes for low-income communities.

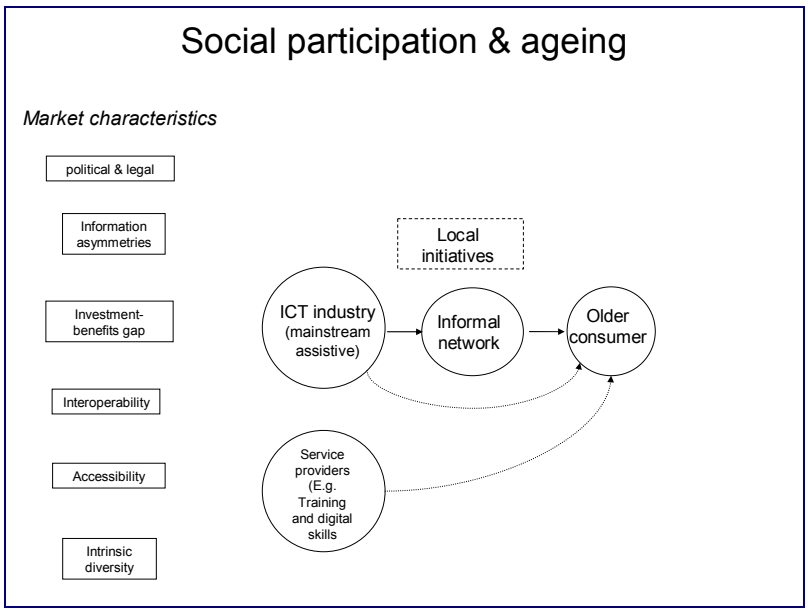


Figure 4 Simplified delivery chain for products/services for social participation

3.2. Key features of product and service provision

Despite the fact that these are three life situations, they have a number of common characteristics from a market perspective as analyzed below. Some of these characteristics currently represent market barriers or market failures (see chapter 4). They are the focal points for public policy, where leverage is expected to be highest (see chapter 5).

3.2.1. Information asymmetries

Users are often in a relatively disadvantaged position in terms of access to information, knowledge and power to choose, for reasons such as:

- Disability, chronic disease, or lacking education or skills. As a result, they may need assistance to make their choices;
- Solutions having potentially a degree of intrusion e.g. health monitoring by the family;
- Lack of sufficient financial means and thus dependent on the good will of others or society at large.

In all these cases autonomy and human dignity can be affected, raising ethical questions (see also section 3.2.7). Even when such ethical questions are resolved, there remain *information asymmetries* due to the complexity of products and services, or monopolistic provision (e.g. of social housing). Users are also unavoidably in a relatively weak position because solutions for serious handicaps or chronic diseases can bear a very high cost (too much for an individual person to carry), even though the risk of them occurring is relatively low. Consequently the user is 'at the mercy' of a collective arrangement (e.g. insurance) to deal with the financial burden.

A consequence is that often the user/consumer is not in direct contact with the supplier, i.e. transactions are mediated and assisted by professionals or others such as family members, and there is a certain degree of involvement of government authorities.

Some services such as health are by their very nature complex and put consumers (in general) in a position of weakness. Health services are delivered by health professionals and carers who are mediating health knowledge to the final users. The user is confronted with a problem of choice (e.g. for treatment) and with a problem of asymmetric information.

The fact that there are information asymmetries is not necessarily an irresolvable problem, since intermediaries can bridge towards users, public policy can put in place safeguards, contracts can be arranged for that guarantee fairness and minimal quality of service, etc. In indirect markets public authorities can step in to to avoid the risk that *asymmetric information* damages the ageing consumer.

However, such measures illustrate that the product / service provision of ICT for seniors is complicated and involves many actors (that are not always coordinated) beyond users and suppliers. Public policy has to take this complexity into account. Moreover, traditional measures to compensate for the 'weakness' of the user have to be and are being re-assessed in many countries. The reasons are threefold:

User empowerment is a reality more than ever before with the help of new technologies, notably the Internet, and increasingly it is recognised that the ageing group represents significant buying power (over 3000 B€ in wealth and revenues for the over 65) and voting power[43];

Increasing competition in service provision increases due to regulatory changes and globalisation – witness the large changes in the health insurance industry- , and

Changing political views (in some countries) about the relation between citizen and state, away from supposedly passive citizens towards the view that citizens should be in the driver seat, and away from the state as an altruistic service provider towards more competitive service provision[44].

3.2.2. Intrinsic and persistent diversities

Another common characteristic is intrinsic and persistent diversity. There is therefore an unavoidable degree of **fragmentation**, which can be expected to be a characteristic of (and barrier for) product and service delivery for a long time. Diversity stems from the variety of users, national reimbursement schemes and political preferences to deal with health or social care and inclusion in general.

A specific manifestation of this is the highly diverse assistive technology industry, which deals with a very wide range of disabilities and reimbursement schemes.

3.2.3. Strong influence of political and legal frameworks

Service provision especially in independent living is strongly conditioned by political and legal frameworks at EU, national and even regional level. These tend to reflect political views on the role of the state versus the individual and community / family in the provision of services notably such as social and health care, which, moreover, used to be monopolistic.

3.2.4. Disconnection of investments and benefits

Investment-benefit disconnects are intrinsic to ICT and ageing solutions and have a variety of reasons:

- Time-lags before benefits materialise: long-term investments can be considerable and are recovered only after a long period of time. Examples are in establishing conditions for

43 User empowerment is not only influenced by ICT but also by other measures, e.g. direct payments for care, leaving choice to consumers. See e.g. OECD Health Working Paper 20, 11 May 2005

44 See J. LeGrand, "Motivation, Agency and Public Policy", 2003

interoperability for independent living (e.g. integrated health and social care), adapted housing, broadband for social participation, ICT training for staying productive in work,.

- Indirect benefits from network effects (network externalities): provisions such as interoperability, quality labels, health information websites, etc. usually have a network externality, that is, benefits increase as the number of users and provisions increase. This leads unavoidably to uncertainty in immature markets as for these it is not yet established if and to what extent such benefits will materialise.

- Strong presence of "*public goods"* characteristics impacting on the organisational of value-chains: investments and benefits concern different actors (e.g. cost-savings in for a Ministry of Health resulting from investments by the Ministry of Social Affairs or vice-versa, broadband infrastructure investments by public authorities paying off through new business in the private sector, public sector investment benefiting individual user, private companies investments not entirely or directly recovered exclusively through market incentives).

As a consequence, social / health carers and mainstream consumer businesses may see benefits materialising only long after the investment has been made and often in indirect ways. At an individual level, elderly users cannot be counted on to fully pay for products and services that are shared by many users (an example is the infrastructure for a smart home).

3.2.5. Technology: access, e-Accessibility, technological change

The technology presence in the field of ICT and ageing implies that access to and accessibility / usability of the technology are preconditions for the ICT-based services, whether for the end-user who often has restricted capabilities, or for the professional or service provider. eAccessibility[45] of general purpose ICT products and services through *design for all / universal design* as well as the provision of dedicated assistive technology are therefore characteristics as well.

eAccessibility is the degree to which ICT is accessible in a wide sense, e.g. for people with sensory, motor, cognitive, or auditive functional restrictions. Such impairments are present amongst a wide part of the population and increasingly prevalent when ageing. For specific areas of ICT such as the World Wide Web standards have been developed or are being put in place.

Design for all aims to enable all people to have equal opportunities to participate in every aspect of society. Therefore the built environment, everyday objects, services, culture and information must be accessible, convenient for everyone to use and responsive to evolving human diversity. The practice of design for all makes conscious use of the analysis of human needs and aspirations and requires the involvement of end users at every stage of design.

45 Overcoming the technical barriers and difficulties that people with disabilities and others experience when trying to participate on equal terms in the Information Society is known as “eAccessibility”, as defined in the 2005 Communication on eAccessibility,

ICT & ageing product/service delivery is also influenced by the general characteristics of ICTs such as rapid technology evolution, need for maintenance, upgrading, training and expert assistance.

3.2.6. Interoperability

Sensible technological solutions for end-users often require putting together and interconnecting a variety of equipment, services and providers that final users are not capable to seamlessly assemble (e.g. assistive technologies combined with mainstream technologies).

Making such interconnection possible is what interoperability is about. Interoperability manifests itself at three levels: technical, organisational, and semantic[46]. As regards technical interoperability, market research shows a marked preference for plug-and-play solutions. However, individual companies and providers may not have sufficient incentives to guarantee ***interoperability and modularity*** across different devices and services, thus increasing costs on final users and consequently missing opportunities of economies of scale on a larger consumer base. Semantic interoperability likewise often requires organised coordination amongst many actors in the value chain. Organisational interoperability (seamless compatibility of processes and procedures) is often the hardest to achieve, due to rules and regulations, vested organisational interests etc.

3.2.7. Ethical conditioning

With the emergence of ICT and ageing new ethical questions are being raised. These questions find their origin in the vulnerability of the user, the changing characteristics of the user population (e.g. more people surviving at high age but also the trend towards more-educated and empowered users), economic constraints such as public budgets that are at tension with serving all fully in health and social care and the constant renewal of science and technology.

3.2.8. Value chain coordination

A consequence of several of these characteristics (protecting the vulnerable user, bridging investment-benefits gaps, interoperability) is that a degree of initial coordination is required between value chain actors (or their representatives) so as to unlock the benefits.

46 IDABC European Interoperability Framework http://ec.europa.eu/idabc/en/document/3473/5585 .

3.3. Demand side: portraying elderly people as users of ICT

Two thirds of the European ageing population is generally open-minded towards ICT. But at the same time more than 70% said that in the media new technologies were always connected with young people, and almost one half considered that ICT manufacturers[47] did not properly take account of their interest. Elderly users of technologies (and specifically ICT) present a wide range of characteristics in terms of needs, physical impairments, motivation and readiness to take up new technology. As explained above, the way they interrelate to new technology is often mediated by informal and formal networks of people and depends on the broader social context they are part of.

If adequately addressed, elderly people can offer large market opportunities for providers of information society products and services.

Current evidence (see Annex III, IV) suggests that age followed by employment, education status and disability, is the most significant element determining access disparities to the online world. Within the group of older people, gender and disabilities are two other factors of exclusion from the information society together with labour market participation and educational status.

Keeping the age factor constant, ICT uptake increases with level of educational and – vice versa – keeping level of education constant ICT use decreases with age. Similar patterns can be observed with respect to other dimensions such as income and life style. Socio-economic factors appear to have a strong impact on older Europeans' propensity to get involved in ICTs and, through ICT, in society. Those older people who utilise ICTs for their own purposes tend to be younger but also better educated; they tend to have a rather active life style and are on average better off in economic terms[48]. Besides, the use of ICT tools and services also depends upon contextual factors such as geographical area of origin, type of household, socio-economic and attitudinal factors, encouraging social networks of families[49].

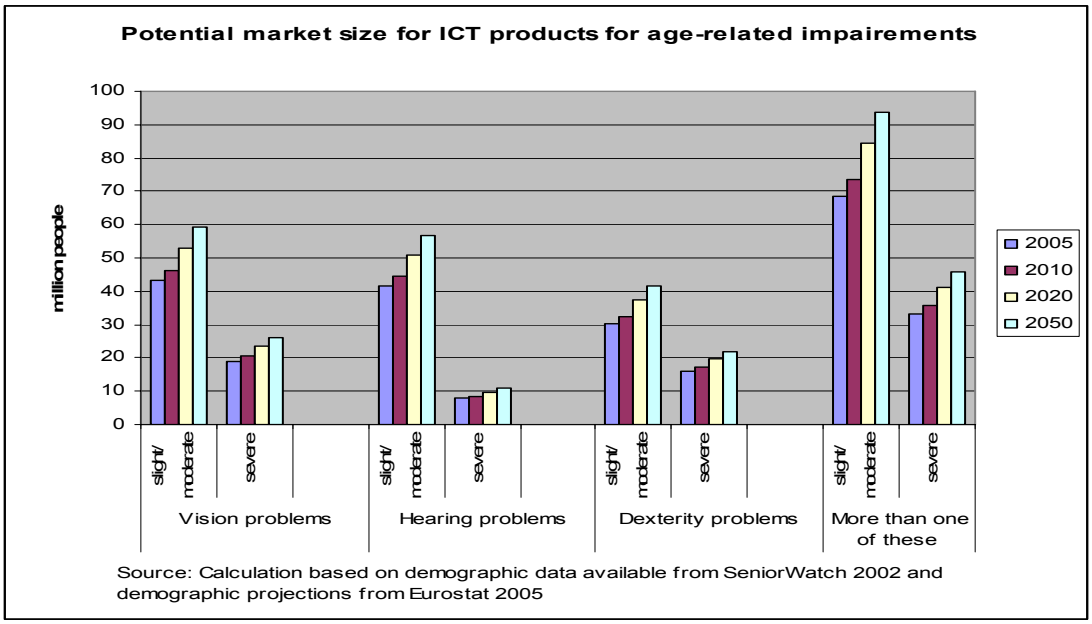
Despite the fact that older adults comprise a large potential market, the influence of personal interest and cost sensitivity is likely to be high:

- ***Personal motivation*** in accessing Internet is an issue for the 50+ (and 65+) groups. This is partly the consequence of a lack of awareness/information on the benefits of Internet.
- ***Cost*** is an important issue for a considerable proportion of older people. The biggest initial barrier may be the cost of equipment purchase, especially for many in the new Member

47 European Senior Watch Observatory and Inventory, 2002
http://www.seniorwatch.de/reports/SWA_final_report_fin.pdf
48 European Senior Watch Observatory and Inventory, ibidem
49 European Senior Watch Observatory and Inventory, ibidem

States as well as for low-income groups in the old Member States. In addition, Internet connection and ongoing usage costs can be a significant barrier for those with low incomes.

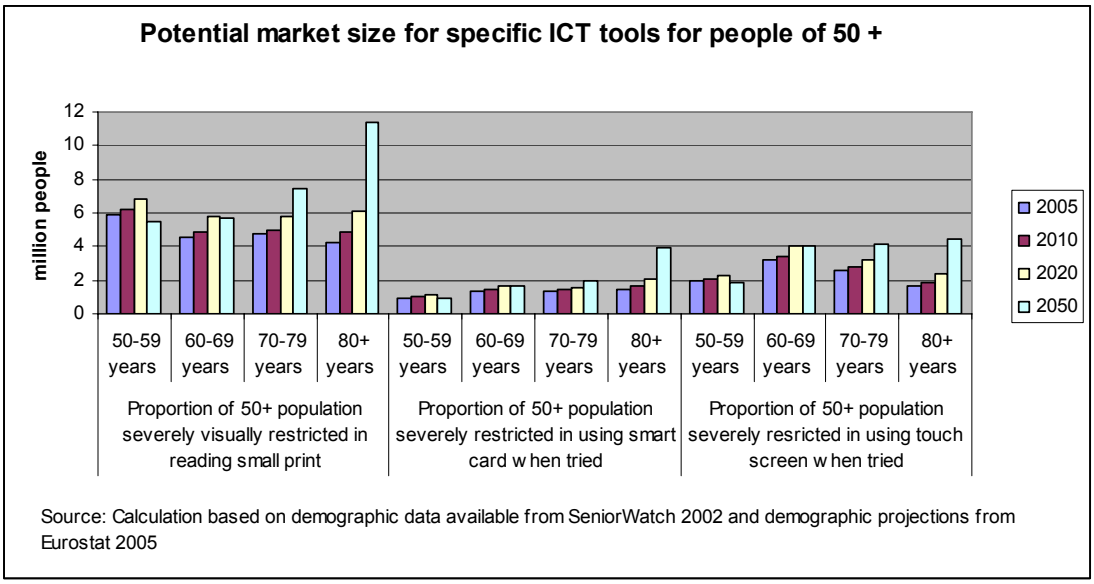
Gerontological research has shown that sensory capabilities (e.g. visual, audio, tactile) as well as cognitive ones – particularly in relation to apperception speed – tend to decline with growing age[50], thus portraying a ***strong link between age and disability***. A large proportion of older adults faces functional restriction when using ICTs, and the severity of the reported restrictions tends to increase with age (see Annex V). For instance, in the EU15 Member States 26 million people aged 50 and above (21% of this age group) are severely functionally restricted in manipulating a keyboard, reading small print on a screen - even when using glasses - or in relation to their hearing capabilities[51]. Users therefore need solutions adapted to these changing capabilities.



By extrapolating from demographic trends, a considerable and growing potential market size emerges with figures ranging from 68,5 million people in 2005 to 84,3 million already in 2020 combining several forms of age-related impairments.

50 European Senior Watch Observatory and Inventory, ibidem

51 European Senior Watch Observatory and Inventory, ibidem



Source: Calculation based on demographic data available from SeniorWatch 2002 and demographic projections from Eurostat 2005

3.3.1. Opportunities from ICT for independent living for the users

Independent living is the ability for older people to manage their life styles in their preferred environment, maintaining a high degree of independence and autonomy, enhancing their mobility and quality of life, improving their access to age-friendly ICTs and personalised integrated social and health care services.

Many of the challenges of old age require support from the health and social care services as well as assistive technologies. Telemedicine opens up new opportunities for providing medical care to the home and there are many new developments in ICT-based home care, including ways of monitoring wellbeing and providing a secure home environment.

Independent living solutions often address daily living support for safety (making sure entrance doors and windows are locked/closed when leaving the house or sleeping; checking for water or gas leaks; and turning all but one light off when going to bed, etc), reminders (memory problems tend to be associated to ageing and thus support may be needed in taking medication and fulfilling household tasks), and user-friendly interfaces (for all sorts of equipment in the home and outside, taking into account that many elderly people have impairments in vision, hearing, mobility or dexterity).

Future developments in many of these areas are underpinned by some key emerging technologies. These include robotics, new materials and biosensors. In addition, the emerging concept of Ambient Intelligence offers great potential, with the possibility for the whole environment (at home, on the move, in the street, whilst driving or during transportation, in public buildings and so on) to have embedded intelligence that helps with everyday life.

Recent advances in miniaturisation technologies in combination with ICT enable a large variety of new systems and devices, especially in the context of support to daily living, fitness, and health systems for elderly[52].

As regards the latter, personal health systems include implantable, wearable and portables systems for monitoring and diagnosis, therapy and repairing/substitution of functionality. Individuals with a chronic disease – major examples include heart disease and diabetes – may experience trouble with treatment plans. Older adults and elderly persons, who face greater physical and mental challenges in maintaining their own health, need more extensive access to care and supervision at home. Telemonitoring and telecare are of primary importance; and so are the newly-emerging personalised healthcare services. Provision and support of care at home to people suffering chronic diseases can avoid hospitalisation[53].

ICT-enhanced equipment, processes and delivery mechanisms can help to increase the quantity, value and quality of services provided to older persons and persons with disabilities (at equal or lower costs), especially in terms of short and medium-term health and social care, informal carers and personal assistance services (Annex VI).

By implementing technology packages into existing houses and the newly built housing with smart technology the West Lothian authorities have achieved a mean duration of stay in hospital by a patient assessed as being ready to move of 9 days, as opposed to the Scottish average of 57 days. An approach directed towards quantifying care recipient benefits commonly applied in the health care sector relies on the concept of so called Quality Adjusted Life Years (QUALYs). A case study based assessment in relation to the utilisation of assistive technologies suggests that through such technology up to 8.859 QUALYs could be added for the cases investigated.

Furthermore, an evaluation of the West Lothian Home Safety Service which was undertaken by the University of Stirling highlights strong economic benefits of telecare technology: the gross annual cost for providing one care home place stands at £ 21.840, compared with £7.121 for the support in the community package including telecare technology, 24 hours response and ten hours of care[54].

The estimated market figures indicate a potential demand for ICT products and services for independent living lie in the two digit million range for every age-related need. They suggest a significant demand potential today among the 50+ population that may slightly increase over a decade and is expected to considerably increase over the longer run[55]:

52 MSTnews "Ambient Assisted Living", http://www.mstnews.de/Homepage/download_05_05.html

53 Workshop Report "User Needs in ICT Research for Independent Living, with a Focus on Health Aspects", http://fiste.jrc.es/pages/documents/WSREPORT-finaldraft.pdf

54 Kelly 2005; Bowes and McCoghan 2002, 2003, 2005

55 European Senior Watch Observatory and Inventory, ibidem

– The market potential for smart homes applications complementing needs related to reduced mobility or age-impairments threatening the individual's independence (such as difficulty to shop, to dress, to move independently) will almost double between 2005 and 2020 from a base line ranging from 13 million people up to 37 million depending on the type of impairment.

– The number of people using community alarms in Europe will further increase from 21 million in 2005 to 26 million in 2020

3.3.2. Opportunities from ICT for active ageing

The development of age-friendly ICTs has a central economic significance for Europe[56], both for the productivity of the sectors of the economy where older workers use ICTs in their daily work and for the competitiveness of the European ICT industry itself. Accessibility and age-friendliness of ICT products and services has the potential to become a competitive factor, driven also by public procurement developments[57].

Computer users aged 60 and over and those aged under 30 are less likely to have received computer training at the workplace

Age-friendly design of work has received limited attention to date, both in research and in practice.

European and US research suggests that up to 60 % of those in the 50-64 years age range may face challenges in age-related physical and cognitive functions affecting usability of ICTs for older

As Europe continues to move towards a "knowledge-based society", the role of knowledge workers and information workers becomes increasingly crucial (OECD, 2001*a*). Overall, workers aged 50 years and older now comprise just a little under one-quarter of the EU workforce and projections based on population trends for the EU 15 suggest that the share of older workers may increase to almost one-third by 2021 (see Annex VII).

A growing mismatch in the labour market for ICT workers (and ICT literates) is being reported by major companies. But it also concerns smaller companies and the entrepreneurial layer in Europe. Particularly the *gap* between the skills of current and future IT workers and those sought by firms seems to be one of the main elements of concern in view of shrinking a labour market due to demographic effects. Immigration is one means of increasing the short-term supply of IT workers. But immigration alone cannot address the need for cyclical adjustments to the labour market.

Employers are increasingly forced to adopt internal strategies to address tightness in the labour market using the existing workforce in more effective and productive ways[58]. Within

56See also European Foundation for the Improvement of Living and Working Conditions. http://www.eurofound.eu.int/areas/populationandsociety/ageing.htm

57 This has already been taken note of by US industry

58 External strategies imply expanding the pool of potential employees and either attracting new recruits or using external workers, or recurring to outsourcing and off-shoring

medium-/long-term solutions, firms can also focus on two complementary aspects: retaining (and training) their current workforce or attracting new skilled workers.

ICT can provide the necessary tools and levers to retain and re-train older workers providing them with better quality work and allowing them to offer their skills and expertise while respecting their life and geographical preferences (see Annex VIII).

Under the growing imperative to retain older workers and increase occupation rates and employability for older workers, opportunities for ICT in the field of active ageing emerge in:

eSkills and innovative ICT training: A range of different stakeholders are involved in building IT skills, with different incentive structures (costs and benefits) resulting in different human capital investment strategies. On the job training and *life long learning* has increased private returns which provides the necessary incentives for companies to invest in training and re-training older workers[59]. This is particularly relevant when confronted with ICT skills, since best use of ICT –as shown by a considerable amount of literature - also enhances productivity.

ICT training and eLearning are also key elements to enhance productivity of IT workers and the skill upgrading of all workers. They become even more crucial when linked to older age workers. However, testing of innovative training and eLearning schemes for older age employees and job seekers is important given the reduced attitude to use training in this age range (see Annex IX).

Innovative ICT-enabled working methods for active ageing: despite evidence showing possible decreases in productivity in the old age, mainly due to relative decline in physical and mental abilities[60], or mere obsolescence of competences assigned to older workers[61], there is a growing corpus of literature confirming that workers in older age can rely on their professional experience to adapt and compensate for declines in mental and physical abilities if assisted by suitable workplace and work method adjustments[62]. Innovative working methods also entail various aspects of work organisation (including labour laws)[63].

59 Although there is strong evidence that secondary education yields important social rates of return (strengthening the case for government support), the evidence for tertiary education and training seems to suggest greater relative private rates of return to individuals. OECD - Vladimir Lopez-Bassols, ICT Skills and Eployment - STI Working Papers, 2002

60 Shirbekk, 2003

61 Salthouse, 1984

62 Volkoff et al., 2000 and OECD -Living Longer, Working Longer, 2006

63 Walker, Alan; Taylor, Philip - Combating Age Barriers in Employment: a European portofolio of good practice – for the European Foundation for the Improvement of Living and Working Conditions, 2005

ICT-enabled working environments: ICT's functionality and flexibility makes it possible to design work in ways that adapts to the physical and cognitive changes that occur with increasing age. Some ICT features may also pose new risks, however. For example, the heavy reliance on visual displays, keyboards and mouse-type input devices might be at variance with some of the age-related changes in physical and cognitive functioning. Standard personal computers and operating systems typically now have a number of built-in accessibility features[64].

3.3.3. Opportunities from ICT for social participation

As Europe's population ages it is essential that elderly people remain active members of society so that society can benefit from their experience and wisdom. Moreover, a major issue confronting many elderly people is the loss of social contacts over the years, in particular for people with limited mobility and in rural or scarcely populated areas.

ICT can contribute to helping elderly persons to maintain their mobility and to stay involved in their communities and the worlds of work and employment, maintaining the links to social networks and places that elderly people have built up over the years as well as contact with relatives through tools such as email, bulletin boards and remote presence and multi-media conferencing facilities. Promoting inclusion and participation of older people in society at large, will improve their quality of life[65], generate new opportunities for involvement in leisure, sports, travel & tourism, and civic participation as well as help avoid social isolation.

It is clear that technology on its own cannot tackle this isolation, but it can, in the form of accessible and user-friendly networking and communication tools, provide a substantial contribution to address it.

New opportunities in information, training, travel, leisure, community and public services are expected to emerge notably on the basis of television once this is going to become a digital and interactive platform, provided digital interactive TV is made easy to use and accessible for all, in particular for the growing group of elderly people with some visual, hearing or dexterity problems.

Accessibility Planning at Your Fingertips

Many elderly users, especially those with disabilities, are prevented from going out shopping, visiting public parks, theatres, etc. because they are unsure about the accessibility of their trip. Currently, the simplest of excursions can involve military-scale planning to ensure that the proposed journey is feasible. Will the next bus be wheelchair friendly? Is there anyone available in the supermarket to help with the shopping?

64 See also Annexes X and XI

65 In line with Decision No 771/2006/EC - European Year of Equal Opportunities for All - European Parliament and of the Council

MAPPED, an FP6 project, is developing an intelligent system that will empower the impaired elderly to increase their autonomy and to play a full role in society. The idea of MAPPED is to allow the user to plan and re-plan excursions while they are on the move. Therefore the user interface has to be mobile.

The system is based around a web browser running on PDAs or smart phones, initially incorporating audio output to facilitate the visually-impaired, and voice command recognition for ease of use. To extend the range of users, later in the project other assistive technologies will be added that can control the interface (e.g. Headmouse). Localisation features are also included. For instance, if the user indicates that they are at the door of a certain establishment (pub, coffee shop, etc.), MAPPED will provide all the accessibility information they need to go inside.

Mobile Personal Assistant for Travel Information

Also concerned with mobility, **ASK-IT** is developing working personalised route guidance services for elderly persons and people with impaired mobility. These services will provide relevant and real-time information, primarily for travelling, but also for use at home and at work. The services are being demonstrated in eight major European cities, using a platform developed under a previous research project IM@GINE IT. For example, ASK-IT could assist an elderly traveller to find the right bus stop at an airport and then tell them when to get off to find a hotel or restaurant with accessible facilities. While visiting a town, the user will be able to use their mobile phone to request information about local facilities, including whether or not they are accessible to him/her. The profile stored on the mobile device could include parameters such as the turning radius of their electric wheelchair, for instance, so that restaurants meeting these specific needs are selected.

3.4. Suppliers and providers

Suppliers, service providers and professionals are of many different types as indicated in Figure above.

They comprise ICT industry (for mainstream products and services; electronic communication services and infrastructure providers; ICT assistive technology industry) the eHealth industry; health care institutions such as hospitals; social care institutions and social care providers; insurers and financial institutions; entertainment industry, etc.

The involvement of suppliers and providers in ICT solutions for ageing is showing two trends: changes in supply-side fragmentation and mainstreaming.

3.4.1. Changing patterns of fragmentation

The advent of new ICTs (the Internet, large scale management software and solutions to interoperability) is becoming one factor for service providers to restructure their back-office functions (e.g. integrated health and social care) with larger productivity gains; to allow senior users to be better and more directly connected to the services; and to move into the provision of new products and services for enhanced social integration.

ICT solutions are expected to shift health and social care provision towards more cost-effective preventive models. Much of today's evidence for this comes principally from the US. Most strategists, policy-makers and experts, however, agree that the findings developed there in the

early part of this decade can be readily extrapolated to the European context. An estimated 30 to 40% of every US dollar spent on health care, or more than half-trillion dollars per year, is spent on costs associated with "overuse, underuse, misuse, duplication, system failures, unnecessary repetition, poor communication, and inefficiency"[66].

Most health services will go through some form of a gate keeper system, where primary care providers, following guidelines, refer to secondary or tertiary care. This will also amplify ***opportunities for new market creation*** in the care domain[67] specifically addressing integrated care solutions in support of ageing.

Another factor influencing fragmentation in the sector is deregulation or changing regulations that aim to stimulate competition amongst care providers and the rising interest of private equity capital, which is already leading to consolidation in some countries.

As regards the ICT suppliers a distinction is made between *mainstream ICT companies* (providing general purpose consumer and workplace technology such as PCs, intelligent environments, broadband), *dedicated assistive technology companies (*providing assistive devices such as screen-readers or ICT-enabled wheelchairs) and *health IT companies* (dedicated health IT solutions and devices). On the one hand, the presence of the mainstream ICT companies is fairly recent and still emerging. On the other hand, the assistive technology and dedicated health IT industry are present since long but represents a fragmented sector with many small enterprises. It is not clear yet whether this fragmentation is starting to change[68].

A specific challenge of the ICT assistive technology sector is to enhance synergies with mainstream solutions including standardised interfacing with mainstream technologies. By incorporating ***accessibility requirements*** into mainstream ICT products and services ***better interfacing with more specialised assistive technologies*** is expected to become possible. Assistive technology manufacturers and distributors rarely address the European market as a whole but predominantly address local, regional or national markets and tend to be specialised in a particular niche or sub-sector.

The ICT market addressing the needs of senior users is still in its nascent phase and does not yet realise its full potential. Traditional suppliers and providers have conceived the needs of the ageing society but are not using a systemic approach, and still largely still developing tailor-made solutions (whether addressing assistive technologies or specific health care services).

3.4.2. Mainstreaming the age factor

66 Proctor P. Reid, W. Dale Compton, Jerome H. Grossman, and Gary Fanjiang, Editors - Building a Better Delivery System: A New Engineering/Health Care Partnership. Committee on Engineering and the Health Care System, National Academies Press, 2005, p. 276, http://www.nap.edu/catalog/11378.html

67 European Commission, Joint Research Centre-IPTS - Foresight activities on eHealth and Ageing, 2004 – http://www.jrc.es/home/report/english/articles/vol81/welcome.htm

68 A study into the fragmentation of the assistive technologies industry has been launched in 2007

The mainstream ICT industry is increasingly interested in the ageing market because of its growing size and buying power as illustrated before. ICT enables new services which are more customer-centred and more responsive to social needs, as well as opportunities for products to be designed around the needs of the growing ageing population. This offers the perspective of ***mainstreaming the ageing factor into its general purpose products and services***. This new perspective entails a change in roles and responsibilities of all the actors involved in the design and provision of ICT products and services for older people.

One FTSE 100 company, who has improved web accessibility, reports:

- *A 30% increase in natural search engine traffic, including improved ranking for Google keywords;*
- *75% reduction in the time each page takes to download;*
- *13,000 visitors per month benefiting from improved browser compatibility;*
- *A reduction in complaints about the website;*
- *£200k saving on annual maintenance costs.*

Nomensa FTSE Report, 2006, investigating the

Mainstreaming the aging and disability factors has important implications for eAccessibility: responding to the needs of the ageing society entails a ***shift in the design philosophy of ICT industry for mainstream products***, insofar as the needs of older persons and persons with disabilities will need to be incorporated upfront into the design of products and services due to a growing market share of ageing customers. This also implies costs reductions in the delivery of eAccessibility, thriving on larger economies of scale for accessible products due to increased demand from the ageing population.

Moreover, it has often been shown that products and services that have been designed to be eAccessible, become easier to use for customers in general, not only for people with special needs and can thus significantly the mainstream market.

Related to this, when the design of a product or service takes account of all users' needs, the potential of advantages for providers is high[69]: increasing the number of potential users and thus of sales, improving customers satisfaction, improving competitiveness, anticipating changes, improving public image.

While the eHealth technology supply side is also still dominated by small and medium size enterprises, the current trend shows an increased interest from larger companies. Amongst larger companies there are a small number of European companies which enjoy a strong global position in the ICT health market and new entrants such as telecom service providers which are increasingly interested in this field.

An example is the recent creation of the ***Continua health alliance***, initiated by Intel, which has been established to help address future health and social care challenges. The collaborative industry organization is dedicated to bringing together standards and diverse technology to create new health

69 See "the Design for All Foundation" http://www.designforall.org

care solutions. The Continua Health Alliance envisions personal tele-health systems that combine diverse products and technologies to enable better personal health care for people worldwide. Founding members include Avita, Body Media, Cisco, GE, IBM, Intel, Kaiser Permanente, Medtronic, Motorola, Nonin, Omron, Panasonic, Partners Healthcare, Philips, Polar Electro, RMD Networks, Samsung, Sharp, Tunstall, Welch-Allyn, and Zensys (http://www.continuaalliance.org/home)

Another example, from the USA, the Center for Aging Services Technologies (CAST) is leading the national charge to develop and deploy technologies that can improve the aging experience in America. CAST has four focus areas:

- Driving a national vision of how technologies can improve the quality of life for seniors while reducing healthcare costs
- Accelerating technology R&D pilots with seniors to fulfill this vision
- Advocating to remove barriers to the rapid commercialization of proven solutions
- Promoting national dialogue about standards to ensure interoperability and widespread access to aging services technologies.

Established in 2003, CAST has become a national coalition of more than 400 technology companies, aging services organizations, research universities, and government representatives. (http://agingtech.org/about.aspx)

In summary, the newly emerging value chains are expected to be characterised by:

- seamless integration of: a) user; b) formal and informal intermediaries; c) health and social care providers; d) technology, and service providers (e.g. telecom operators); e) local/regional authorities;
- redesigned roles and responsibilities between insurers and health service providers in the emerging service market for front-desk assistance;
- exploiting the EU internal market in the cross-border provision of services while safeguarding patient data security across national and organisational boundaries;
- incorporating the perspective of ageing users into the design, production and delivery of mainstream products and services (‘embedding inclusion’).

4. BARRIERS TO ICT FOR AGEING

Currently, the ageing market fails in unchaining its full potential for the several reasons that are mostly related to the common characteristics of product/service delivery analysed previously. The relationship between these characteristics and market barriers / failures is summarized in the table below.

Characteristic of product/service provision	Market Barriers / Failures
Information asymmetries, relatively weak user	*Information failures* leading to slow adoption of solutions and combined to to lack of skills to choose and use solutions, e.g. where users have reduced cognitive capabilities, limited user financial means, limited user voice, and lack of motivation. Older people lag behind in basic access (only 10% of persons over 65 used the Internet). A resulting barrier can be fragmentation of the internal market, where there is policy intervention to protect the user which is not coordinated between Member States.
	Due to the degree of sophistication of tools and services for the ageing users there is a risk of *information failures* between actual users needs and the providers (as there is intermediation), resulting in unsuitable products, high prices, and lack of competition.
Intrinsic or persistent diversity	Fragmentation of industry and often tailor-made solutions at local and regional level, lead to lack of economies of scale;
	Fragmentation of user organisations; lack of insight into progress e.g. relative to other countries, lack of provision of more advanced health services or social services or assistive devices.
Political and legal frameworks	Regulatory barriers fragmenting the internal market for accessible information society services for the ageing population: fragmentation of reimbursement and certification schemes, lack of interoperability, and high costs of development and validation
	Regulatory barriers national or sub-national level: limited reimbursement of innovation; slow certification.
Technology: access, accessibility, change	Access barriers tend to be related to the characteristics of the user (e.g. is lacking finance, skills or has an impairment). Accessibility barriers can be seen mainly as a technology issue, either inadequacies of the state-of-the-art of technology itself, or in the technology design: inaccessible devices from PCs and television sets to micro-waves, inaccessible websites, insufficient application of design for all.
	Speed of technology development can be much greater than speed of adoption or

	adaptation of service delivery leading to a supply-demand mismatch.
Disconnection of investments and benefits	Time-lag between investments and benefits leads to risk-averse behaviour; organisational / value-chain gaps lead to self-centred or non-inclusive behaviour and sub-optimisation of solutions; lack of critical mass to achieve network effects lead to proprietary solutions, and – notably – the lack of provision of sufficiently rich content and services.
Interoperability	Lack of interoperability between services (e.g. health – social), between devices and systems (e.g. need to re-enter data with resulting errors), and across borders (barriers to internal market, freedom of movement). The reasons are various, including historic choices, (maintaining) dominance in national markets, speed of technology development, localised and tailor-made solutions.
Value chain coordination	Coordination failures such as between users and industry or between users and authorities.
Ethically conditioned	Uncertainty in the market as regards ethical acceptability leading to under-investment and lack of take-up.

These market barriers / failures can be grouped into broad categories, as illustrated in Figure and detailed in the sections below:

Barriers related to lack of awareness and common strategies

(4) Barriers related to enabling conditions

(5) Barriers related to take-up

(6) Barriers related to the development of future solutions.

Barriers in these categories can be inter-related. For example, lack of awareness amongst authorities can lead to lack of formulation of a common vision and thereby lack of willingness to invest in pilots that would promote take-up and resolve interoperability barriers. Consequently a key enabling condition, interoperability, is not put in place and as a result there is stagnation in the maturation of the market.

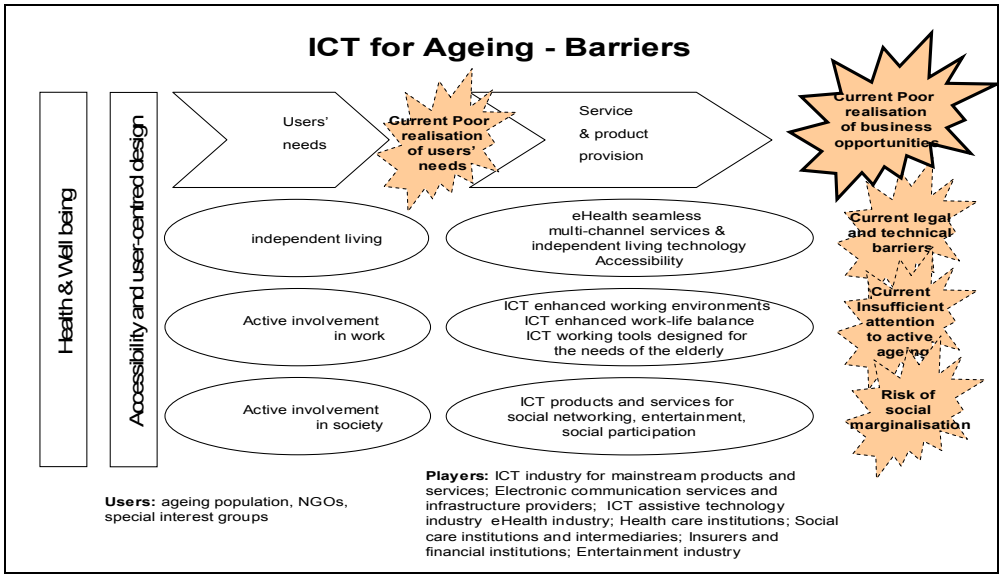


Figure 5 Barriers to ICT for ageing

4.1. Barriers related to lack of awareness and common strategies

4.1.1. Lack of awareness

Lack of awareness by the European ICT industry, intermediate and final users of assistive technologies for elderly people has been a key factor why the senior market for ICT has not been so far adequately addressed.

Despite the proven potential of telemedicine and home care support systems, adoption still suffers from lack of sufficient awareness among potential providers and authorities. Despite growing demand for ICT for ageing, there is still no widespread realisation of potential profits amongst industry.

The lack of awareness among the European ICT industry players, the adopters of ICT inclusive technologies (e.g. employers in ICT-using sectors) and the final users has also led to the fact that the market of seniors has not been so far adequately addressed by manufacturers and service providers (e.g. the *design for all* approach has not gained enough recognition).

More than 60% of persons over 50 in Europe feel that their needs are not adequately addressed by current ICT equipment and services. Over 10 million of them are potential customers of new mobile phones, computer and Internet services[70]. More specifically, the

70 European Senior Watch Observatory and Inventory, Older people and Information Society Technology – Factors facilitating or constraining uptake, 2002

provision of ICT for older people is hampered by lack of awareness of[71]:

- Socio-economic circumstances of their lives and their income levels that may impede access to ICT equipment and services;
- Knowledge, education level, learning capabilities and personal attitudes and sensitiveness towards ICT;
- Physical and/or cognitive functional limitations coming with age.

In labour markers, while age management is becoming an increasingly visible theme in human resource circles, so far neither employers, employer organisations nor the other social partners in the EU have given much direct attention to the specific theme of ICTs and work-related active ageing. Part of the explanation for this is a lack of awareness amongst employers of the issues for older workers around ICTs and how these can be addressed.

Finally, as regards users themselves, US data suggests that levels of awareness and usage of the built-in accessibility features of mainstream technology vary considerably amongst those who could benefit from them (study regarding the workplace, see Annex XII).

4.1.2. Lack of stakeholders involvement, cooperation and common strategies development

In addition there are market barriers / failures due to lack of coordination and involvement of stakeholders, lack of leadership and lack of common vision and strategies.

Such involvement and cooperation or the lack thereof relates to most of the barriers addressed here: users are not provided with solutions and the development of the market is hampered due to a lack of shared awareness raising, agreed approaches to regulation and interoperability, deadlocks in resolving reimbursement questions, common understanding of user requirements, transfer of design for all expertise across the value chain, synergies in research agendas. This is only a partial list of key agenda points that should be addressed by strengthened cooperation and coordination amongst actors.

Cooperation and coordination failures not only occur across the value chains, but also within each group of actors – industry internal, users amongst them, and authorities.

Users – providers cooperation is in particular an issue in technology development. Unless technology is developed in close collaboration with users and other stakeholders, it will not likely answer to the specific users' needs and receive market acceptance. This is even more true knowing the diversity of the older age group, from "young" older in good health till "old"

71 Various Studies on Policy Implications of Demographic Changes in National and Community Policies LOT7 The Demographic Change – Impacts of New Technologies and Information Society Final report, 2005

older with some degree of disability or illness. Furthermore, the involvement of the carers, both formal and informal, is necessary to ensure the acceptance of the technology by the close circle of persons having an active role in the day to day life of the older person. A better, more systematic involvement of relevant stakeholders will also help in a better acceptance and take up of technologies for elderly people.

Industry internal cooperation is amongst others an issue in the adoption of design for all. This concept means that a chain of professionals (i.e. architect, software programmer, engineer) need to work together, adapt and develop expertise. Failure to achieve this collaboration is one reason why the take-up has so far been limited.

4.2. Barriers related to enabling conditions

4.2.1. Regulatory barriers towards a single European market of ICT for ageing

Regulatory barriers towards ICT for ageing exist in several areas: the fragmentation of reimbursement and financial support schemes for users; the uncertainty about certification of solutions notably whether they are medical or not; minimal technology requirements, notably as regards interoperability and accessibility.

Different reimbursement and certification schemes: the provision of services is subject to different national and even local regulations, i.e. different reimbursement, service delivery and certification schemes. This constitutes a key impediment for critical mass, since most products and services are developed to match only national or local needs, where the market is very limited, thus leading to higher costs and low levels of investments. Moreover, without proper regulatory approaches and replication of initiatives at EU level, potential ***tailor-made solutions*** from local authorities combined with differing national certification and reimbursement schemes for ICT solutions might only ***add up to the technical and regulatory burden*** of the sector with no benefits for the final users.

A particular consequence is the fragmentation of the assistive technologies industry, largely confined to national borders due to the lack of harmonisation of reimbursement schemes, causing lack of economies of scale and resulting in unnecessary high costs for users and insurers. As of today this industry largely does not benefit from the internal market.

Uncertainties exacerbate this, e.g. about what should be financed collectively rather than by the individual as well as about certification (e.g. medical certification of independent living and fitness / health monitoring devices). Uncertainty also exists as regards whether a service is accepted as a medical service. More specifically, tele-health is even considered legally as a medical service in some countries.

Current evidence shows diverging national legislative interventions and standards on e-Health interoperability, on e-Accessibility, which constitute a potential barrier to the uptake of ICT products and services for the ageing society.

Legislation that is not ICT specific can nevertheless have important consequences for older people and ICT, but interpretation is still emerging. An example is anti-discrimination legislation, e.g about reasonable accommodation at the workplace where often ICT plays an important role. In this respect technical barriers in accessibility of technologies can have regulatory implications. The lack of accessibility of services and ICT tools might give rise to regulatory intervention if the market is not able to cope with this need. This is reinforced by the fact that, through ICT, a number of public services are delivered. In this regard, a case of discriminatory treatment might emerge insofar as equivalent services are not provided to the excluded users.

ICT specific legislation for electronic communications and for ICT equipment, specifically addressing people with disabilities regardless their age, is highly relevant given the strong linkage between age and prevalence of impairments. However, barriers are signalled due to perceived lack of effectiveness, slow progress in implementation or lack of agreement between users and providers about the implementation of such eAccessibility-related legislation (i.c. regulatory provisions for disabled people in the electronic communications package[72] and in the radio equipment and telecommunications terminal equipment RTTE directive[73]).

INCOM, the Inclusive Communications subgroup of the eCommunications Framework Committee (COCOM)[74] has issued two reports on the access and use of electronic communications by users with disabilities. These reports, in 2004 and 2006, identified the major problems that people with disabilities face when using electronic communications as well as the relevant applicable legal provisions from the electronic communications package ensuring protection of the interests of end-users. The reports found as main outcome that users with disabilities – and thus, often elderly users - are placed in an overall disadvantaged situation in Europe, in relation to availability, choice, quality, price and in particular access to electronic communications.

The existence of regulatory barriers heavily limits the profitability of value chains for ICT products and services for ageing

72 The regulatory framework adopted by the Commission in 2002 consists of five Directives: Access Directive (2002/19/EC); Authorisation Directive (2002/20/EC); Framework Directive (2002/21/EC); Universal Service Directive (2002/22/EC), and Privacy and electronic communications Directive (2002/58/EC).

73 Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

74 COCOM was established by the Framework Directive. INCOM is a subgroup of COCOM. For further information: http://europa.eu.int/information_society/policy/accessibility/regulation/incom_2003/index_en.htm

4.2.2. Market fragmentation and lack of interoperability

The market environment for ICT products and services relevant for older people is highly diverse, and this diversity has led to complex and fragmented demand and supply, lacking the adequate scale for a profitable uptake and a niche approach by companies. Different actors are involved in the development and provision of ICT inclusive products and services, and a variety of social and local factors of technological, psychological, sociological, political, economic nature influence uptake. This creates market barriers in terms of commercialisation and in terms of overcoming technical barriers notably interoperability.

Interoperability problems concern both the general field of interoperation between assistive technologies and mainstream technologies as well as the specific area of eHealth products and services. Lack of interoperability of existing assistive and health-related ICT with mainstream technologies gives rise to sub-optimal dimensions of the market which results higher prices for users and lower profits for suppliers and service providers. Without proper market incentives, companies do not tend to tackle the issue of interoperability by themselves.

Interoperability failures also manifest themselves also in lack of seamless interaction of technologies to deliver services to the user independently from the technological platform of access. These barriers concern both the "front-desk" service delivery (the "how" to access the service) and the "back-office" organisation of services and workflows (e.g. health services supported by ICT need to comply with interoperable protocols as well as need to rely on interoperable technologies for "back-office" and patient access to the service, independently from location).

It has been estimated that there are currently more than 20,000 assistive technology products available in Europe. Although there is no reliable estimate of the numbers of people actually using assistive technologies, it is widely accepted that there are significant market and supply failures in Europe, which are partially due to lack of interoperability between such products and mainstream ICT environments.

Interoperability has to address many levels: political, organisational, legal and regulatory, semantic, and technical. Interoperability should be ensured in key areas such as smart homes (incl. sensor networks), integrated social and health care, eHealth-related care for chronic diseases – which particularly affect elderly persons, and between assistive technologies and mainstream technologies. Interoperability would require de facto or de jure standardisation on a wide range of technical, service delivery and process issues (e.g. quality control) – see also below.

Interoperability problems hinder the development of services and products for ICT and ageing, thus reducing the benefits to users and the profitability to providers.

4.2.3. Lack of basic access to the information society – digital divide

Older people in particular can miss out on the benefits of the information society because they are lacking basic access to communication networks, e.g. broadband, and information technology, e.g. PCs. Solutions can only bring benefits if users have access to basic ICT facilities. Only 10% of people over 65 use the Internet against 68% of those aged 16-24[75].

Reasons most often are lack of motivation, lack of financial means, and lack of skills. This in particular hampers the social participation in the information society. However, findings from the USA have also shown that once this digital divide has been bridged, these users that were once lagging behind become at least as intense users as the earlier adopters of online public services, communications, and online health.

4.2.4. Lack of consideration of ethical issues

Ethical issues encompass dealing with sensitive problems such as informed consent, protection of personal data, non invasion of the private sphere, respect for dignity and integrity of the persons.

The **European Group on Ethics** in its opinion of March 2005 on "Ethical aspects of ICT implants in the human body" has listed fundamental ethical principles. Though applicable to ICT implants in the human body these may also give guidance to ICT and ageing:

- non-instrumentalisation: ethical requirement not to use individuals merely as means but as an end of their own;
- privacy: ethical principle of not invading a person's right to privacy;
- informed consent: ethical principle to not expose persons to treatment or research without their free and informed consent. Therefore a strict preliminary evaluation should be performed to ensure an informed consent;
- non-discrimination: ethical principle according to which a person deserves an equal treatment unless reasons exists that justify difference in treatment;
- equity: ethical principle that everybody should have fait access to the benefits under consideration;
- precautionary principle: the basic constituents and the prerequisites of this ethical principle are the existence of a risk, the possibility of harm and a scientific uncertainty concerning the realisation of this harm. There must be a proportion between the potential harm and the "zero risk" situation: the acceptable risk should be identified with regard to the respect for the human body.

75 Riga e-Inclusion Ministerial Declaration, 2006
http://europa.eu.int/information_society/events/ict_riga_2006/index_en.htm

These principles are based upon more general ethical principles such as human dignity and human inviolability. Human dignity is a universal, fundamental and inescapable principle. Article 1 of the European Charter of Fundamental Rights states that "human dignity is inviolable". Dignity is used to convey the need to respect people's autonomy and rights. On its side, the principle of human inviolability limits the freedom to use one's body by prohibiting turning a body into sources of profit.

When ethical concerns are ignored or not fully taken into account by the technology developed they lead to a rejection by the older person and his informal carers and then constitute a barrier to market uptake.

4.3. Barriers related to take-up

Barriers to take-up, beyond lack of awareness, can limit investments. One set of reasons are the various forms of investment - benefit mismatches (time-lag, organisational / value chain, network effects). Another reason is lack of insight into the returns on investment, whether in terms of cost-effectiveness or quality of life. All these barriers result in uncertainty of investors to put their money to ICT and ageing, insurers to include solutions in reimbursement schemes, suppliers and providers to step into the market, and for users to adopt solutions. Consequences are lack of access to finance, fragmentation of approaches, sub-critical or too costly solutions, lack of service and content innovation, and inadequate service for users.

4.3.1. Lack of exchange of experiences and reference implementations

Generally there is a lack of reference implementations notably in independent living and long-term chronic care management and in active ageing at work. As of today there is little exchange of good or bad practices. E.g. smart home / independent living solutions are not yet recognised on objective criteria or given wide visibility such that replication is enabled.

Most of the advantages in terms of productivity and economic growth, in a period where the "baby boom" generation is heading for retirement, are coming from increasing older age participation in the labour market. However, there is a limited exchange of best practice on:

- Awareness of practices and policies at EU level for best retaining older workers (e.g. those over 55);
- Comprehensive approach towards active ageing at work including coherent frameworks for long life learning and digital literacy;
- The need to adapt labour market regulations to innovative concepts of work-organisations and work-environments;
- The design of new methods of work and innovative work-environments for elderly workers enhancing their quality of life at work by better adoption of accessible ICT.

4.3.2. Insufficient validation of solutions, lack of critical mass

Solutions often stay in laboratory stage or remain small scale as the critical mass is lacking to scale them up for large scale deployment, due to the various forms of fragmentation. This seriously hampers large-scale assessment of cost-benefits and quality of life impact and achieving economies of scale and corresponding cost reductions. The situation is somewhat improving though in the eHealth area, but socio-economic evidence of solutions in ICT for ageing in general is still very limited. Scaling up is also severely hampered by lack of critical mass to validate interoperability and arrive at common specifications.

4.3.3. Lack of common approaches and coordination of take-up of innovation

Generally, take-up is hampered by lack of definition of and agreement on common approaches, ranging from common specifications for platforms, interoperability, reimbursement models, and systematic market development.

4.4. Barriers related to developing future solutions

4.4.1. Lack of risk sharing in exploring the future, lack of synergies in research agendas

The diffusion of ICT applications and services for older and disabled people is limited by ***initial high economic costs linked to investments in research and technology development (as in uptake)***. Public and private partners can only overcome these by sharing innovative funding schemes and seeking synergy in their research agendas, for example sharing costs and preparing for future economies of scale by coordinating national agendas. This would also and in particular be relevant for stimulating the involvement of SMEs, that may have lowest barriers to participate in research at the national level (rather than international) but still seek a larger future market.

The lack of sharing of efforts and agendas in the development of future solutions hampers the market in finding solutions for many of the other barriers:

- Radically simplifying usage and access to enable older people without digital skills to use independent living or social participation solutions;
- Exploring new services that could overcome the motivation hurdle that many older users have to become more extensive users and thereby gain more benefits;
- Preparing for large-scale follow-up validation based on interconnection and local adaptation of generic platforms so that take-up is already stimulated by research;
- Developing interoperability and accessibility approaches that are future proof and thereby allow technology-neutral regulatory support if needed– i.e. with a mainstreaming view, designed for all, with standardised interfacing between mainstream and specialised technologies for economies of scale, etc

Many users, but also intermediaries (e.g. care providers) will only be motivated to take-up ICT solutions if these offer significant improvements, for daily life, for cost control, etc. However, the various barriers add up to effectively stifle innovation and research until now. Particularly acute is the lack of research into integration of health and social care, or lack of research into the integration of home technologies with tele-services.

4.4.2. Future eAccessibility and interoperability

Access to the information society can be provided by several technical means or channels: PC/Internet, digital TV, mobile or fixed phones, and private (e.g. ATMs) or public kiosks, while new channels will be emerging (e.g. Internet access integrated in the intelligent home applications, car, and public transport). Many of these channels are 'converging'. It is important to ensure that whatever type of service is delivered to older persons at home (health, social, financial, etc), they are provided from the perspective of the user on a common friendly platform or easily understood form set of interactions as it is unlikely that older persons would cope with a separate platform and different interaction modalities for each application. This form of 'convergence' requires a high degree of ***future interoperability*** within and between front-end services presentation/interaction and the back-end services provision.

Interoperability (and accessibility), once explored in research require standardisation follow-up. This involve the development of standards allowing system integration of multi-vendor solutions, e.g. in terms of sensor networks, semantic interoperability of sensor data, interfacing with assistive devices, and interaction with ICT-enable equipment in the home.

Although some partial standards are emerging for the home environment (e.g. Universal Plug and Play, OSGI) they remain at a basic system level and do not facilitate easy development and integration of components into complete system solutions. Thus this leads to market fragmentation and higher costs. It is likely that future independent living solutions will integrate a large number of devices and services. Therefore, it is key to prepare for interoperability by researching interoperable platforms.

Many forms of standards would be needed: such as standards for devices, protocols, messages, documents, processes, architecture, design and modelling, as well as standards for infrastructure and infrastructural services with specific emphases on safety, security and privacy services. Furthermore, it can be considered that standards for specifications, knowledge representation, terminologies and ontologies can be deployed for shared care through a voluntary, collaborative process that involves all the relevant stakeholders.

A question is also how to ensure ***consistent and inclusive accessibility in the future world of converging communications*** – i.e. at the level of design for accessibility (design for all) of equipment, and at the level of applications or services.

These challenges become even more important due to the expected strong technological input in future services. In this regard, barriers to usability of ICT services and tools add up to asymmetries of information that can affect weaker consumers' choice (such as lack of access to technologies, lack of accessibility and user-friendliness, inaccessible devices from PCs and television sets to micro-waves, inaccessible websites, insufficient application of the principles of "design for all").

In the domain of social participation both access to and the accessibility of content and community services through commonly used platforms must be ensured to allow elderly people to fully reap the benefits of ICT and of the services increasingly delivered through ICT channels. For instance, a great potential emerges from tailored content due to progress in terms of interactivity. However, there is an urgent need to improve the accessibility and easiness-to-use of platforms such as digital television and mobile communications for this purpose. The success of new solutions in ICT for ageing will depend critically on use and acceptance by the target market: older people themselves. Research shows that not everyone would automatically accept and use ICT-based products and services in their everyday life. Usability and acceptability depend on various factors: adequate design, financial resources, living circumstances, personal attitudes and experiences, and of course, the advantages and practicality of the device.

However, because of uncertainty about these technologies and the perceived sub-critical nature of user requirements these issues are not consistently explored and taken into account early in product development. Despite growing demand for ICT for ageing, there is still no coherent agenda for technology development. Companies are still acting on a trial-and-error basis.

Consequently these are research challenges, with subsequent market validation and possibly further standardisation and possibly regulatory support that require cooperation and bundling of efforts.

5. POLICY ACTIONS

5.1. Introduction

Following the preceding contextual analysis, followed by the analysis of the three life situations in ICT and ageing and subsequently the identification and grouping of barriers in product/service delivery, this chapter finally presents a range of possible policy actions to both address the barriers and to fully exploit the future opportunities. ***Here no more than a number of options are presented. Actual choice and formulation of actions is subject of official Commission policy*** (Communication on Ageing Well in the Information Society).

Firstly, a one-to-one analysis is provided of barriers and generic policy responses. The nature of these policy responses – some of which would be at the national or regional level, some at the European level – will be familiar from other fields where there is a limited mandate to intervene by public policy and to act at European level. Secondly, an adoption model is presented that is useful in considering the impact of actions in relation to the stage of take-up. Finally, actions are detailed and grouped in the same four categories as the barriers in the preceding chapter, namely:

5.2. Raising awareness and building consensus

5.3. Putting the enabling conditions in place

5.4. Promoting take-up

5.5. Preparing for the future.

Where possible the concrete actions that are suggested here build upon or are part of ongoing action plans and policy work, such as the action plans on broadband, e-health, e-government, or the preparatory work for e-inclusion, on which a separate Communication is foreseen.

5.1.1. Policy responses to barriers

The link between barriers and policy actions is summarised in the table below.

Barriers	Policy responses
Information failures leading to slow adoption of solutions and combined to to lack of skills to choose and use solutions, e.g. where users have reduced cognitive capabilities, limited user financial means, limited user voice, and lack of motivation. Older people lag behind in basic access (only 10% of persons over 65 used the Internet). A resulting barrier can be fragmentation of the internal market, where there is policy	Private or collective insurance and taxation for social and health security, supporting user organisations for stronger interest representation, user awareness creation and training, incentives for intermediaries to provide assistance, legal safeguards and obligations.

intervention to protect the user which is not coordinated between Member States. Due to the degree of sophistication of tools and services for the ageing users there is a risk of *information failures* between actual users needs and the providers (as there is intermediation), resulting in unsuitable products, high prices, and lack of competition.	Incentives for intermediaries closest to the user e.g. with new types of contracts based on results rather than production, re-organising delivery, user empowerment by informing the user and providing direct choice, amongst others through legislative intervention, guidelines, exchange of experiences, user-empowering technology (e.g. Internet-/television-based health-information websites and channels).
Fragmentation of industry and often tailor-made solutions at local and regional level, lead to lack of economies of scale; Fragmentation of user organisations; lack of insight into progress e.g. relative to other countries, lack of provision of more advanced health services or social services or assistive devices.	Policy countermeasures address risk-sharing through R&D and deployment pilots in new approaches to solutions and technologies (economies of scale through mainstreaming combined with standardised interfaces to special adaptations), and service / reimbursement harmonisation through guidelines, standards, and legislation, as well as benchmarking.
Regulatory barriers fragmenting the internal market for accessible information society services for the ageing population: differences in reimbursement and certification schemes and in e-accessibility requirements, legal uncertainty as regards cross-border health services reimbursement Regulatory barriers national or sub-national level: limited reimbursement of innovation; slow certification.	Policy countermeasures are creating sufficient political awareness and political support for changing regulatory frameworks, through a combination of hard legislation and soft legislation (e.g. self-regulation) on common principles and their application (e.g. service portability to enhance user mobility in the Internal Market; service accessibility in electronic communications) and on harmonisation.
Time-lag between investments and benefits leads to risk-averse behaviour; organisational / value-chain gaps lead to self-centred or non-inclusive behaviour and sub-optimisation of solutions; lack of critical mass to achieve network effects lead to proprietary solutions, and – notably – the lack of provision of sufficiently rich content and services.	Risk mitigation, shared financial schemes (such as insurance and taxation), incentives for pursuing a common agenda, shared R&D, piloting, and validation.
Access barriers tend to be related to the characteristics of the user (the 'weak user'). Accessibility barriers can be seen mainly as a technology issue, either inadequacies of the state-of-the-art of technology itself, or in the technology design: inaccessible devices from PCs and television sets to micro-waves, inaccessible websites, insufficient application of design for all.	Creating awareness of and spreading design for all, joint R&D on early-stage inclusion of accessibility in ICT, common specifications development and standardisation, legislation.

Speed of technology development can be much greater than speed of adoption or adaptation of service delivery.	Technology foresight, value-chain oriented R&D, and sand-boxed innovation support schemes (where rules are temporarily waived).
Lack of interoperability between services (e.g. health – social), between devices and systems (e.g. need to re-enter data with resulting errors), and across borders (barriers to internal market, freedom of movement). The reasons are various, including historic choices, (maintaining) dominance in national markets, speed of technology development, localised and tailor-made solutions.	Encouraging industry cooperation, risk-sharing in interoperability R&D and validation, mandating formal standards, and legislation.
Coordination failures across players in the value chain and across public authorities such as between users and industry or between users and authorities.	Stakeholder platforms, cooperation networks monitoring and benchmarking.
Uncertainty as regards ethical acceptability leading to under-investment and lack of take-up.	Studies into ethical issues related to technology foresight, ethical debates, guidelines, monitoring and supervision by ethical committees.

5.1.2. The stages of market maturity and the required policy actions

According to the Molnar model[76], ICT markets go through the usual 3 stages of early adoption, take-up and saturation (see Figure) under the influence of a number of factors. If older people are not moving as fast through these stages as others then this is called an age-related digital divide.

Factors influencing early adoption are basic access to ICT and accessibility, which both strongly and negatively correlate with age. Main factors for the take-off stage are motivation and skills, where motivation is strongly influenced by the content of services (e.g. the health and social services) and by the social network (‘are peers using it’) and where skills include digital literacy. In the saturation stage benefits become much more profound for certain groups of users and stay superficial for others. Factors influencing this are more complex, and can be related to the sophistication of services, and the extent to which usage contributes to the formation of social capital.

76 Molnar, S. - The Explanation Frame of the Digital Divide, 2003; and The Tavistock Institute - Status of e-Inclusion Measurement, Analysis and Approaches for Improvement, 2007

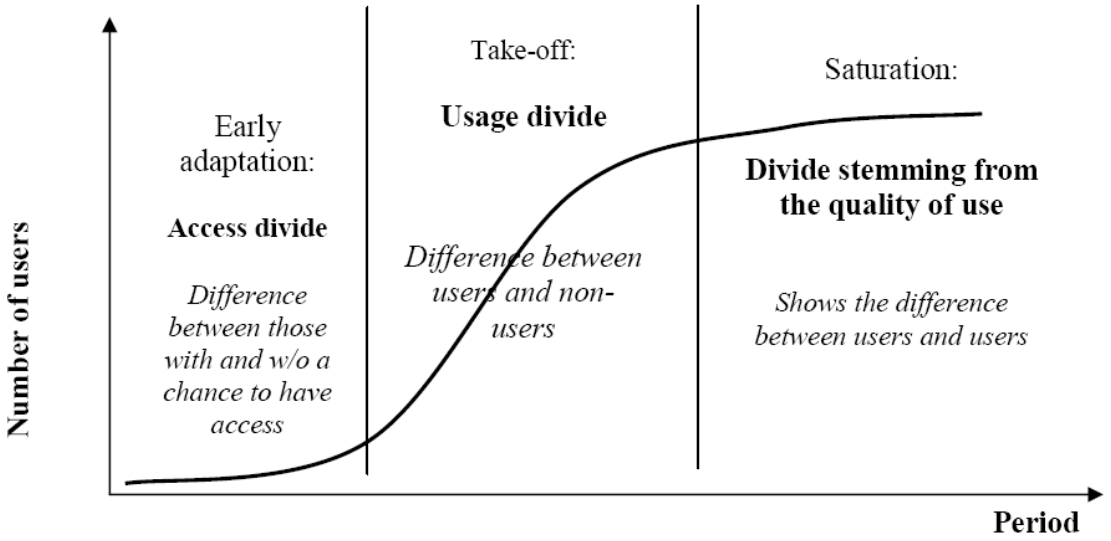


Figure 6 Market stages and digital divides

The following policy actions can be related to these phases of digital divide:

Access divide: policy actions to reduce access divide make use of regulatory frameworks (e.g. revision of the electronic communication framework, assessment of universal service obligations, analysis of principles for digital accessibility and user-friendly design of ICT, interoperability of ICT services); fostering research and technological development in innovative solutions for cost-effective access, user-centric design and interoperable solutions; innovation initiatives to replicate successful examples to overcome access divides and effective business models (also in partnership with public authorities) to extend the reach and affordability of socially inclusive services.

(7) Take-off / usage divide: policy measures aim to address mainly two aspects on which usage depends: a) willingness (hence digital skills and motivation) and b) the existence of attractive services which are useful to the ageing population (services related to their life patterns). Policy actions thus mainly relate to exchange of good practices for social inclusion in the information society, replication of successful services, awareness raising campaigns to the users and industry actors on the economic and social potentials of innovative services, and finally research activities in technologies and innovative services which are useful and cost-effective for the ageing population.

(8) Quality divide: this divide concerns the most mature technologies that are available in the market and are not used (or not affordable to all) due to inadequacy in delivery, lack of attention to user-centred design, or perceived limited added value for the ageing person. Policy actions in this area include minimum quality standards for service delivery (whether on a voluntary or regulatory basis, e.g. for accessible and user-friendly technologies), replication of successful experiences and promotion of best practices for delivering high-quality cost-effective services.

The model above also corresponds closely to practical guidance derived from experiences in achieving digital inclusion, which, in addition, advocate taking an integrated ('holistic') approach to overcome barriers[77].

5.2. Raising awareness and building consensus

5.2.1. Awareness raising and dissemination

After consulting with industry and civil society representatives, a strong need is emerging to increase visibility and disseminate knowledge in this domain in order to attract the attention of key actors in the field. Actions include:

- Increased public visibility of **real life practices, pilot and research efforts**, including visual material for educational and awareness purposes

- **Wide dissemination of progress and results** through annual workshops and major conferences (2006-2010); ICT and ageing should make a major contribution to the envisaged 2008 EU e-Inclusion Summit.

- Activating awareness through conferences and workshops for specific as well as general audiences. As regards design for all the EDEAN network would be invited to contribute[78]

- Raising awareness of ICT and work practices for older-age workers among employers and workers themselves

- Raising awareness of the benefits of being connected to the information society – especially access to the Internet – amongst older people.

POSSIBLE ACTION: Industry, authorities at national and regional level, user organisations, professional networks and innovative projects to contribute to awareness raising, notably around Intenet access, ICT for active ageing at work, and the opportunities of ICT for independent living. The EU e-Inclusion initiative 2008 to be used to significantly raise the visibility of solutions notably in independent living.

An event by mid 2007 to bring together real-life experiences as well as show progress in design for all solutions, notably for older people.

The Commission to create a single online entry point on ICT and ageing.

77 See e.g. Intel, Achieving Digital Inclusion. Government Best Practice on Increasing Household Adoption of Computers, 2005, http://www.intel.com/business/bss/industry/government/govgappwhitepaper.pdf

78 European Design for All eAccessibility Network – www.edean.org.

5.2.2. Building consensus

In order to successfully carry out a policy aiming at stimulating the ICT market for older people, it is necessary to involve all key actors, i.e.:

- **Older persons** should be involved from the beginning, to take on board user needs, and to be involved in testing and evaluation, and to make their voice heard in vision and policy development.
- **Ministries and public authorities** at **national** and **regional** level responsible for policy, legal and implementation frameworks with policy responsibilities for finance, competitiveness, innovation, social affairs, health, housing, labour, education.
- **Industry and service providers**, industry associations, chamber of commerce, professionals and their professional associations (product development, deployment, take-up). ICT, professional social services, health, training, pharmaceuticals should all play a role.
- **Employers,** to address the issues of active ageing at work.
- Public and private **health insurers** whose cost reduction concerns will need to be addressed by any policy initiative on ageing.
- **Researchers and academia** looking into innovative and creative solutions also provide scientific support to these actions.
- **Telecom and building infrastructure** regulators and standardisation bodies: organisations are key enablers of the products and services availability.

A consultation with stakeholders held in January 2006 highlighted the following needs[79]:

- Creating a ***European stakeholder partnership on ICT for ageing*** to look for innovative views on active ageing and independent living;
- ***Engaging users in social networking*** through e-society applications (e.g. e-voting facilities for seniors with mobility impairments; tele-consultations for health care, social e-meetings, e-leisure…).
- Establishing national programmes focusing on the introduction of ICT-based independent living services supported by informal carers.
- Continuing enhanced coordination of policies and activities of Member States under the i2010 High Level Group.
- Creating a ***European forum on active ageing in work*** with social partners, health authorities and policy makers, in order to find common frameworks to promote work involvement of older age groups.

A consultation held in September 2006 confirmed the need for strengthened and flexible stakeholder partnerships in delivering practical progress in ICT and ageing.

79 European Commission, Joint Research Centre - IPTS, 2006

Further discussions with stakeholder representatives in November 2006 clarified both the need and the opportunities to strengthen the link between ageing and disability advocacy. User organisations with various interests (ageing, patients, disability) could benefit by exploring their common ground and thus strengthening their voice in policy discussions. In addition, active partnerships between industry and users in addressing future technology developments should be significantly deepened and new mechanisms need to be explored (see also below under "5.5. Preparing for the future").

The following key actions would contribute to building consensus and common strategies:

Establishment of a stakeholder partnership involving all the value chain actors to contribute the delivery-oriented roadmaps for ICT and ageing, towards the 2008 EU e-Inclusion initiative and to advice on a common long-term vision for ICT and ageing.

Taking up ICT and ageing as a priority theme in the e-Inclusion subgroup of the i2010 High Level Group representing Member States, and cooperation with the eHealth and eGovernment subgroups of Member States representatives.

Deepening cooperation and partnership between user representatives and industry as well as amongst industry and user representatives themselves.

POSSIBLE ACTION: A continuous stakeholder dialoque on ICT and ageing to be put in place, involving all relevant public and private entities which should result in common visions and roadmaps for actions. The Commission to explore with users and industry further cooperation in order to ensure effective follow-up of policies and preparation of future work.

*The establishment of an **innovation partnership** on ICT for Ageing bringing all stakeholders from business and civil society would contribute to this aim.*

Within the e-Inclusion policy following the Riga Ministerial Conference, the related i2010 subgroup to address ICT and ageing as a priority theme and propose roadmaps that include the 2008 EU e-Inclusion event as an important milestone to report progress and review directions, including on ICT and ageing. The subgroup thereby also to provide input to the foreseen follow-up Communication on ageing announced in the recent Demographics Change policy of the Commission for 2008.

*To explore advancing the common agenda in the area of **ICT for active ageing** and sustained digital competences at work in the agenda of a Ministerial-level event under the Portuguese Presidency.*

5.3. Putting the enabling conditions in place

5.3.1. Regulation

In most European countries, delivery-to-use of technology for ageing is conditioned by two different service provision systems, the health care system on the one hand and social services on the other. From a legal and regulatory perspective, these delivery schemes are embedded in

general social legislation/regulation or anti-discrimination legislation/regulation which have their own history and continue to evolve. Much of the information about potential barriers related to these provision, reimbursement and certification systems is at Member States level and the first step in removing regulatory barriers due to their fragmentation is making this information available and subsequent analysis. Based on the analysis the removal of barriers in reimbursement, interoperability etc should be discussed and targets be defined, as announced in the Riga Declaration.

POSSIBLE ACTION: Member States through the i2010 e-Inclusion subgroup to make available information on the national regulatory and organisational approaches (including reimbursement, certification). The Commission to bring together this information in national factsheets.

The Commission to launch a study on independent living that will amongst other analyse the national situation and identify barriers.

Member States in the relevant i2010 subgroups to come forward with objective setting and target dates for the removal of such barriers, in line with the Riga Declaration.

In the frame of the follow-up to the 2005 Communication on eAccessibility[80], the Riga Declaration, and the eHealth Action Plan the steps are:

To make <u>better use of current legislation</u> such as the Equal Treatment in Employment Directive[81], the current eCommunications Framework, the Directive on Radio and Telecommunication Terminals, the Public Procurement Directives (that foresee that accessibility is taken up where possible, see also 5.3.2. Standardisation and Interoperability below). A particular issue to use the Radio Spectrum Decision for ICT for ageing to achieve spectrum harmonisation for devices / services for independent living e.g. social alarms.

To <u>contribute to improved legislation</u>, including the electronic communication package and the public procurement directives. As regards eCommunications this would include accessibility of emergency services (112 number) and strengthened involvement of users. The revision of the Universal Service provisions for electronic communications[82] foreseen for 2007, and the current review of the electronic communications framework[83] should be used to address the requirements of users with special needs – and older users – on an equal rights basis[84]. As concerns the Universal Service provisions, the opportunity

80 COM(2005)425 final

81 Council Directive 2000/78/EC of 27 November 2000 prohibits discrimination of older persons inter alia at work and encompasses reasonable accommodation including ICT

82 Riga Ministerial Declaration, ibidem, §34

83 http://europa.eu.int/information_society/policy/ecomm/index_en.htm

84 In the particular case of access to online health information and services a study for the European Commission in 1999/2000 concluded that any need for extension of universal service obligations in a manner that would facilitate the affordability of online access to health services for citizens would depend on the extent to which such services become a normative and central feature of health activity of citizens (EMPIRICA and WRC 2000). The study recommended that this issue be kept under review as the Information Society evolves in Europe.

consists in reducing costs of access (although many of the new services will require broadband access, which is not part of the Universal Service provisions) and allowing better accessibility provisions. As regards public procurement it should be explored whether accessibility provisions can be made mandatory – by 2010 as requested in the Riga Declaration.

(7) To investigate the need for new legislation: the above may not cover the full scope of digital accessibility or of interoperability, e.g. not included are accessible terminals, accessible content, web-accessibility, interoperable eHealth systems across Europoe. In some case in existing legislation provisions are not technology-neutral and not future-proof. The need is being assessed for reinforced or complementary legislative measures based on internal market and non-discrimination principles technology-neutrality and performance criteria rather than specific implementations, supported by joint research work for to safeguard future-proofness.

Assessment work is amongst other happening in dialogue with users and industry and by the MEAC study aimed at measuring the accessibility legislation impact and assessing the need for legislation on eAccessibility.[85]

POSSIBLE ACTION: to request from Member States strengthened implementation of current legislation related to ICT and ageing.

Stakeholders to provide their input to revision of current legislation notably eCommunications and within this the fundamental debate on Universal Service and User Rights Directive. Stakeholders to provide input to the consultation and debate about health services in Europe.

Commission to assess effectiveness of eAccessibility-related legislation and if needed come forward with complementary legislative proposals.

Commission to consider legislative measures to support eHealth Interoperability.

5.3.2. Standardisation and Interoperability

The Commission has recently mandated European Standardisation Organisations, CEN, CENELEC and ETSI, to address standardisation of ICT accessibility requirements to be used in public procurement. This work is expected to deliver results in the course of 2007.

POSSIBLE ACTION: Member States, organisations of older people and industry to actively contribute to the eAccessibility standardisation work during 2007/2008.

85 Measuring progress of eAccessibility in Europe. Study running for 3 years from 2006

As regards eHealth interoperability, based on the input of standards development organisations that include the participation of industrial experts and particularly from the ICT sector, a set of guidelines that the Commission services will release during 2007 will focus on **framework architecture, possible technical solutions for patient summary, identifiers and an emergency data set**. Industrial representatives will include both large corporations and – presumably – small- and medium-sized enterprises. Scalability and technological neutrality issues will be taken into consideration so as to transparently contribute to the development of industry. Co-operation is also required with Integrating the Healthcare Enterprise-Europe. Although this entity is not strictly a standards organisation, integrating the Healthcare Enterprise has established profiles for standards to enable seamless communication.

European standards development organisations need to be strongly encouraged to collaborate with international standards development organisations such as Health Level 7[86] (HL7), SNOMED International[87] and DICOM[88] as well as international standards organisations and the International Telecommunication Union. In addition, it is recommended that ICT companies, including large corporations and small and medium-sized enterprises create a forum to develop interoperability guidelines. This will be based on best-known methods and practices that focus on framework architecture, interoperable patient/physician identifiers, and patient summary records to create an emergency data set.

Co-ordination efforts need to be undertaken with other areas domains of activity within the European Commission such as eGovernment, eBusiness, eInclusion in general, and with the European Interoperability Programme (IDABC)[89]. A collaboration scheme must be strengthened with the Directorate-General Enterprise and Industry and the Directorate-General Regional Policy. This initiative should take place in order to implement the technical aspects of a set of guidelines on eHealth interoperability and to assure the sustainability at both the regional and national levels of the eHealth systems to be implemented.

POSSIBLE ACTION: Commission to consider legislative support for eHealth interoperability during 2007.

Standardisation work will be complemented by reinforcement of standardisation related dialogues on ageing, eHealth and accessibility with international partners such as the USA and Japan.

86 www.hl7.org/ehr

87 www.snomed.org

88 http://medical.nema.org

89 The European Interoperability Programme (EIF) available at:
http://europa.eu.int/idabc/en/document/3761/5583

5.3.3. Basic access

The Commission has put a policy in place to bridge the broadband gap – raising broadband coverage especially in disadvantaged areas[90]. Indeed, correspondingly one of the objectives of the Riga Declaration is to raise broadband coverage to at least 90% by 2010. Broadband is often a necessary infrastructure for meaningful independent living / remote monitoring & assistance and social participation services.

Access to broadband is therefore one step to ensure that all older people can have the necessary basic access to the information society. Another measure is stepping up the currently sporadic initiatives by Member States and ICT service providers to focus on fiscal / financial incentives to reduce cost barriers for accessing ICT services[91]. Nevertheless, these measures only address ***cost-related aspects*** of digital divides.

Broadband roll-out, awareness-raising and financial support for access to the information society should be complemented by active training and education programmes particularly aimed at elderly persons. Once older people do get online it will be important that they are knowledgeable about and have the digital literacy and competences to use the Internet effectively and gain real benefits, for example, in managing independent living and health matters. This requires second-order skills, i.e. skills that go beyond mere basic computer skills, in information searching and extraction of quality. These types of skills also need to be encouraged amongst older people, and any EU-driven efforts to develop ICT skills amongst older people also needs to give attention to this aspect. It has also been reported that such training and motivation efforts need to be kept up regularly.

Together these measures should help to meet the Riga target of reducing the gap in Internet use by at least half by 2010.

POSSIBLE ACTION (within the broadband policy): Member States to step up efforts and exchange experiences as regards awareness, financial support, and digital training efforts for older people to increase their take-up of the Internet and reduce the gap by half by 2010, in line with the Riga Declaration.

90 Bridging the Broadband Gap, COM(2006)129, 21 March 2006

91 Empirica et al. - Thematic Study to Analyse Policy Measures to Promote Access to Information Technologies as a Means of Combating Social Exclusion, 2006, http://ec.europa.eu/employment_social/social_inclusion/docs/2006/ict_en.pdf

5.3.4. Dealing with ethical issues

The introduction of ICT in support of ageing raises a number of ethical challenges. To be fully accepted by the older person and his carers, the technology should be aware of the ethical challenges involved. Examples include:

- In a case such as Alzheimer's disease, there is a fundamental concern about who takes decisions. How can claims to **self-determination and autonomy** best be fulfilled, when a patient's information processing and decision making power is deteriorating? This requires a responsible balancing of a patient's articulated wishes, with his interests and needs.
- The **processing of personal data**, including sensitive data linked to health and especially when different actors are involved, should be made in strict compliance with the relevant data protection legislation, thus securing the data subject.
- Bringing technology with monitoring functions into a person's home also raises important ethical questions with regard to possible conflicts with the principles of **dignity, independence and privacy.** The appropriate choice of technology can help to mitigate some of these concerns.
- Another ethical challenge is to avoid the perception that the installation of ICT-bases solutions means that decision making power is ceded to a heuristic machine or that it replaces human care and precipitates the **erosion of social interactions**. This perception is a major barrier to the uptake of ICT. It leads to the important principle that these services should not aim to substitute existing care networks, but that they should be promoted and implemented as complementary solutions. Smart home devices, for example, should be seen as a means to enhancing social care rather than as a substitute for it. ICT-based solutions should not increase isolation. Instead they should be tools for maintaining and, ideally, even strengthening social networks.
- The **autonomy** of a user of an independent living service should be fully respected, meaning that the user must have the right to overrule or switch off the technology: such rights must be built into the services. Users should also have the right to opt out completely from using the services, should they so wish.

POSSIBLE ACTION: ethical issues to be addressed in stakeholder discussion, research projects and studies and in market acceptance pilots with users. Common understanding could be captured into an 'ICT & ageing ethics charter' of stakeholders.

Ethical issues in ICT and ageing could in particular be part of a high-level debate, aiming to move the thinking forward under the forthcoming Slovenian EU Presidency.

5.4. Promoting take-up

5.4.1. Deployment and uptake of innovative ICT solutions

Already existing under the eTen programme[92], a set of tools to accelerate the transformation, effectiveness, efficiency and interoperability of European services will be available from 2007

92 eTEN is the European Community Programme designed to help the deployment of telecommunication networks based services with a trans-European dimension: http://europa.eu.int/information_society/activities/eten/index_en.htm

under the ICT Policy Support Programme (ICT PSP), one of the three parts of the Competitiveness and Innovation Programme (CIP)[93]. The instruments in the CIP include pilot projects that are oriented towards market validation and prepare for larger-scale roll-out, thematic networks that explore emerging themes and support stakeholder cooperation, and accompanying actions that facilitate exchange of good practices, benchmarking, and studies.

The aim of pilot projects is to increase the scale and intensity of potential solutions, in a demand-driven approach built in consultation with Member States, industry, service providers, and users, stimulated by public-private partnerships.

The pilots should aim to demonstrate the relevant business case and viable business models, accelerate the innovative uptake of ICT, focus a critical mass of actors on an agreed sharing risk goal and, as appropriate, create a **lead market** based on interoperable pilot service deployment. Pilots will support cooperation between Member States based on a common approach to demonstrate services in the public interest.

Member States are currently implementing solutions at local, regional and national level with their own means. Community support for pilots is important to ensure that these solutions are interoperable to the extent that is required for the functioning of the internal market and other Community policies such as mobility of persons, social security etc, and can viably scale up. A well-defined interoperability framework for ICT and ageing will also create an EU-wide, de-fragmented market place, in which industry has a stable base for investments in products and services addressing the entire EU market. This should be complemented by replication and adaptation guidance in order to facilitate re-use while taking into account diversity and the need for local customisation. This will in particular create further opportunities for SMEs developing innovative products. Such an ICT and ageing interoperability framework is foreseen to be further developed within the FP7 R&D Programme, and to be validated through pilots in (ICT Policy Support Programme of) the Competitiveness and Innovation Programme.

The pilots are expected to demonstrate and support ICT-based solutions and new services and validate the necessary interoperability. They address integrated homecare (social, health, self-care, family care, community) with interoperable products and services for non-intrusive medical, social and wellbeing at European/cross border levels.

Pilots aim to facilitate the creation of a larger market and address **affordability and sustainability** of the solutions by delivering common functional specifications, (pre-)standards and comprehensive socio-economic evidence concerning the impact and cost-benefits arising from introduction of ICT-based solutions. Of particular importance is that pilots stimulate the emergence of common agreements on interoperability, as this facilitates the creation of a critical mass, necessary to realise benefits from network externalities. More generally, such pilots would address investments-benefits mismatches identified before (e.g. time-lag before benefits materialise, distribution of benefits vs investments across the value chain actors, indirect benefits or benefits from network effects), and thereby provide examples of sustainable business models.

93 http://cordis.europa.eu/innovation/en/policy/cip.htm

The ICT part of the CIP will also include policy analysis and coordination measures in thematic networks, good practices exchange and innovation encouragement (with particular emphasis on SMEs) that the Commission will use to monitor and support ageing in the information society.

In order to further support deployment of technologies developed in former Framework Programmes there is the possibility to develop an action plan on eHealth / Independent Living. Examples of such technologies are in the areas of homecare, telecare and personal health systems. The main target would be to deploy these technologies Europe wide, ensure interoperability of corresponding systems and define a legal and regulatory environment at European level. Industrial groupings such as the Continua forum could be associated to such an initiative.

A number of experiences already exist in the design of age-friendly work-spaces and practices through ICT use. However, these experiences are still anecdotic and isolated. Their positive results are not sufficiently shared and not transferred to all parts of the economies (e.g. SMEs and public service providers). Testing of new ICT-enhanced working methods for elderly workers and sharing of best practices is a necessary activity for Europe to take the chance of best using its ageing workforce. Preparatory work in the CIP is envisaged.

POSSIBLE ACTION: to define a focal point on ICT & ageing in the ICT part of the Competitiveness and Innovation Programme, in particular with pilots in the areas of independent living and chronic disease management. Similarly to define eAccessibility pilots in the CIP. To prepare for future actions in the CIP in the area of active ageing at work through thematic networks in the CIP. A set of pilots in ICT and ageing (independent living, chronic disease monitoring) to provide a major contribution to the 2008 EU e-Inclusion Summit.

To propose an interoperability framework for ICT and ageing, with guidance on replication and local adaptation.

5.4.2. Exchange of good practices

In addition to pilots a key role is to be played by stepping up the exchange of good practices. Member States are invited to bring forward such good practices and their exchange can be envisaged to be supported through the CIP programme.

Exchange of best practice should also concern the best integration of ICT services within existing social contexts and networks. The virtualisation brought by the Information Society can present a social challenge for older people. It will be therefore important to report on

negative impacts such as loneliness and isolation and, if these are emerging, to try to counteract these through awareness-raising measures.

A promotional **smart home / independent living European award scheme,** can be envisaged rewarding initiatives complying with specifications defined by the eHealth and eInclusion i2010 subgroups. The target could be for at least one smart home site in each Member State by 2008, with a significant increase by 2010.

POSSIBLE ACTION: to collect and exchange good practices in ICT and ageing into an observatory and national reporting, with contributions by Member States at the national, regional and local level during 2007/2008.

A good practice exchange and awareness raising event during 2007 based on real-life cases contributed through this process to be explored by the Commission.

To provide recognition and visbility through a smart home / independent living award scheme from 2008 onwards.

Further CIP ICT actions to contribute to promoting take-up, exchange of good practice, and providing support to awareness raising.

5.4.3. Raising professional skills

Opportunities should be explored to develop basic EU wide training actions, on ICT and ageing, accessibility and assistive and eHealth technologies, for equipment and infrastructure providers, as well as for care and support personnel.

With the development of initiatives such as the *European Curricula for Design for All*[94] and the growing awareness of the sector it is expected that the concept will be more widely used in the coming years. Further dissemination and take-up of design for all amongst professionals is to be pursued from 2007[95].

In 2000 it was agreed at EU level to adopt the W3C/WAI web accessibility guidelines. While the agreement is there and so are the guidelines, there is still a need to pursue work on accompanying measures on training and adequate authoring tools.

94 See: the European Design for All and eAccessibility Network – EDEaN: http://www.ita-kl.de/ita/forschung/projekt.php?projektid=470&navid=32

95 Support measures under FP6 are expected to provide building blocks for this.

POSSIBLE ACTION: professional associations and expertise centers with Member States', industry, users, and EU programmes support to step up training related to ICT and ageing (a.o. accessibility, Web design, design for all)

5.4.4. Use of structural and social funds

The use of Structural and/or European Social Funds can provide additional means to the creation of a lead market and accelerate uptake of innovative ICT products and services be encouraged for the following purposes:

- to foster **interoperability** by providing funding to large-scale pilots initiatives and particularly cooperation between local and regional pilot schemes;
- to answer the **market issues** at the local and regional level by financing the deployment of independent living solutions, promoting large scale public/private initiatives (such as the use of broadband services at home);
- to increase the local **professional expertise as well as skills of elderly people** by financing their training;
- to ensure that ICT solutions are **affordable and sustainable** by providing financial support linked to regional care management schemes for their implementation;
- to ensure **access by older people** by developing broadband infrastructures across regions;
- to improve and develop social and health care services and to facilitate integrated care solutions focussing on the needs of the elderly population at the local and regional level.

DG-REGIO foresees to profile the demographics challenge (and the opportunities of ICT) by means of a conference in early 2007[96].

POSSIBLE ACTION: to identify and highlight the opportunities for ICT and ageing in the structural and social funds.

5.4.5. Creation of a lead market

The September 2006 Commission Communication on "A broad-based innovation strategy for the EU"[97] proposed a new "lead market initiative" aiming at "facilitating the creation and marketing of new innovative products and services in promising areas". The Competitiveness Council of December 2006 endorsed this proposal and invited the Commission to present in 2007 such an initiative with the objective "to elaborate a valid approach for fostering the emergence of markets with high economic and societal value".

96 The new regulation on the use of Structural Funds (article 16) also makes accessibility a requirement for all funded initiatives

97 COM(2006)502f of 13 Sept 2006, http://ec.europa.eu/enterprise/innovation/doc/com_2006_502_en.pdf.

The Commission is now progressing to identify areas where concerted action through key policy instruments and framework conditions can speed up market development. Among the candidate areas to be presented as examples or pilots to show the way are market segments for ICT-based solutions in health and social care. The potential demand, the knowledge and industrial basis of the EU and evidence of the expected influence of policy instruments on lifting obstacles to the emergence of the market, as drivers and facilitators, constitute the essence of the considerations to be taken into account.

The set of proposed policy actions shall help create the business environment that allows industry - large and small - to develop and commercialise innovative products and services on a competitive basis. They can notably concern public procurement measures, be of a regulatory nature, address standardisation or IPR issues, or remove obstacles to financing.

Public procurement measures explore opportunities for the public sector, acting as a launching customer, or first buyer, to foster the development and market take-up of new products and services. This involves more proactive and innovation-oriented approaches, leading to more effective solutions for public procurers and more efficient exploitation of research results for the supplier base. Public authorities can also support legislative reforms necessary for markets of innovative products and services to emerge in a context of multiple levels of regulations and requirements. Co-financed pilot demonstration actions can stimulate the wider adoption and better use of new technology, and show the benefits of innovative solutions to risk-averse public authorities. Other actions can help identify emerging needs for standards and interoperability guidelines for new products and services and speed up their agreements, thereby overcoming fragmented products and services markets.

5.4.5.1. Accessibility and public procurement

Of direct relevance is the recent EU activity to encourage ***accessibility in public procurement of ICT***. The revised EU Directives on Public Procurement[98] now include clauses encouraging the inclusion of accessibility criteria in public procurement.

- *"Contracting authorities should, whenever possible, lay down technical specifications so as to take into account accessibility criteria for people with disabilities or design for all users."*
- *"Whenever possible [these] technical specifications should be defined so as to take into account accessibility criteria for people with disabilities or design for all users."*

It is significant that the reference includes "design for all users" and this perspective is very important for ageing workers who might not be classified as having a disability but nevertheless have age-related changes that pose accessibility challenges when working with ICTs. The Commission has issued a mandate to European standards organisations on standards for accessibility requirements and to prepare a toolkit to guide procurers in this area.

98 Directive 2004/18/EC and paragraph 42 of Directive 2004/17/EC

The public procurement line of action is potentially a very powerful one for ensuring that ICTs in the workplace are accessible and usable for ageing workers. Provided the needs of ageing workers are given sufficient attention in the toolkit and by public procurers, the initiative will make a significant contribution to the achievement of more age-friendly workplaces in public sector jobs. This will require a response from the ICT industry, of course, which would have as a consequence a more generally increased availability of age-friendly ICT. Ageing workers in private sector employment can also be expected to benefit in due course, if employers follow the lead of the public sector and the ICT industry mainstreams accessible and age-friendly ICT designs. The Commission has also established a dialogue with the USA on alternatives leading to a more attractive market for e-Accessibility solutions.

POSSIBLE ACTION: to pursue the work on eAccessibility and public procurement and exchange experiences between authorities, a.o. in the eInclusion subgroup.

5.4.5.2. Innovative public procurement for ICT and ageing

Sophisticated demand from 'lead users' is an important driver for innovation-based products and services. Between 60% and 80% of successful innovations are responses to market needs and demand. Innovation of new products and services can be stimulated by using public procurements and by creating new innovation friendly markets for solutions addressing European socio-economic challenges, i.e. in this context ageing. A 'lead market' approach is a way to overcome market fragmentation, integrate public procurement into the innovation process, create 'user-pull' for research, and introduce innovation into society – particularly public services.

Moreover, European industries can become world wide leaders by building on Europe as a lead market itself. In this respect Europe is well-placed with a large domestic market for ICT and ageing – provided the barriers mentioned before are overcome.

Lead markets in public service related areas – such ICT and ageing - can involve pre-commercial procurement, typically including research and development as well as early exploratory and experimental deployment. Pre-commercial procurement schemes in other parts of the world such as the US and some Asian countries have proven their ability to provide the missing link between R&D investment and the public sector as 'first buyer' of new technologies. Examination of their experience in refining their first-buyer strategies indicates that the pay-off can be significant in Europe if public procurers are willing to share risks and benefits of high-tech R&D procurements with potential suppliers and bundle demand to reduce market fragmentation.

This could be further enhanced by funding competing approaches in the earlier phases of the development (research, prototype development, field testing) against functional or

performance based specifications, rather than selecting a specific technology at the beginning. (Cf. the US approach of 'fly-offs' in defence procurement.) Once the development is complete, the use of standardisation and open interfaces will reduce vulnerability to commercial health of individual suppliers.

The Commission could explore, together with Member States, regional and local authorities, and with the *i2010 sub-groups* on *eInclusion, eHealth and eGovernment,* innovative methods for ***coordinated pre-commercial procurement.*** The approach would involve aggregating demand for innovative ICT systems for the ageing society at the European level, helping to establish the conditions for technical interoperability, and exploring sustainable exploitation (i.e. sustainable 'business models') of ICT products and services for the ageing society.[99]

In concrete terms, this means identifying potentially interested public procurers, clarifying the conditions within EU public procurement rules for such procurement, aggregating demand through workshops of potentially interested parties (e.g. regional authorities), encouraging joint specifications, and once the process is running, providing an assessment for public re-use and learning from this approach.

POSSIBLE ACTION (as part of pre-commercial procurement actions being undertaken in the follow-up of the 2006 Innovation Communication): to provide visibility to the opportunities of innovative public procurement for ICT and ageing, through workshops, good practice examples, and studies. To explore with Member States the possibility and interest for facilitating the creation of a lead market for innovative products and services in the field of ICT for independent living and health through innovative public procurement

5.5. Preparing for the future

5.5.1. ICT Research and Development

5.5.1.1. Framework Programmes

R&D at EU level in ICT & ageing has much potential to be supportive to wide-ranging EU policies such as information society promotion in general (i2010), dealing with demographics change (cf Spring 2006 Council, Demographics Communication), anti-discrimination as regards age (adapted technology in the workplace), cross-border health services (interoperability) and others.

99European Commission - Pre-Commercial Public Procurement. A Missing Link in the European Innovation Cycle, 2006 http://europa.eu.int/information_society/research/key_docs/documents/procurement.pdf

Since 1991, about 200 projects addressing technologies for older people and people with disabilities have been funded[100] and in the eHealth sector, about 450 EU projects have been funded since 1988.[101] This has created a large knowledge and technology base. With the rapid rise of the ageing market there are strong prospects for successful exploitation and take-up.

Building on the past experiences and projects on independent living in the 5th and 6th EU Framework Programmes for research and technology development[102], the European Commission has proposed to increase the budget in the **7th Framework Programme** (FP7) for the period 2007-2013, as well as specific research actions on ageing as part of both the societal and technological challenges to be tackled by the Information and Communication Technologies work programme in FP7[103]. These actions should particularly focus on integrated solutions and personalised systems for health and wellbeing, applications for independent living, research in ergonomics and interfaces[104], assistive technologies and easy-to-access mainstream ICT, interoperable solutions.

Examples of EU-supported research and development projects <to be complemented by further FP6 projects, including Call 5 and 6>

ICT for social and eHealth care

- ⇒ DOC@HOME Project (FP5) - Home care and remote monitoring system for the population with special needs allowing expert advice to be generated *ex situ* based on the collected data. The project developed and implemented a health care knowledge management and delivery platform.
- ⇒ MEDICATE Project (FP5) - The control, identification and delivery of prescribed medication. Hardware was developed for home used to store the medication, to dispense it appropriately and to provide a reminder to the patient in the event of non-compliance.
- ⇒ SAID Project (FP5) - Social Aid Interactive Developments. To face the critical problem of the ageing of the population and of the increasing requests for social assistance, the project developed an innovative social infrastructure to provide more efficient social care for elderly people, improving services and access, quality of life and reducing costs.
- ⇒ ACTION Project (FP4) - Assisting carers using telematic interventions to meet older people's needs. The project has compiled information on carer's needs for information, education and practical assistance.

Independent living and quality of life

- ⇒ SILC Project (FP5) - Supporting Independently Living Citizens. To allow older people to stay at home, the SILC project developed an intelligent alarm system to increase the safety and independence of elderly and disabled people. The alarm is equipped with a range of biometric sensors which can be programmed individually to trigger an automatic alarm call whenever a critical situation is detected.
- ⇒ TELECARE Project (FP5) - A multi-agent tele-supervision system for elderly care. The project developed a framework for supervision using a multi-agent approach that includes both stationary and mobile agents, and providing expert supervision and acre facilities so as to improve the quality life of elderly persons and their families.
- ⇒ DAILY Project (FP4) - Make daily life easier. The daily program has been developed to help older people with minor motor impairments to maintain their independence at home, during daily life. A CD-ROM has been developed showing older people some technical devices they can use at home, during gardening, shopping, navigation, etc.
- ⇒ FACILE Project (FP4) - Support tools for housing design and management, integrated with telematics systems and services. Aimed at helping people to rediscover their home environment and increasing their autonomy, the project managed to build rehabilitation programmes based on users' behaviour, to supply constructive answers to independence and quality of life requirements, to help relatives to better target expenditure on home adaptation and to improve health services with limited costs.

100 For an approximate budget of €200 million. The projects concerned the development of both assistive devices focusing in supporting the multiple minor disabilities that come with age, and of mainstream technologies that should be usable and suitable for older people for their full and active participation in society. Examples of projects in this area have built integrated systems and flexible interfaces for smart homes with environmental control facilities, and access to services from the home environment. Other projects have addressed the area of provision of security and remote support by developing alarm system with active and passive features and bio monitoring systems. Particularly interesting was a project developing ICT solutions to support older people with dementia in their daily living activities.

101 These projects includes ICT solutions to support home care and to support mobility of citizens with chronic health conditions (e.g. health monitoring, telemedicine, personal health systems), to develop health care services for integrated solutions and for disease prevention.

102 Projects from Call 6 in FP6 will receive 44 MEUR of EU funding

103 In the 6th Framework Programme the Commission has co-funded projects on ICT and ageing (in particular in the areas of eAccessibility, eInclusion and eHealth) for an approximate budget of €200 M.

104 This also requires to bridge research in ICT with other disciplines (bio-/nano-/cogno- sciences) as highlighted in the recent report from the IST advisory group (http://www.cordis.lu/ist/istag.htm).

⇒ HOME-AOM Project (FP4) - Home applications optimum multimedia / multimodal system for environment control. The project's objective was to promote the autonomous living of disabled and older people by providing them with the possibility to control and teleoperate various home appliances and services. Among others, the project has developed a single camera gesture recognition system and a specific user interface, and has defined a set of gestures for a camera system, a vocabulary for natural language control, a set of functionalities for teleoperation, a set of preliminary safety guidelines.

Assistive technologies

⇒ EUSTAT Project (FP4) - Empowering users through assistive technologies. The project developed tools aimed at helping people with disabilities to learn about assistive technologies. To this end the project identified and analysed critical factors needed to be addressed when carrying out educational initiatives for end users and published a set of guidelines for trainers and organisers of educational activities.

Adapting mainstream technologies

⇒ MORE Project (FP4) – Mobile Rescue Phone. The project was focused on redesigning and simplifying mobile phones to make them accessible for disabled and elderly users. The project ended with the development of a system integrating GSM and GPS modules focused on the needs of disabled and elderly users. Today, the mobile phone commercialised by a Finnish company, member of the MORE consortium, has totally graphical language and only three buttons which makes it easy to use, especially in case of emergency. It can also be used as a normal mobile phone. The system can be linked to a service centre where the exact location of the person is localised on a map screen, allowing emergency services to be alerted.

Web Accessibility

- WAB Cluster made of three projects (EIAO, BenToWeb and Support EAM) and aimed at making the web accessible to all:
- BenToWeb (Benchmarking tools for the web) provides benchmarking tools supporting the accessibility recommendations of the WAI initiative of W3C105.
- EIAO (European Internet Accessibility Observatory) intends to develop a robot collecting accessibility information in a data warehouse.
- Support EAM (Supporting the creation of an eAccessibility mark) intends to create an eAccessibility quality mark based on the methodologies used for evaluating web accessibility.
- Enabled (Enhanced network accessibility for the blinds and visually impaired) intending to develop technologies creating universal accessible contents on the web and ubiquitous tools enabling easy access to information and interfaces that are adaptable and interoperable.

Research projects aim at developing **interoperable solutions** in key areas such as smart homes and integrated social and health care. In this way such research is supportive to the Internal Market for products and services related to ageing, and enhances citizen mobility which is a key objective of the EU. More specifically, interoperability is in direct support to EU health services policy and the modernisation of public services across borders.

In order to ensure **accessibility and usability** of ICT products and services by older people, as well as assistive technologies, research will pay permanent attention to elderly people's needs: this includes research on the emotional attitude of older people towards technology, their changing needs as they get older, their multiple impairments and functional restrictions, as well as in the field of prevention and rehabilitation of health conditions. In the professional environment, research is to concentrate on the **suitability of ICT related work** to ageing workers and the necessary adaptations to ensure that the workplace proposes ICT mainstream tools that seamlessly interact with assistive technologies and that are convenient to elderly workers. In all these research projects a strong and **active participation of elderly people** is foreseen to ensure that ICT products and services developed are **suitable to the needs of the senior market.** This is the approach of the new e-Inclusion research challenge in the 7th Framework Programme.

105 WAI: Web Accessibility Initiative from the World Wide Web Consortium.

5.5.1.2. The Article 169 Initiative on Ambient Assisted Living

Complementary to ICT & ageing research in the 7th Framework Programme and as a key component of the i2010 flagship on ICT & ageing and therefore directly in support of i2010, the European Commission is committed to explore possible synergies with existing initiatives and research programmes in the Member States in the area of independent living. The proposed **Article 169 initiative on ambient assisted living**[106] is an innovative approach to linking research programmes of several Member States and creating a critical mass with the support of EU funding. Subject to a Council and Parliament Co-Decision, this initiative is expected to mobilise at least **€600 million of public and private funding over a 6-year period**.[107] The Commission will call upon all Member States to be active members of this new research initiative during 2007-2008.

The joint programme **Ambient Assisted Living** (AAL) aims to establish a new European funding programme for research and innovation projects which outcomes will enhance the quality of the lives of elderly people by the use of new ICT products and the provision of remote services.

Ambient Assisted Living will provide equipment and services for the independent living of elderly people, via the seamless integration of info-communication technologies within homes and extended homes, thus increasing their quality of life and autonomy and reducing the need for being institutionalised. These include assistance to carry out daily activities, health and activity monitoring, enhancing safety and security, getting access to social, medical and emergency systems, and facilitating social contacts, in addition to context-based infotainment and entertainment.

Ambient Assisted Living addresses in particular the issues facing an ageing population and targets the needs of the individual person and their caretakers.

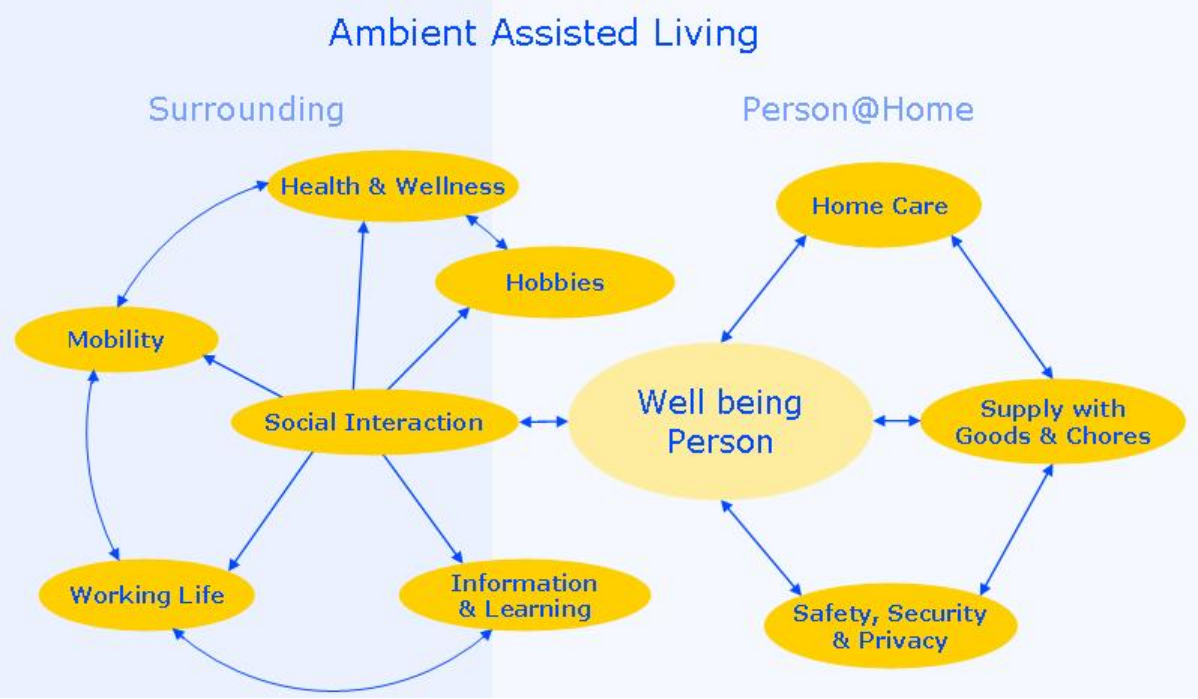
Article 169 of the EU-treaty allows new forms of joint R&D activities with shared financial contributions between the European Commission and Member states. It has been newly introduced as a funding instrument within the 6th Framework Programme for Research and Technological Development and will continue towards the 7th Framework Programme. This legal base proves to be the most adequate to unchain the potentials and synergies of research programmes in this area where many Member States have an interest in stimulating activities and mobilising currently fragmented private sector efforts around common and shared research agendas.

106An FP6 project preparing this initiative is currently funded by FP6 budget: http://www.aal169.org

107Both EC and Member States contribution represent 50% of the budget, the other 50% come from private organisations including industry and RTD organisations.

Initiatives on the basis of Article 169 of the EU treaty are subject to the co-decision of the European Parliament and the Council. It is expected that the co-decision procedure will be launched this summer 2006. A final decision is expected in 2007, shortly after which AAL169 will be ready to start.

The technologies to be applied cover integrated assistive smart objects and health status monitoring systems including wearables as well as context-aware services, virtual presence, security and safety technologies. Here trust and safety, privacy, confidentiality, user acceptance, dependability, interoperability and usability aspects are key issues to be addressed in an integral way. Single calls for research and innovation projects launched regularly by the AAL169 programme will address the **needs of the target group, a well being elderly person**.



AAL169 is formed as an independent programme and will include **activities to support the programme image, network generation and policy level programme activities**. To form a programme the activities must include also the activation and generation of joint activities to network the partners and projects to form a European cooperation network. Also the programme centrally has the duty to promote important topics on different European platforms as well as maintain a close cooperation with relevant activities in the EU Framework Programme and within National Programmes. In particular, cooperation should be

further strengthened with another initiative coordinating national research programmes on ageing and the ERA-Net action ERA-AGE[108]

The programme takes care of **generating active networking between the partners and potential project partners**. The programme arranges, related to programme topics, networking workshops and seminars together with national Programme Management Agencies. The target of these partnering events is to activate the projects, generate new proposals for the AAL calls and increase the general awareness of the AAL programme and the topics related to ageing and the use of the technology to solve the ageing related challenges.

In September 2004, ministries, national programme agencies and research organisations from 7 European countries started to prepare the article 169 initiative "Ambient Assisted Living". Since then, the number of interested states to participate within the AAL169 initiative increased. They comprised in May 2006:

Austria	Bundesministerium für Verkehr, Innovation und Technologie
Belgium	IWT (Flemish Funding Agency)
Denmark	Ministry of Science, Technology and Innovation
Finland	TEKES – The Finnish Funding Agency for Technology and Innovation
Germany	Bundesministerium für Bildung und Forschung and VDI/VDE Innovation + Technik GmbH (current co-ordinator)
Hungary	National Office for Research and Technology
Israel	ISrael Europe R&D Directorate (ISERD)
Italy	Ministero dell'Istruzione, dell'Università e della Ricerca
Spain	Ministerio y Sanidad y Consumo
Sweden	Vinnova – Swedish Funding Agency
Switzerland	Commission for Technology and Innovation
The Netherlands	Ministerie van Volksgezondheid, Welzijn en Sport

Each of the participating states will earmark a yearly budget of national funds to support their successful national project partners. Together with the substantial contribution by the European Commission, a multi-annual financing plan will be defined. The overall budget is envisaged to reach approx. €300 M in public funds over the 6 years duration. With the expected financial engagement of the European industry, the total volume will be €600 million. This new European technology funding programme is intended to issue calls over a period of 6 years (2008 to 2013), starting in parallel to FP7.

Through **funding of applied research and innovation projects**, with emphasis on integration of the required technologies and exploring new ways for the inclusion of user needs into relevant products and services, AAL169 aims to reinforce a consolidated European market for AAL products, environments and services by addressing multinational consortia that consist of organisations from the AAL169 partner states.

POSSIBLE ACTION: to create synergy in national research agendas to stimulate inovation to meet the demographic challenge and accelerate the exploitation of the opportunities by supporting the launch of the Article 169 Ambient Assisted Living joining of research programmes between Member States.

108 The aim of the ERA-NET action ERA-AGE is to promote the development of a European strategy for research on ageing and, thereby, to enable Europe to gain maximum added value from investment in the field.

5.5.1.3. Strengthening the link to European Technology Platforms

A number of the current **European Technology Platforms** (ETP) in the field of ICT[109] have activities relevant to ICT and Ageing, e.g. NESSI (in the field of software and service platforms), eMobility (in the area of mobile networks and services), NEM (in the field of networked media and home platforms), ARTEMIS (in the field of embedded systems) and EPOSS (in the field of micro-nano systems). As these initiatives will bring a number of enabling technologies and services, active collaboration should be explored to bridge their Strategic Research Agendas with the key objectives of ICT for Ageing and help activate a lead market in this area[110]. Linking ICT & ageing research to the ETPs is a two-way reinforcement of both the innovation capability in the industrial base in Europe, and progress in solutions for the ageing population.

POSSIBLE ACTION: to identify interests and stimulate involvement of European Technology Platforms for ICT and ageing within their strategic research agendas.

5.5.1.4. eHealth research in the 7th Framework Programme

Medium-term **research activities in eHealth** concern the further development of solutions based Personal Health Systems. This research is the main vehicle for enabling prevention and efficient management of diseases. Work in this field includes the development and integration of sensors wireless communications, control and processing units, knowledge-based systems and intelligent algorithms for decision support into wearable, implantable and portable systems. Telemedicine support services based on integrated or convergent mobile, wireless and fixed communications are also incorporated. Personal Health Systems enables the provision of care at the point of need. They facilitate remote health status monitoring on a frequent or even continuous basis, and also remote management of chronic diseases.

The intention is to provide citizens and patients, including Europe's ageing population, with a means of interacting directly with healthcare providers and giving them the opportunity to live as independently as possible outside traditional care institutions, ideally in their homes. These types of solutions contribute to empowering citizens to adopt an active role in managing their own health status and, in doing so they encourage preventive lifestyles and facilitate early diagnosis of diseases.

The Commission has included in the 7th Framework Programme for research and technological development FP7 eHealth research related to ageing, in particular in personal health systems in challenge 5 of the FP7 / IST programme.

109 Overview can be found at http://cordis.europa.eu/ist/about/techn-platform.htm

110E.g. Smart Systems Integration in the EPoSS ETP

5.5.1.5. Increasing dedicated socio-economic research

Socio-economic research is needed to better assess the benefits of ICT for the ageing society in terms of cost containment for service delivery and increased quality of life. It will form an integral part of research initiatives in FP7 and will allow for better understanding of benefits of, and user requirements for, ICT designed around the needs of the ageing population. It will also assess ethical issues and the needs and opportunities for work-environments to introduce accessible ICT, assistive technologies and innovative eLearning (and Life Long Learning) concepts[111].

In all research activities a ***strong and active participation of elderly people*** is foreseen in order to best assess their needs in real life settings. All stakeholders will also be invited to assess the ethical implications (e.g. in terms of privacy and consent) of ICT for ageing.

POSSIBLE ACTION: to launch studies and research into ethical issues related to ICT and ageing in FP7.

5.6. Summarizing the actions: the i2010 flagship on ICT for Ageing

An interlinked set of policy actions for ICT and ageing could form the **i2010 flagship** initiative "on caring for people in an ageing society addressing technologies for wellbeing, independent living and health" as an ***action plan on ICT for Ageing***.

The flagship would aim at ***best combining awareness and consensus building, improving regulatory frameworks and other enabling conditions, uptake and research measures for accelerating the delivery of benefits to the ageing population in the information society***.

The i2010 flagship could possibly consist of:

Awareness raising, consensus building and stakeholder cooperation. Highlights could include:

- awareness events during 2007/ 2008 with industry, users, national / regional authorities;
- a single online entry point (portal) to ICT and ageing at European level;
- an innovation partnership for ICT and ageing of stakeholders in the value chains

(8) **Putting enabling conditions in place**, of which highlights could include:

111See eUser Project: www.euser-eu.org/

- Inventory of national level reimbursement and organisational barriers to ICT and ageing
- Advancing interoperability and standardisation in eHealth, exploring legislative support
- Guidance on ethical issues in ICT and ageing notably independent living
- This is accompanied by work of general benefit for e-inclusion: improving accessibility-related legislation, assessment of need for legislative reinforcement, standardisation.

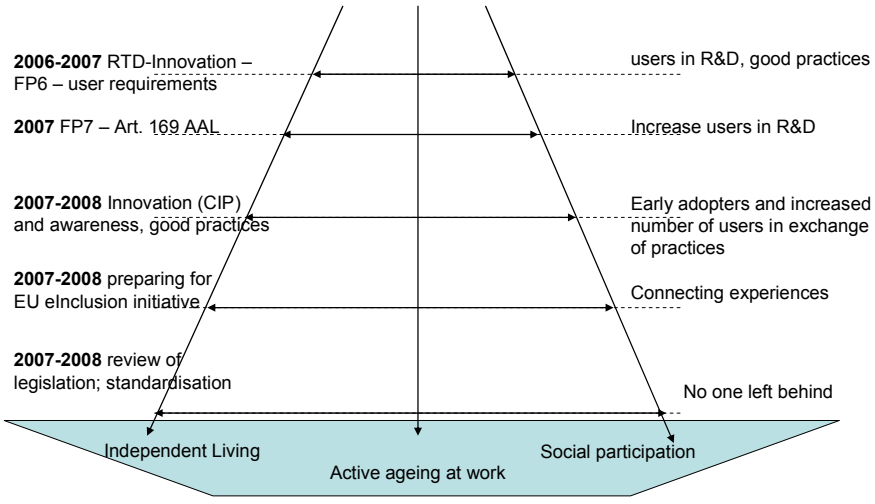
(9) **Promoting take-up**, of which highlights could include:

- Good practice observatory, good practice profiling events, an award scheme
- Launch of pilots in independent living / chronic disease management under the CIP
- Thematic exploration of ICT for active ageing in work
- Developing innovative public procurement in independent living
- Profiling Structural Funds opportunities

(10) **Preparing for the future**, of which highlights could include:

- Launch of the Article 169 Assisted Living research cooperation of Member States
- eHealth and eInclusion research related to ageing in FP7
- Linking up research in ICT and ageing with the European Technology Platforms.

The i2010 flagship initiative on ICT and Ageing



6. CONCLUSIONS

This paper collects evidence on the emerging needs from the European ageing population in the Information Society, the potential benefits deriving from the growing senior market, the challenges and opportunities to be assessed and captured for all stakeholders involved and specifically for the final users, the older persons.

Many of the issues raised in the paper also touch upon the more general debate at the EU level on long-term economic aspects linked to demographic change. However, the paper concentrates on what ICT and the Information Society can best achieve to make the ageing society better adapt to a changing a demographic and economic environment.

Three main areas of possible action have been identified as the key domains where ICT can contribute to a factual improvement in the living conditions of the ageing society while encouraging the necessary societal and economic adaptation to the ongoing demographic change. The suggested actions refer to the opportunities to reduce forms of exclusion for elderly persons in the Information Society; the ways in which ICT can help to pursue active working patterns combined with optimal work-life balance; the support from ICT in providing elderly persons with autonomous and independent lives while enhancing the provision of health and social care. The paper also supports the need to address ethical issues and strengthen stakeholder involvement (Europe's citizens in the ageing society, public authorities at all levels, providers of general public services, social care, life-long learning or health-care, financial and insurance service providers -whether private or public-, the ICT industry, the construction and housing industry, the transport and automotive industry).

Finally, the paper provides grounds for the ***launch of the i2010 flagship initiative on ICT and ageing as a combined set of awareness and consensus building actions, updating of regulatory frameworks and other enabling conditions, uptake measures and. research actions.***

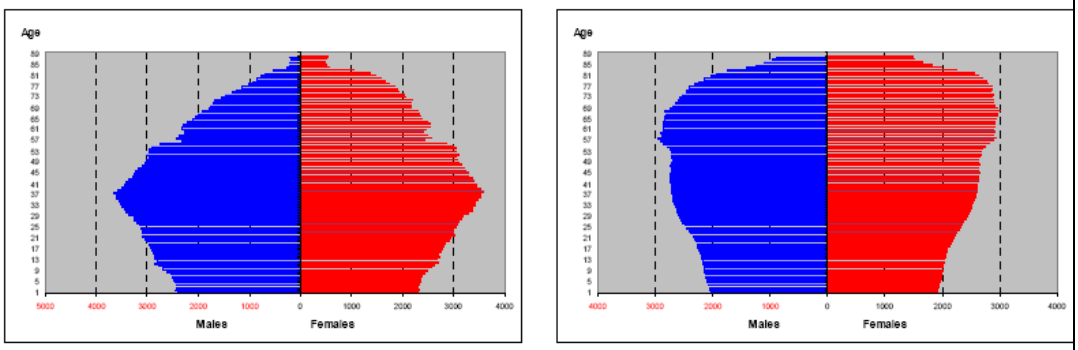
ANNEXES

Annex I – Snapshots from the future ageing society

Europe's population will be older in 2050, with a much smaller population of working age. This is due to fertility rates remaining below the natural replacement rate and continuous increases in life expectancy which are only partially offset by inward migration. From an economic perspective, the most important development concerns the working-age population (15 to 64), which is projected to drop by 48 million (16%), between 2004 and 2050. In contrast, the elderly population aged 65+ will rise sharply by 58 million (77%). Europe will go from having four to only two persons of working-age for every elderly citizen.

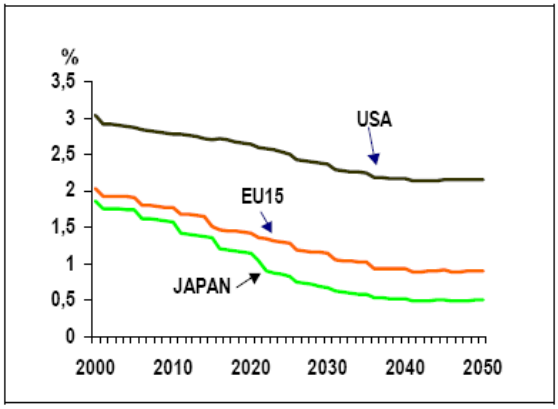
Age pyramids for EU25 population in 2004 and 2050

2004 *2050*



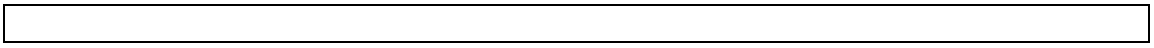
The potential exclusion of a growing aging population from the social and economic fabric can further limit growth potentials for Europe and enlarge the economic gaps between Europe and the rest of the world.

A smaller workforce will drag down growth. From 2015 a shrinking workforce will act as a brake on potential growth in the Union, reducing it from 2 to 2.5% today to just 1.25% by 2040. The impact will be even more marked in the ten Member States that have recently joined the EU.



The economic success and the financial viability of Europe's social systems – pensions, welfare, health – is called into question. Under current policies, projections suggest spending, for example, for age related spending on pensions, health and long-term care will increase by between 4 and 8 % of GDP in coming decades. More than half of all EU Member States, the majority of which are in the euro area, face significant risks to the sustainability of their public finances. For the EU as a whole, this suggests unsustainable increases in public debt or unacceptable increases in taxation and/or cuts in the services or benefits provided[112].

112 European Commission - European values in the globalised world - Contribution of the Commission to the October Meeting of Heads of State and Government (Hampton Court) - COM(2005) 525 final

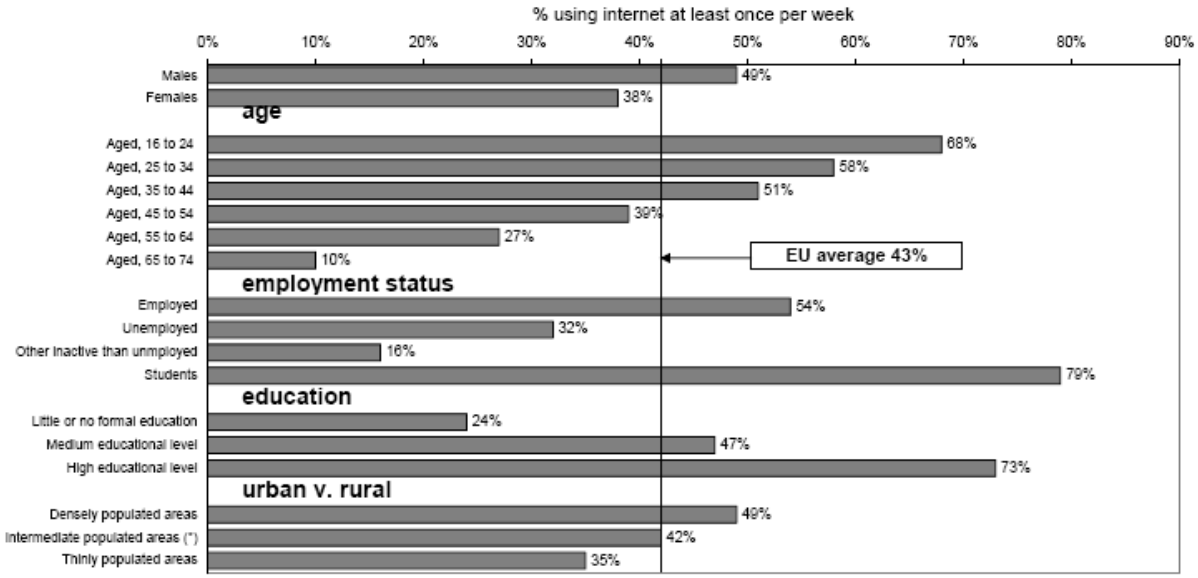


Annex II

Table 1: Summary of Output Gains and Cost Savings (Entries are in Billions of 2005 dollars)

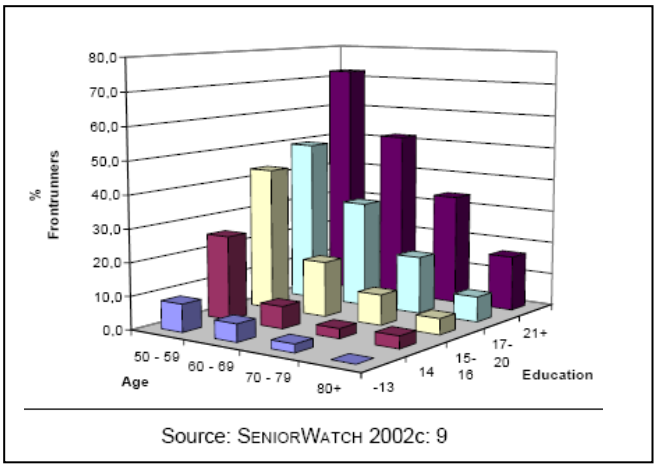
Scenario/Year	Base 2010	Policy 2010	Base 2020	Policy 2020	Base 2030	Policy 2030
Output	$61-122	$114-228	$224-447	$402-804	$411-822	$726-1,452
Health	$28	$49	$208	$352	$516	$733
Total	$89-150	$163-277	$432-656	$754-1,156	$927-1,338	$1,459-2,185

Annex III: Percentage of individuals regularly using the internet at least once a week, by gender, age, employment status, education, type of residence area, EU25, 2005



Source: Eurostat, Community survey on ICT usage in households and by individuals, 2005

Annex IV: ICT "experienced frontrunners"



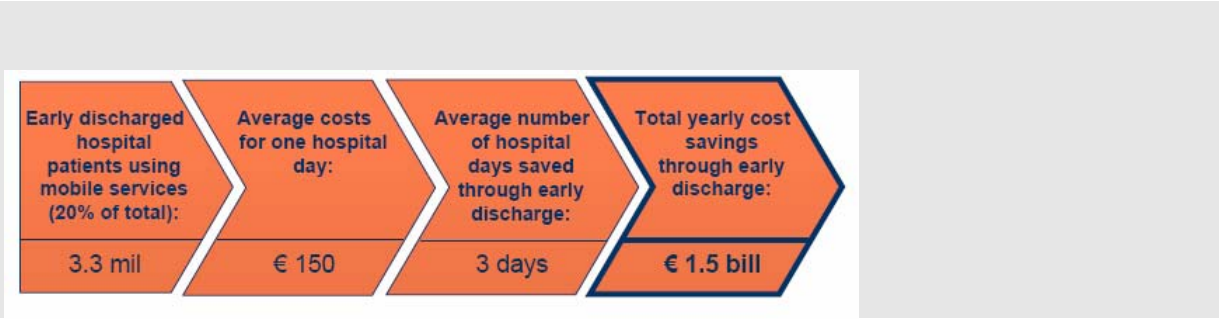
Source: SENIORWATCH 2002c: 9

Annex V: Prevalence of functional restrictions as % of older population

	Age class				
	50 - 59	60 - 69	70 - 79	80+	total 50+
Vision problems					
severe problems	10.2	10.0	14.0	23.3	12.1
some problems	26.4	25.4	30.8	24.8	27.1
Hearing problems					
severe problems	3.0	3.8	5.8	12.5	4.7
some problems	18.5	28.0	31.8	36.2	26.2
Dexterity problems					
severe problems	6.0	10.0	12.6	15.8	9.7
some problems	17.4	18.1	20.4	27.3	19.2
Any of these					
severe problems	16.7	19.3	25.1	38.6	21.4
some problems	41.1	43.9	44.6	39.7	42.7
total: problems	57.7	63.2	69.7	78.3	64.1

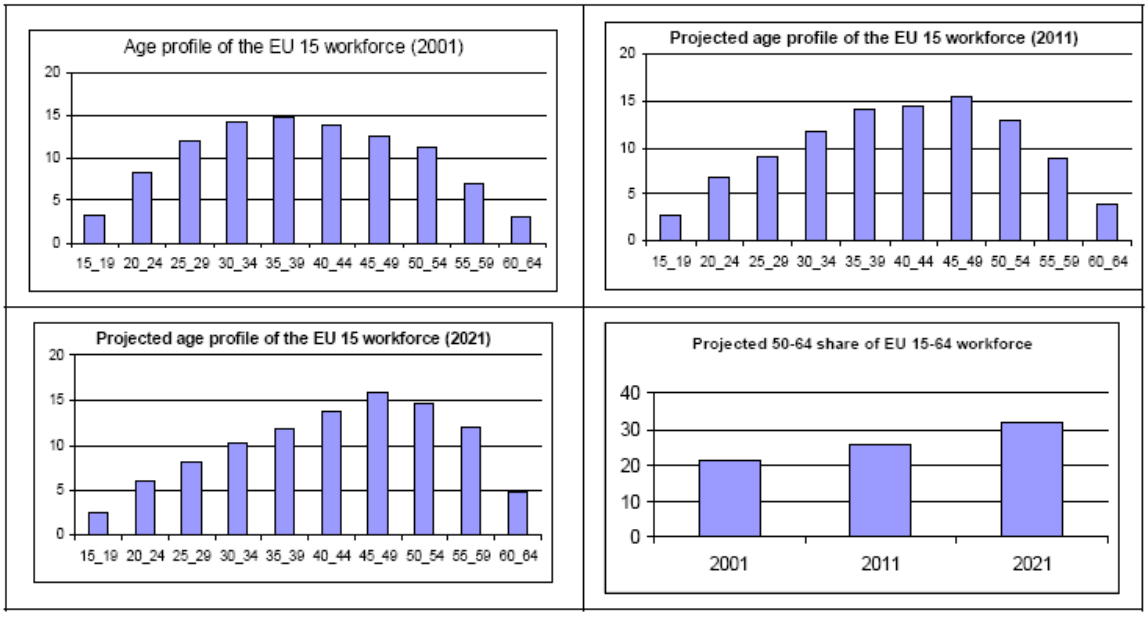
Source: own presentation based on data available from SeniorWatch 2002

Annex VI: Hospitals in Germany can save up to €1.5 bill per year through early discharge of patients made possible by mobile monitoring services



Source: GesundheitScout 24 GmbH and Bayerisches Rotes Kreuz; and Kristin Säteröy, Ericsson Enterprise, Riga Conference on ICT for an Inclusive Society, June 2006

Annex VII: Projected age profile of EU workforce



Source: EU LABOUR FORCE SURVEY for 2001; COOMANS 2004

Annex VIII: Firm strategies for coping with skills shortages

Table 3. Firm strategies for coping with skills shortages

	Short-term	Medium-/long-term
Internal strategies	Train (or retrain) existing staff Overtime Increase wages or other forms of compensation (profit-sharing, stock options) to retain current skilled workers Offer better non-wage benefits (flexible work schedule, holidays, health benefits and services) to retain workers	Train (or retrain) existing staff Changes in management practices and workplace organisation
External strategies	Outsourcing Hire foreign workers (either offshore, or immigrants) Temporarily hire less skilled workers	Outsourcing Increase compensation and non-wage benefits to attract workers, either unemployed or employed by other firms Expand scope of recruiting: use private recruitment firms, campus recruiting, Internet recruiting Work with educational institutions to identify and build skills for the future

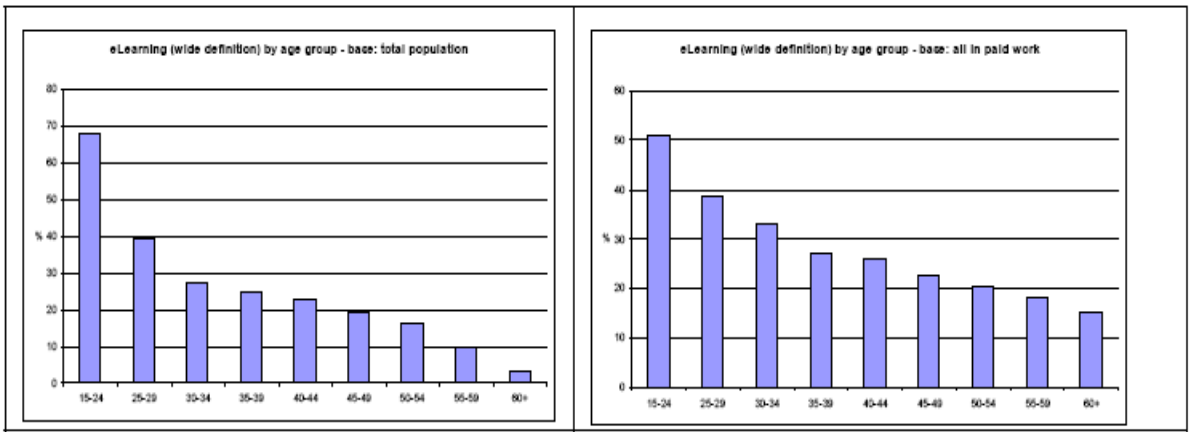
Source: OECD.

Annex IX: Assessing costs and benefits of human capital investment

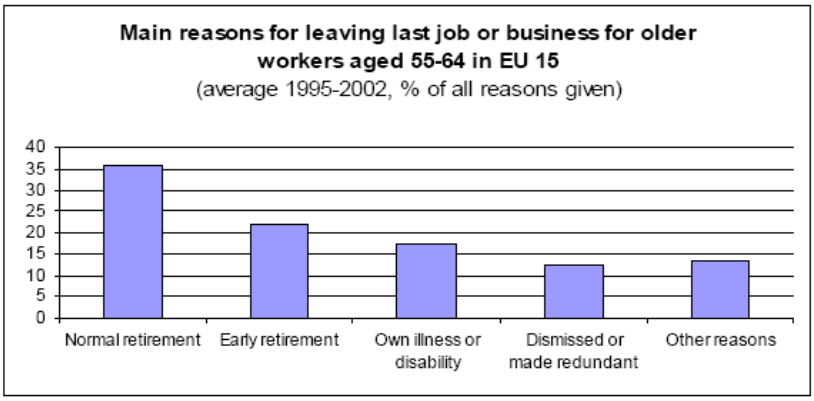
	Individuals		Enterprises		Government/society	
	Costs	Benefits	Costs	Benefits	Costs	Benefits
Compulsory education	Tuition fees and other educational costs	Future productive and social capabilities and better quality of life	Some direct financial contributions	Improved skills, cognitive and behavioural attributes of workers	Direct outlays	Higher skill levels, social cohesion, growth and tax returns
Post-compulsory and higher education	Tuition fees, other educational costs and foregone earnings while studying	Skills/qualifications leading to higher earnings, employability and quality of life	Direct financial contributions	Improved skills, cognitive and behavioural attributes of workers	Direct outlays on educational institutions, transfers to students	Higher skill levels, social cohesion, economic growth and tax returns
Enterprise training	Zero to full cost depending on terms of contract	Studies suggest positive impact on wages, job tenure and productivity	Direct outlays, wages paid and some training levies	Enterprise-specific knowledge with improvements in productivity	Zero to full subsidy	Higher skill levels, social cohesion, economic growth and tax returns
Informal learning	Opportunity time costs and direct financial costs	Economic and non-economic gains depending on qualifications earned	Cost of lost production time due to learning	Enterprise-specific knowledge with improvements in productivity	No cost	Economic and social spin-offs

Source: OECD (1998).

Annex X: Usage of eLearning by age (EU15) – eUser project, 2005



Annex XI: Main reasons for leaving work amongst workers aged 55-64 (EU15, 1995-2002)



Source: CEC 2004 – based on LFS data

Annex XII: Good practices in long-life learning

In order to avoid *digital exclusion*, IT skills need be integrated into the concept of lifelong learning. All stakeholders agree on the need for an early introduction of students to computers and other new technologies (OECD, 2000*b*). Investments in technologies (hardware and software) must be accompanied by an adequate supply of qualified instructors and training schemes able to teach these new skills, as well as innovative curricula which take into account the possibilities (and limitations) of the new technologies for older age workers.

Outside of the academic realm, a variety of different approaches to enhancing access to ICTs are emerging (*c.f.* the current debate on narrowing different "Digital Divides"). Some *firms* have chosen direct measures to enhance access of their workers to IT: low-cost PC programmes including Internet access have been recently launched by various large US firms. It is unclear whether firms in some European countries will be able to implement similar programmes given current taxation restrictions and the lack of widespread unmetered

Internet access (OECD, 2001*g*).

In the last few years, there has been a strong increase in the number of technical credentials granted by companies, business associations and commercial IT bodies. Table 4 shows that by early 2000, Cisco, Microsoft, Novell and other firms or private bodies had awarded more than 1.8 million credentials certifying IT skills to individuals.

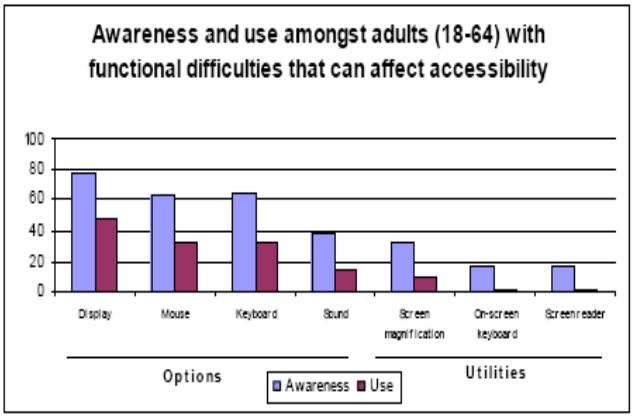
Table 4. World-wide commercial IT certifications, early 2000

	Certifications
Microsoft Certified Professional (MCP)	457 603
Microsoft Certified Solutions Developer (MCSD)	23 785
Microsoft Certified Systems Engineer (MCSE)	231 180
Other Microsoft Certified Professional Programmes	176 028
Certified Cisco Design Associate (CCDA)	4 000
Other Cisco certifications	31 000
Certified Novell Engineer (CNE)	175 000
Certified Novell Administrator (CNA)	370 000
Other Novell Certifications	18 300
Oracle (all certifications)	24 000
CISSP (Certified Info Systems Security Professional)	1 500
CCA (Citrix Certified Associate)	8 000
A+ (Computer Tech Industry Associate)	180 000
Institute for Certification of Computing Professionals	50 000
Natl. Assoc. of Communication Systems Engineers (all Certif.)	18 000
Others (Baan, Sybase, SAP, Adobe, etc.)	43 778
Total	1 812 174

Source: Adelman (2000) and 21st Century Workforce Commission (2000).

Annex XIII: Awareness and used of built-in computer accessibility – awareness and work use of assistive technologies by people with functional difficulties likely to affect accessibility

Awareness and used of built-in computer accessibility features (US)



Source: FORRESTER RESEARCH / MICROSOFT CORPORATION 2003

Awareness and work use of assistive technologies by people with functional difficulties likely to affect accessibility (US adults, 18-64)

	Awareness %	Work use %
Alternative keyboards	31	1
Augmentative communication devices	14	<1
Braille embosser / printer	13	<1
Electronic pointing devices	32	1
On-screen keyboards	21	1
Reading tools	17	<1
Refreshable Braille display	8	<1
Screen magnifier	36	3
Screen readers	16	1
Sip-and-puff switches	10	<1
Speech-training software	16	1
Talking word processor	24	1
Touch screen/monitor	64	4
Trackball	46	4
Text telephone	24	<1
Voice recognition products	56	1
Word prediction programs	11	1

Source: FORRESTER RESEARCH / MICROSOFT CORPORATION 2003

Annex XIV: Snapshots from foresight exercises on eHealth (source: IPTS, 2004)

Snapshots from foresight exercises on eHealth (source: IPTS, 2004)

Short term (2008): prototypes on

- *online patient identification systems,*
- *pharmacies provide individualised services,*
- *digital TV to deliver health-related services,*
- *remote delivery of health care and support services,*
- *remote exchange and delivery of medical diagnosis,*
- *consultation and information (doctor-to-doctor and doctor-to patient) will be possible.*

Mid term (until 2010):