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Active Ageing and Independent Living Services:
The Role of Information and Communication Technology

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Increasingly, ageing populations influence services and traditional social support systems like social and health care in the European countries, as well as global patterns in labour and capital markets. Quality of life and the active inclusion of the ageing population in social and economic life are key policy targets in Europe. In this context, Information and Communication Technology-based Independent Living Services can play an important role. It is widely accepted that Information and Communication Technology (ICT) applications can provide new ways of helping older citizens to live independently.

European research programmes[1] are supporting projects to promote independent living and quality of life in an ageing society by means of ICT applications. "ICT for Independent Living and Inclusion" has been set as one of the research challenges in the European 7th Framework Programme. Important European initiatives, like "Independent Living for the Ageing Society", which is part of the strategic policy i2010,[2] include the recently approved action plan "Ageing Well in the Information Society". This action plan on Information and Communication Technologies and Ageing,[3] aims to foster quality of life in our ageing societies. The European dimension of these challenges makes it necessary for the European Commission, the Member States, industry and other stakeholders to coordinate their policies and research programmes, as they have done in the programme Ambient Assisted Living (AAL).[4] This programme aims -by the use of intelligent products and the provision of remote services including care services– to extend the time older people can live in their own homes by increasing their autonomy and assisting them in carrying out their daily activities.

This report aims to support the research and policy development activities of DG Information Society and Media towards the European Research Area. It suggests complementary ways of approaching ageing: addressing the demographic phenomena as a serious challenge for social support systems and considering the opportunities offered by ageing societies, such as new markets for innovative applications. It then highlights the main policy areas related to ageing, where ICT-based applications could play a role, and suggests a number of research and policy challenges that need to be resolved in order to maximise the opportunities offered by ICT.

Policy Challenges

Active Ageing and Independent Living Services (ILS) are receiving attention in the different national and regional health and welfare policies. For example, policy makers are now considering ways in which ICT-based applications can support family carers. Some countries make specific references in their policy documents to the use of ICT to empower family carers through better information, support and care services, and often mention the use of new technologies.

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[1] Examples of former programmes on assisted and independent living along the last 15 years are, for instance, the action programmes for disabled people (HELIOS I and II), the Technology initiative (EEC) for disabled and elderly people (TIDE), the Sub programme Area Telematics Applications for Disabled and Elderly People.

[2] i2010, European Commission's strategic policy
http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm

[3] COM(2007) 332 final, Ageing well in the Information Society, An i2010 Initiative, Action Plan on Information and Communication Technologies and Ageing, Brussels, 14.6.2007,
http://ec.europa.eu/information_society/activities/einclusion/policy/ageing/launch/index_en.htm

[4] http://ec.europa.eu/information_society/qualif/health/index_en.htm, "Ambient Assisted Living" (AAL) is the name for a new European technology and innovation funding programme.http://www.aal169.org/

In Belgium, for instance, the use of personal alarm systems for homecare is regulated. This has been widened to cover the use of more than one type of device and the use of other emergency alarm systems, such as video telephony, thus providing more choice to family carers.[5] Although some countries have no explicit policy or initiatives that mention the use of ICTs as an empowering tool, especially for family carers, others are beginning to show interest.

In the work and retirement policy areas, important for Active Ageing, the Netherlands has already brought in laws like the "Act on Age Discrimination" which aim to counteract any discrimination in the work place due to age. In Finland, there is an overall consensus on the need to modify employment policies in accordance with the demands of an ageing population and several policies to retain older people at work have been formulated. However, it has been observed that not enough attention is being paid to coordinating health, employment and ageing policies, and the role played by ICT in these policies, in order to avoid possible segmentation.

Furthermore, ICT-based applications for independent living vary from general purpose and communication applications to applications specifically for e-learning, e-work and e-health. ILS should include different policy arenas and concepts, such as telecom and general information society policies, "Design for All", health, social, employment and ageing policies, and, central to all, e-Inclusion policies.

Research Challenges

ICT-based services and understanding the needs of older people are key to supporting Active Ageing in upcoming ageing societies. However, there is still limited understanding of older people's technology-related needs. For instance, although most European countries have become aware of the urgent need for policies to retain older people at work, and, in general, the possibilities offered by ICT for the employability of older people raise high expectations, today's practice does not show many examples of this. Early research has revealed that though older workers do not pick up more advanced applications easily, they may be able to keep up with general office ICT technology.

One reason for this lack of information on the technology-related needs of older people is that gerontechnology research has not kept pace with technological change. A mix of existing methods is the most suitable way of getting this information, rather than the extrapolation method alone.

Empirical research shows some results on certain aspects of older people's use and acceptance of ICT-based applications. Applications and products are often designed for a "standard" user. Some of the reluctance in using ICT-based applications described today might disappear over time as the values, attitudes and expectations of the next older generation are expected to favour their acceptance. However, this will probably not solve all challenges to the adoption of these applications, such as self-confidence, control, ethics and adaptation of devices to the frequent physical impairments of older people. Nevertheless, there is progress in, for example, the "Design for All" approach, which has been applied to a certain extent in product design with a view to meeting the technology-related needs of all as far as possible.

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[5]   Source: SeniorWatch project, http://www.seniorwatch.de/

A purely market-driven approach towards ILS and other ICT-based products and services for Active Ageing endangers equal access and affordability for all. Indeed, Independent Living and Active Ageing are directly related to particular welfare issues. It is suggested that the role that ILS and ICT-based products and services for Active Ageing could play in economic and social welfare policies should receive increased and more holistic attention.

GLOSSARY

Active Ageing
WHO definition (2002) - "Active Ageing is the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age". On the basis of the work carried out by IPTS, the authors of this paper propose an expanded definition: "Active Ageing policies are those that aim to enable people, as they grow older, to lead independent lives (socially and economically) and to make a full range of choices in the way they shape their lives in all its life spheres".

Independent Living Services (ILS)
Enabling services, which are designed to assist people in gaining independence and assisting communities in eliminating barriers to independence.[6]

ICT- based Independent Living Services
ICT products and applications as well as services based on a salient deployment of ICT that enable people, whose independence in daily life is challenged, to lead a more independent and participatory life.[7]

Life course perspective
A 'life course' is seen as a succession of events and activities in different fields of life and institutional settings, which are subject to many influences.[8]

Design for All
"Design for All"[9] is a concept which consists of three strategies: (1) Products/services and applications should be usable by as many people as possible regardless of age, ability or situation without any modifications. (2) Products should be easily adaptable to different users. (3) Products should have standardized interfaces capable of being accessed by specialized users. The concept links directly to the political concept of an inclusive society integrating all citizens into the information society. Its importance has been recognized by governments, industry,[10] and the stakeholders of older people (e.g. pensioner organisations, care homes, etc). It is a concept that emerged from "barrier-free" or "accessible design" and "assistive technology." Barrier-free design and assistive technologies provide a level of accessibility for (older) people with disabilities but they also often result in separate and stigmatizing solutions - for example, a ramp that leads to an entrance to a building other than the main one. Design for All strives to offer a broad-spectrum solution that helps everyone. Participative product development is considered to be a promising means of meeting the technology-related needs of (older) people.

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[6] IPTS (2006 ILS project reports) "Active Ageing and Independent Living Services: Core propositions leading to a conceptual framework", by M.Leys, S.D.Louck. http://is.jrc.es/pages/EAP/iLS.html

[7] IPTS (2006 ILS project reports) "Inventory of ILS related policy, applications and contextual factors", by L. Kubitschke and B. Hüsing. http://is.jrc.es/pages/EAP/iLS.html

[8] Settersten, R. A. (2006): Aging and the Life Course, in: Binstock, R./George, L. K. (eds.): Handbook of Aging and the Social Sciences, Elsevier Academic Press, Amsterdam et al., pp. 3-19.

[9] Other terms quite often used synonymously are universal design, inclusive design, accessible design, universal access and access for all.

[10] See for instance the European Union on design for all in ICT products, services and applications http://europa.eu.int/information_society/policy/accessibility/deploy/dfa/index_en.htm and European Design for All e-Accessibility Network [EDeAN] (http://www.edean.org/index.asp?auto-redirect=true&accept-initial-profile=standard&myselectedgroup=189).

Assistive Technologies

Assistive, adaptive, and rehabilitative devices, which enable people with disabilities to perform tasks by providing enhancements to, or changed methods of, interacting with the technology needed to accomplish such tasks.[11]

Smart homes

A dwelling incorporating a communications network that connects the key electrical appliances and services, and allows them to be remotely controlled, monitored or accessed.[12]

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[11] http://ec.europa.eu/information_society/policy/accessibility/deploy/a-t/index_en.htm.
[12] http://www.cat.csip.org.uk/_library/docs/Housing/smarthome.pdf.

1. INTRODUCTION: FACETS OF THE AGEING PHENOMENON

The world is experiencing an important demographic transformation: the unprecedented ageing of the population of almost all developed and developing countries. The increasing presence of older people in society makes people of all ages more aware that they are living in a multi-generational society. Increasingly, ageing populations influence global patterns in labour and capital markets, services and traditional social support systems like health care and pensions in the European countries. In all the Member States of the European Union (EU) the current fertility rates are low. If birth rates continue to decrease as predicted, the proportion of young and old citizens will undergo a historic crossover. Besides this, the 'baby-boomer' generation (born between 1945 and 1965), which consists of a large number of people, has started to retire. A moderate projection of ageing in the EU for the period between 2004 and 2050 shows that the population aged 65+ will increase by 58 million or 77% and that, at the same time, the working-age population will drop by 48 million or 16%. In the EU, this might mean that the ratio of people of working age would be two for every older citizen, instead of four working people at the present time. All EU Member States will experience an ageing population, though there will be some differences between them in timing, nature and scale.

Quite often the demographic challenges are discussed in the media as a serious problem for social support systems. They are seen fairly negatively (as a "cost explosion"), which is one way to discuss this topic. The other way is to discuss the opportunities offered by ageing societies like, for instance, new markets for innovative applications and products/services for older people. Both ways can be combined and discussed in a third way. This would highlight the possibilities of preparing ourselves for the consequences of demographic change and shaping our ageing societies, instead of thinking that ageing societies will come on us like a hurricane and damage the heart of our civilization. Hence, the policy challenge is how to tackle the challenges and use the opportunities of the ageing societies in an intelligent way.

There are several paradigms behind the general aim of extending average human life expectancy without extending suffering. One is "compression of morbidity" - humans live long and vigorous lives, terminated by a sharp decline in functioning and followed relatively swiftly by death. Another paradigm is "decelerated ageing" (the processes of ageing are slowed, late-life functional disabilities are not eliminated but occur at a more advanced age). The most radical paradigm "arrested ageing" aims to reverse ageing and restore vitality and function to those who have lost them. An alternative paradigm of ageing points out that "the older" are a heterogeneous group and for this reason improved differentiation is necessary. Some suggest that the different phases of ageing should be taken into account, namely the age close to formal retirement, the autonomous age as a pensioner (period of independent living), the age with increasing handicaps (the start of the dependent living phase) and the dependent pensioner phase.

This new paradigm could also include the 'life-course perspective', which basically means that the "life course is a succession of events and activities in different fields of life and in institutional settings that is subject to many influences. It reflects the complexity and reflexive character of choices and constraints throughout the whole life course".[13] Using this perspective could also help us to focus on predicting the future needs of those who are not yet old, and on doing more "anticipatory" research. This perspective implies that the path by

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[13] IPTS (2006 ILS project report): "Active Ageing and Independent Living Services: Core propositions leading to a conceptual framework", IPTS, Sevilla. http://is.jrc.es/pages/EAP/iLS.html

which individuals arrive at old age is not predetermined. Instead it reflects lifestyle practices during the individual's life. 'Lifestyle' describes the way a person (or a group) lives and includes patterns of social relations, consumption and entertainment. Furthermore, the perceived quality of life of older people, or in other words their subjective well-being, is not only a very vital part of ageing research but also of policy concepts like those in the World Health Organisation's policy framework for Active Ageing.[14] All these aspects (the fact that older people are a heterogeneous group, the life-course perspective, lifestyle practices, perceived quality of life, intergenerational justice and predicting future needs) are the main elements of a research framework on ICT-based services for Active Ageing and Independent Living Services.

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[14] WHO (2002): Active Ageing – A Policy Framework, WHO, Geneva.

2. POLICY ASPECTS OF ACTIVE AGEING

According to the WHO (2002, p. 12 f.), Active Ageing - a term increasingly used in current policy discourses - is "the process of optimising opportunities for health, participation and security in order to enhance quality of life as people age. Active Ageing applies to both individuals and groups. It allows people to realise their potential for physical, social, and mental well-being throughout their lives and to participate in society according to their needs, desires and capacities, while providing them with adequate protection, security and care when they require assistance."

'Active' refers to a continuous participation in social, economic, cultural, spiritual and civic affairs, and not only to the ability to be physically active or part of the labour force. Another important element in this policy framework is quality of life. This is an individual's perception of his or her position in life in the context of the culture and value system where they live, and in relation to their goals, expectations, standards and concerns. It is a broad-ranging concept of the complex relationship between a person's physical health, psychological state, level of independence, social relationships and personal belief. As people age, their quality of life is largely determined by their ability to maintain autonomy and independence. 'Autonomy' means, in this context, the perceived ability to control, cope with and make personal decisions about one's life on a day-to-day basis, according to one's own rules and preferences. 'Independence' is understood as the ability to perform functions related to daily life - i.e. the capacity to live independently in the community with no and/or little help from others.

The WHO identifies seven categories of important determinants for Active Ageing (Table 1). Culture and gender are cross-cutting determinants. On the one hand, culture shapes the way in which people age because it influences all the other determinants of Active Ageing. On the other hand, gender is a 'lens' which helps us to consider how policy options affect the well being of both men and women. As regards the determinants related to health care and social services, it is suggested that health systems use a life course perspective which focuses on health promotion, disease prevention and equitable access to quality primary health care and long-term care. The behavioural determinants are often very important for Active Ageing. A healthy lifestyle is under one's own control. Engaging in appropriate physical activity, healthy eating, not smoking, and using alcohol and medication wisely, can, for instance, prevent diseases and support Active Ageing a lot. Determinants related to personal factors are genes and psychological factors. These include the intelligence and cognitive capacity to adapt to change, which may be one of the causes of disease. Determinants related to the physical environment are, for instance, safe housing and avoiding falls. Most injuries to older people could be avoided by having appropriate physical environments. Social support, opportunities for education and lifelong learning, protection from violence and other factors are important determinants related to the social environment. Finally, economic determinants like income, social protection and work are very important. In the case of work, the WHO suggests that it is important not to concentrate on the formal labour market alone, but to also recognise that older people work in the informal sector and do unpaid work at home and/or in their family.

Table 1: Determinants of Active Ageing

Culture and Gender (cross-cutting)	Determinants related to the Physical Environment
Health and Social Services • Health Promotion and Disease Prevention • Curative Services • Long-term Care • Mental Health Services **Behavioural determinants** • Tobacco Use • Physical Activity • Healthy Eating • Oral Health • Alcohol • Medications • Iatrogenesis • Adherence	• Physical Environments (e.g. transportation) • Safe Housing • Falls • Clean Water, • Clean Air and Safe Food **Determinants related to the Social Environment** • Social Support • Violence and Abuse • Education and Literacy **Economic Determinants** • Income • Social Protection • Work **Determinants related to Personal Factors** • Biology and Genetics • Psychological Factors

Source: based on WHO (2002, p. 19 ff.)

Most of the determinants - or in other words: supportive ways for Active Ageing – presented in **Table 1** have an implicit technology component like, for instance, safe housing, education, curative services and transportation**.**

The term "Active Ageing" is also used in European policy discourse. It is associated with both challenges and opportunities, and the relevant stakeholders have been intensively involved in the political process. They are central to discussions at both the European Union (EU) and Member States level.[15] The EU is tackling the economic, employment and social implications of ageing as part of an "overall strategy of mutually reinforcing policies", launched at the Lisbon European Council in March 2000. This approach was confirmed at subsequent European Council meetings in Nice, Stockholm, Göteborg and Laeken, since population ageing has been observed in most EU Member States.[16] The Social Policy Agenda, annexed to the Nice European Council conclusions, lists EU policy priorities in employment and social affairs, and outlines how Member States can deal with the wider social and work-related implications of ageing through mutually reinforcing employment, social protection and economic policies. Active Ageing policies and practices in this sense are being encouraged by approaches like life-long learning, working longer and retiring more gradually, being active after retirement, and engaging in health-sustaining activities.

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[15] For the developments on the level of the Member States which are not to be discussed in this paper see for instance Hinrichs/Aleksandrowicz (2005), Active Ageing and European Systems – Synthesis Report of the ACTIVAGE-Project, University of Bremen.

[16] The paper of Braun, A. et al. (2006): Issue Analysis on the 2006 European Foresight Monitoring – Healthy Ageing: Challenges and Options for Research, Future Technologies Division of VDI TZ, Düsseldorf, gives a solid overview of the EU-activities related to ageing. For this reason, we focus on the ageing and technology related activities.

Since the Lisbon European Council in 2000 there have been a number of EU initiatives linked to the field of ageing societies and Active Ageing. Recently, the EU has started to promote closer co-operation between the Member States on the modernisation of social protection systems through the application of the Open Method of Co-ordination (OMC). National social protection systems face similar challenges across the EU in the areas of social inclusion and pensions. The EU study "Long-Term Care Expenditure in an Ageing Society" (2003)[17] investigated the key factors that are likely to affect future expenditure on long-term care services in Germany, Spain, Italy and the UK. The aim was to investigate how sensitive long-term care projections are to assumptions about future trends in different factors, using comparable projection models. The main factors investigated include demographic changes, trends in functional dependency, future availability of informal care, the structure of formal care services and patterns of provision, and the future unit costs of services.

The Economic Policy Committee[18] established a working group on ageing populations to examine the economic and budgetary consequences of ageing. On the basis of this work, an assessment of the long-term sustainability of public finances was integrated into the annual surveillance of EU Member States' budgetary positions. The report "The impact of ageing on public expenditure: projections for the EU-25 Member States on pensions, health care, long term care, education and unemployment transfers (2004-2050)"[19] was published in February 2006.[20] It serves as the basis for assessing the sustainability of public finances in the context of the Stability and Growth Pact. It also contributes to ongoing debates on the modernisation of welfare systems and extending working lives and serves as a follow-up to the revised Lisbon strategy and the open method of co-ordination. The renewed European policies on the Lisbon goals, as set in the framework of Hampton Court,[21] are intended to build up new stakeholder forms for cooperation, communication and dialogue to help ensure that the European Union and its Member States develop effective strategies.

At the beginning of 2005, the European Commission published a Green Paper "Confronting demographic change: a new solidarity between the generations"[22] with a view to launching a debate amongst all relevant stakeholders and within society on ageing populations. With the launch of this paper, it was expected to find answers to the key question on how to cope best with the impacts of an ageing population. Another paper by the EU Commission entitled "Communication on the demographic future of Europe" followed in 2006. It presented a synthesis of the stakeholder replies to the Green Paper on demographic change.[23]

As presented in this short overview, Active Ageing has been a central point in the European Union discourse on ageing since the beginning of the new century. The concept of Active Ageing is not only included in the current European Employment Strategy and Health Strategy,[24] but its importance has also been re-emphasised in the mid-term review of the Lisbon Strategy, in which the High Level Expert Group urges the Member States to "develop

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[17] http://ec.europa.eu/employment_social/social_situation/docs/european_study_long_term_care_en.pdf.

[18] http://ec.europa.eu/economy_finance/epc/epc_en.htm.

[19] http://ec.europa.eu/economy_finance/epc/documents/2006/ageingreport_en.pdf.

[20] http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ecofin/88403.pdf.

[21] http://www.pes.org/downloads/EC_Time_to_move_up_a_Gear_Part_I_Jan_06.pdf.

[22] http://ec.europa.eu/comm/employment_social/news/2005/mar/comm2005-94_en.pdf.

[23] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, "Unlocking Europe's full potential", Commission Legislative and Work Programme 2006 http://ec.europa.eu/comm/atwork/programmes/docs/clwp2006_en.pdf.

[24] See for instance http://ec.europa.eu/health/ph_overview/Documents/byrne_reflection_en.pdf.

a comprehensive Active Ageing strategy" (Kok 2004). Furthermore, the EU institutions and the Member States are explicitly asked to ensure that a dedicated communication strategy should be established involving all national, regional and local stakeholders.[25]

A new step towards a broader Active Ageing strategy was taken just recently when, for the first time, future ICT-based applications were put forward explicitly as a means of supporting Active Ageing. The EU initiative "i2010 - A European information society for growth and employment", announced in June 2005, aims to promote an inclusive European information society and make Europe more attractive to investment and innovation in knowledge-based goods and services.[26] Linked with i2010 are three "quality of life flagship initiatives on key social challenges." One of these is the initiative "needs of the ageing society".[27] In addition, actions are suggested to overcome the geographic and social digital divide, culminating in a European initiative on e-Inclusion.[28]

The Ministerial Declaration, made at the Ministerial Conference "ICT for an inclusive society" in June 2006, underlines the use of Information and Communication Technology (ICT) options for Active Ageing. This declaration explicitly stresses the need to address "ICT solutions for Active Ageing" (p. 5). In line with the 2008 European initiative "e-Inclusion", it also stresses that "the contribution of civil society, industry and all other stakeholders is essential …" (p. 6). The declaration suggests that the needs of older people should be addressed in four areas by:

- Exploiting the full potential of the internal market of ICT services and products for older people by, for example, 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.

- 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 and private sectors, and civil society, making special efforts with ICT skills for older people.

- 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.

- 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."[29]

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[25] In the scope of the "EC Action Programme to combat Discrimination" DG EMPL has started to support new stakeholders' forms. The EC is co-funding the European Older People's Platform AGE. AGE is involved in a range of policy and information activities to put older people's issues on the EU agenda and to support networking among older people's groups in the following areas: - Social policy; - Discrimination; - Pensions; - Social Exclusion and Poverty; - Employment; - Health; - Independent Living and Accessibility; Life-long Learning and Citizenship.

[26] http://europa.eu.int/information_society/eeurope/i2010/i2010/index_en.htm.

[27] The other ones are "intelligent vehicles that are smarter, safer and cleaner" and "digital libraries making multimedia and multilingual European culture available to all".

[28] See http://europa.eu.int/information_society/eeurope/i2010/i2010/index_en.htm page 12.

[29] See http://europa.eu.int/information_society/events/ict_riga_2006/doc/declaration_riga.pdf, page 2.

2.1 Health and care policy: The role of ICT

The ageing of society has great influence on trends and developments in a number of policy fields. A very popular one is health and care policy. Changes in demand for care and health treatment are often directly related to the growing number of older people and increasing life expectancy. At the same time, the health of older people has steadily improved in the last decades. However, predictions about which people will grow old in good health and which people will not are still very unreliable, though it is clear that health is strongly related to age, gender and economic status.[30]

Currently, only a small proportion of older people live in institutions but this number is expected to grow fast in the coming 15 years. The share of older people in need of care living at home will grow even faster, with 54% expected in France and 38% in Germany.[31] It is important to note that even though these figures will grow fast in the coming years due to the ageing society, they still refer to a minority of the total group of older people. Older people in general, in good or not so good health, often have to deal with sensory restrictions resulting in special access-related needs as regards Information and Communication Technology. Among older people in general this applies to more than one quarter, a figure which rises the older they are.

People's cognitive functions are closely related to their education levels. Differences between countries in cognitive functions can therefore be linked to national differences in educational experience. Today's older generation in the Mediterranean countries have a lower educational level and accordingly higher figures for cognitive impairment. Depression among older people is more prevalent among women, particularly those who are not married and those who live alone. Here too there is a North-South gradient with higher prevalence of old age depression in Southern countries.[32]

All the European national governments are actively anticipating the challenges the ageing society presents to the health and care sector. Finances, capacity, privatisation, changes in government competencies and quality of services are all on the agenda. There has been a shift of emphasis from acute health care to more long-term care and treating chronic diseases. Policies related to the application of Information and Communication Technology in the health and care sector are slowly gaining ground. Assistive technology policies which have been translated into actual laws have been limited to telecommunications and telephony and have not yet been applied to new media to any great extent. Germany is an exception in this, having introduced the "Law for mainstreaming handicapped people" which pays special attention to barrier-free communication and requires public sector bodies to create an Internet presence suitable for disabled people. Apart from this, Design for All policies are increasingly visible in strategy statements and concrete measures. However, European measures are modest in comparison with regulations in the USA, which explicitly organise accessibility for disabled people to, for instance, government web pages and government ICT hard- and software.

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[30] See, for instance, Ageing: Exploding the myths, WHO. http://whqlibdoc.who.int/hq/1999/WHO_HSC_AHE_99.1.pdf.

[31] Jacobzone, S. and E. Cambois, E. Chaplain, J. M. Robine (1998), "The Health of Older Persons in OECD Countries: Is It Improving Fast Enough To Compensate For Population Ageing?" Labour Market and Social Policy – Occasional Papers No 37. Paris: Organisation for Economic Cooperation and Development.

[32] http://www.share-project.org/sharebook/chapter1.php

In many European countries, the delivery of assistive technology services often involves complex organisation of partners and players, and different levels of government responsibility. Service providers, often public organisations have problems getting the message across to their potential clients about which services they are entitled to and how to apply for them. In Spain, for instance, delivery of services is split between a carousel of organisations. A general trend is that delivery of services is more and more locally organised, close to where older people lead their daily lives.

Experiments with more advanced ICT services supporting care and health services are often small-scale and local. Up-scaling these initiatives appears to be problematic for financial and organisational reasons. An example of this is the poor take up of smart home technology; which has been available for years but not yet widely implemented. The previously quite protective attitude of the smart home technology business is currently being shaken up by technological developments. Better interoperability between technical standards has opened up new possibilities for more flexible and easier to use systems with modular functionalities in entertainment, security (including care services) and comfort.

2.2 Active Ageing in the policy field of work and retirement: attempts to shift attitudes

Most European countries have become aware of the urgent need for policies to retain older people at work. These policies, where they are implemented, focus mainly on reducing the effects on national pension systems. Active Ageing is not very often directly part of this governmental drive.

For example, in the Netherlands, two laws have been launched in this field. Most important is the "Act on Age Discrimination" dealing with age in general. This law has been established in order to counteract any discrimination in working life due to age.

In Finland, there is overall consensus on the need to reform work life in accordance with the demands of an ageing population. Finland has set up several policies regarding the topic of retaining older people in work. The ActivAge project has identified the following programmes:

- The National Programme on Ageing Workers 1998-2002
- The National Well-being at Work Programme 2000-2003
- The Workplace Development Programme 1996-99 and 2000-03
- The National Productivity Programme
- The VETO Programme

In the political discourse about ageing in Germany there is little emphasis on retaining older workers in work. Instead it is "dominated by questions of burdens, costs and dependency, while the positive sides of ageing are not addressed. The issues of material security and the threat demographic ageing poses to social security systems are overemphasised." (ActivAge Project: Country Report Germany, 2004: p. 32).[33]

Apart from this, the effectiveness of these polices may be questioned. Governments often cannot do much more than set an example as they are important employers themselves.

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[33] For more country examples, see SeniorWatch Reports and especially the country reports of the ActiveAge project (http://www.iccr-international.org/activage/).

Convincing the private sector of the benefits of retaining older workers, however, may be a difficult task.

It may therefore be expected that EU policy will need to act as a guide in this topic. Whereas the need to start ageing policies because of economic and fiscal challenges has been recognised, only some national governments have been able to translate this need into policies directed at Active Ageing in the wider sense.

Part of this problem is that there seems to be no clear picture of the elements that influence people to remain working longer. Education and motivation are key factors which are thought to be heavily influenced by flexibility and mobility at work, however the exact causal relations are not yet clear. Countries which pay attention to these influencing factors seem to prefer a general 'healthy working' policy above one specifically for older workers. In other words, if a healthy and pro-mobility working policy is adhered to early enough this will automatically mean that older workers will be healthier and more motivated later in their careers.

The same holds for the role of ICT. In general, the possibilities offered by ICT for the employability of older people raises high expectations. However, today's practice does not show many examples of this. Early research has revealed that more advanced ICT applications are not well picked-up by older workers, who may, however, be able to keep up with general office ICT technology.[34]

Considering ICT-based services and the needs of elderly people is – as discussed in this chapter – one important way of supporting active ageing in the upcoming ageing societies. For the moment, the EU is in the phase of developing a coherent strategy for active ageing. This strategy aims to supply the needs of older people in ageing societies using ICT-based services, and to use a participatory political process where all the relevant stakeholders are consulted.

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[34] Koning, J. & Gelderblom, A. (2004). ICT op de werkvloer en oudere werknemers. In: Haan, J. de., et al. (2004). Surfende senioren. Den Haag; Academic Service.

3. SPECIFIC TECHNOLOGY-RELATED NEEDS OF OLDER PEOPLE IN AGEING SOCIETIES

At a first glance, there seems to be a lot of information already available on older people's needs or wants. We find architects claiming to plan houses for older people, designers purporting to shape products for them, and urban planners conceptualizing local communities attuned to their "real" needs. However, products, services and public infrastructures which have failed, or have been poorly accepted by older people, and a small number of recent empirical studies show that there is still an enormous lack of differentiated knowledge on the current needs of older people. Solid research on their needs is therefore an indispensable task for scientific communities working on ageing.

Based on the basic pillars of the WHO concept on Active Ageing, it is recommended that specific higher level needs (or wants) of older people with regard to quality of life in highly developed countries be classified into five groups:

- Health: the health needs of older people comprise three aspects: non-existence of illness, a good functional status and an appropriate system of social support for the individual. The decision as to whether one is healthy or ill depends strongly on one's perception of one's own body. In coming years, it is expected that better informed patients will take on more responsibility for their own health. It is expected that they will be more proactive when asking for a medical diagnosis, medical treatment and medical therapy.

- Safety: the need for personal safety is very important in everyday life and at home. Quite often it is focused on physical inviolability of older people. The most common challenges are physical infirmity and the loss of mental abilities and cognitive performances. These restrictions quite often lead older people to make the necessary adjustments and use safety products (e.g. the use of detectors capable of noticing when a person falls down). In other cases, more serious restrictions lead to admission to an institution which means a very serious loss of individual autonomy.

- Independence: usually, older people like to live an independent and autonomous life as long as possible. A central point is living independently in their own homes. Moving to an institution is regarded as something negative. However, for older people who have an increasing number of serious handicaps, it is much more difficult to continue independent living.[35]

- Mobility: there is a strong need among older people for mobility. However, for individual reasons (e.g. health problems) this mobility can be constrained and a reduced mobility may be necessary. A serious reduction of mobility can lead to enormous reductions in quality of life.

- Participation: being part of everyday life is one of the central needs of older people. Contact and relations with other people have a positive influence on well being and health in older age. An increasing number of older people decide, for instance, to learn more about new topics and attend courses at universities and other educational institutions. This is part of their quality of life.

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[35] For more details on independent living see IPTS (2006 ILS project reports): "Active Ageing and Independent Living Services: Core propositions leading to a conceptual framework", IPTS, Sevilla. http://is.jrc.es/pages/EAP/iLS.html

This classification of specific higher-level needs of older people might be a little vague but it can be seen as an auxiliary template to help us get more detailed knowledge about the specific needs of older people related to technology (referred to in this paper as "technology-related needs") by doing empirical research. These specific technology-related needs are closely related to the higher level needs for health, safety, independence, mobility and participation. The study of the relationship between the specific needs of older people for technology and their technology use and technology acceptance has been an increasing important research area since the early 1990s, when the field of gerontechnology was established. Since then, there has been some scientific work, focusing especially on ICT-based applications, which tries to tackle the aspect of specific technology-related needs with empirical research methods (e.g. survey questionnaires, and in-depth interviews).[36]

Concerning the older people of tomorrow ("baby boomers") some authors see tremendous exposure to computer applications which will lead to a growing openness and increasing competency with respect to using technological innovations. However, they do not expect that all older people in this group will be able to take advantage of these technological advances ("digital divide") since their experiences with future technology, their educational backgrounds and their incomes may vary significantly. They predict a number of older non-users of ICT in the near future who will be at risk of being excluded from important social domains.

Empirical research show some remarkable results on certain aspects of specific technology-related needs of older people and their use and acceptance of ICT-based applications. Some of the reluctance described today in using ICT-based applications might disappear over time as the values, attitudes and expectations of the next generation of older people are expected to be more accepting. This review of studies on current specific technology-related needs of older people also shows that it is important to remember that these needs are on three different levels (individual, individual environment and societal environment) as shown in Table 2. It should also be kept in mind that these technology-related needs are closely related to the higher level needs (health, safety, independence, mobility and participation) discussed above. Therefore, it does not make sense to isolate the specific technology-related needs from their specific higher-level needs.

Table 2: Different levels of older people's specific technology-related needs

Level	Specific technology-related needs of older people (examples)
Individual	Devices for hearing and vision
Individual environment	Appropriate equipment at home (e.g. intelligent stair lifts and smoke detectors)
Societal environment	Appropriate communication tools (e.g. easy to use internet, easy access)

One of the assumptions of the life-course perspective is that the more active people are, the more their lifestyle practice will become mobile and the more their expectations and specific needs for technologies that support mobility, independence, participation and safety will

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[36] For a review of literature published between 2001 and 2004 see Empirica/TNO/Free University of Brussels (2005): Inventory of OLS Related Policy, Applications and Contextual Factors, Draft of a report of a project financed by the European Commission, Empirica, Bonn.

increase. Besides this, increased awareness of our health will also increase the attention to prevention, healthy nutrition and medical information and the expectations with regard to technological support for these activities. But there is another important point: empirical research also shows that there has been a shift away from treating the older person as a rather passive object of research whose specific technology-related needs are simply deduced from observed functional impairments. Now a more active approach is starting to develop, in which older people are encouraged to articulate their own specific technology-related needs in a differentiated fashion. They could even assume a role as feedback providers in the technology design process.

3.1 Research challenges

Overall there is still very limited understanding of older people's specific technology-related needs. One reason for this is that the main research methods used (survey questionnaires and in-depth interviews) have both advantages and disadvantages. A major advantage of closed-ended questions in questionnaires is that it is quite easy for most older people to answer them and it takes little time. Additionally, it is easy for researchers to compare the answers. The disadvantage is that an older respondent is forced to choose an answer category. Older people may not like this since they have to choose between answers which may be oversimplified. Therefore, the response has less meaning and is less useful to the researcher. A major advantage of open-ended questions in in-depth interviews is that older respondents have the freedom to state what they know and think. This can also be a disadvantage in that older respondents may respond at length, making it difficult to compare answers. A further problem with current research, raised by observers like Cutler[37] is: "Gerontological research has not kept pace with technological change (and) gerontological research on technology has itself been beset by lags." If this is correct, researchers may have to change their perspective and to adapt themselves to recent technological changes faster. Another main reason for the limited knowledge is, as Oestlund[38] notes, that present understanding is still limited by stereotypes which fail to understand how different groups of older people use or do not use technology and how they articulate their specific technology-related needs. There are sufficient reasons for not regarding older people from 55 onwards as a homogenous group. Ageing is a complex process with big variations between groups and individuals. According to the life course perspective, it is important to remember that "the older people" are a very heterogeneous group and for this reason a better differentiation is necessary when it comes to their specific technology-related needs.

Instead of the extrapolation method to get more knowledge about future technology-related needs, an intelligent mix of existing methods is suggested. It could help to avoid the deficits of the prevailing qualitative (e.g. in-depth interview, literature review, Delphi-workshop, focus group, scenario-workshop) and quantitative (survey questionnaire, structured observation, quantitative content analysis) methods for research on current and future technology-related needs of older people. With this mix, it is possible to capture the individual results not only isolated from each other within the framework of the special method applied, but to deal with them within the context of all findings. In order to evaluate results, it might be useful to organize specific workshops where (provisional) results could be

[37] Cutler, S. J. (2006): Technological Change and Aging, in: Binstock, R./George, L. K. (eds.): Handbook of Aging and the Social Sciences, Elsevier Academic Press, Amsterdam et al., pp. 257-276.
[38] Oestlund, B. (2005): Design Paradigms and Misunderstood Technology – The Case of Older Users, in: Jaeger, B. (ed.): Young Technologies in Old Hands – An International View on Senior Citizen's Utilization of ICT, DJOF Publishing, Copenhagen, pp. 25-40.

critically examined and evaluated by acknowledged experts and stakeholders. A final pooling and assessment of all results would follow. This last step is important for the plausibility and elaboration of all results. However, in this case, it will be a challenge to get the detailed knowledge on future technology-related needs of older people which is needed if we are to prepare ourselves sufficiently for ageing societies. It may mean that completely new research methods will have to be developed.

3.2 ICT maturity of older people

The notion of ambient intelligence implies that computing devices move into the background. Thus, the requirements for users to be involved with computers may diminish. For the time being, however, many Independent Living Services and ICT-based services for Active Ageing seem to demand that older users have some basic ICT knowledge and experience.

ICT maturity in inhabitants of 50+, however, differs strongly across the countries analysed. Out of the Eastern European member states, Poland and Slovenia clearly lag behind the EU-25 average in all three areas: ICT access, usage and skills. Estonia, however, is further ahead and is comparable with the rest of Europe in the usage by 50+ year old of PCs, mobile phones, and the Internet. In fact, Estonia appears more ICT mature than some West European countries such as Spain and Italy. West European countries Germany, Sweden, Finland and the UK are ahead of the European averages on practically all indicators, whereas the Netherlands is low in its SMS and e-learning usage and 'Search for health information'.[39]

Older users struggle with the image, conveyed by the media, which links ICT to young people. They do not recognize themselves as a potential user group. Their needs are not taken into consideration by ICT manufacturers although recently some mobile telephone operators have announced simple mobile phones (Vodafone Simply for instance in Germany and the UK).

Older people can be divided into four typologies of ICT involvement. European figures show that the largest group, representing almost one-third of the population, is still the "Digitally Challenged". The affinity with ICT technology seems at first closely linked with the 'Young Old', however there still is a potential group of 'young old' who are not open to ICT use, and an encouraging group of 'older old' who are beginning to be, or are already, experienced in ICT use. The crucial question now is whether those in their 50s who are using today's ICT will become the non-users or reluctant users as they enter later life stages, or whether they will continue to be ICT users.

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[39]   SeniorWatch, (2002): Older people and Information Society, Brussels, http://www.seniorwatch.de/.

4. TECHNOLOGICAL SUPPLY FOR THE AGEING SOCIETIES

After finding out about current and future technology-related needs of older people, the next important step is to develop technologies and applications which match them and improve quality of life. An application's lack of applicability to older people may be a result of conflicting interests and trade-offs. For instance, most mobile handsets are getting smaller with more functionality, but this miniaturisation is at the expense of ergonomics and simplicity. Overly narrow market considerations, with a very strong focus on younger consumers and their abilities, often lead to design of products/services which can cause major problems for many older people.

Currently, there is quite a lot of public discussion in the press about the high economic potential of appropriate products for older people and the enormous "silver" market. It is often said that companies have simply to develop the adequate technological supply (or in other words: applications, products/services) to be able to make use of the opportunities resulting from the existing purchasing power of the older population. However, ways to harness the opportunities offered by ageing societies by converting the technology-related needs of older people into a strong demand for age-based products are not as easy to find as it might seem at first glance.

4.1 Matching demand and supply

Ideally, future applications should adapt to the needs of the individual, rather than the other way round. However, future applications and products are often designed for a "standard" user. One major reason for this is commercial deployment and economies of scale.[40] Most of the few companies which are already active in developing innovative aged-based products try to focus on improving the perceived quality of life of older people, and thus try to meet the specific technology-related needs of some groups of older people (e.g. people with increasing handicaps). A relatively new concept, which aims to meet the specific technology-related needs of all older people as far as possible, is "Design for All" (DfA).

"Design for All"[41] is a concept which consists of three strategies: (1) Products/services and applications should be usable by as many people as possible - regardless of age, ability or situation - without any modifications. (2) Products should be easily adaptable to different users. (3) Products should have standardized interfaces capable of being accessed by specialized users. The concept links directly to the political concept of an inclusive society which integrates all citizens into the information society. Its importance has been recognized by governments, industry,[42] and the stakeholders of older people (pensioners associations, care homes, etc).[43] It is a concept that emerged from "barrier-free" or "accessible design" and "assistive technology." Barrier-free design and assistive technology provide a level of accessibility for (older) people with disabilities but they also often result in separate and stigmatizing solutions, for example, a ramp that leads to a different entrance to a building than

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[40] IPTS (2001): Scenarios for Ambient Intelligence in 2010, IPTS, Sevilla.

[41] Other terms quite often used synonymously are universal design, inclusive design, accessible design, universal access and access for all.

[42] See for instance the European Union on design for all in ICT products, services and applications http://europa.eu.int/information_society/policy/accessibility/deploy/dfa/index_en.htm and European Design for All e-Accessibility Network [EDeAN] (http://www.edean.org/index.asp?auto-redirect=true&accept-initial-profile=standard&myselectedgroup=189).

[43] The International Federation on Ageing, the most famous international stakeholder network has chosen for its next world conference on global ageing the topic "Design for all". It will take place in Montreal in 2008.

the main stairway. DfA strives to be a broad-spectrum solution that helps everyone. Participative product development is considered to be the most promising means of meeting the technology-related needs of (older) people. There have been numerous discussions on this concept, leading to special laws in the USA. These laws give companies a lot of freedom in how companies achieve the aims of DfA. In Europe, 2002 was the "Year of People with Disabilities"[44] and the concept 'design for all' was highlighted. There have also been several projects on DfA within the EU Research Framework Programmes 4, 5, and 6.

A very practical example of design-for-all policy in the area of eGovernment can be found in the USA where regulations have forced new government web pages to guarantee access to the blind, the deaf and other disabled people. In Europe no explicit regulations or legislation were implemented, nor did it appear that any were planned. However, both the DfA concept and the aim, although not always explicitly labelled DfA, has become increasingly visible in strategy statements and concrete measures.

Finland and the Netherlands were the forerunners in this area in Europe. In Finland, although there were no specific legislation or regulations concerning design-for-all in 2001, government statements and some government initiated research and development projects already existed. For example, in the Finnish Consumer Policy Programme, 2000-2003 (the Advisory Council on Consumer Affairs, Ministry of Trade and Industry) special attention was given to the ageing of the Finnish population, in relation to, among other aspects, the Information Society. The programme stated that IS services should be available to all population groups both technically and economically and that all population groups should be able to use essential services with reasonable conditions. It also stated that IS services and products should be usable in the different phases of a consumer's life and require few modifications. The programme highlighted ICT as an important facilitator for bringing everyday services to people with disabilities, and improving their capacity to live independently.

Other countries without specific policy or legislation appear to have addressed the design-for-all issue in other general policy areas. In countries like Austria, France, Germany, Ireland, Italy, Luxembourg, and Portugal, e-Government policy in particular appears to be a dominant driving force, with several initiatives aimed at implementing the sub-concept of internet-for-all. The Dutch government has no regulations to support internet-for-all. However, it has signed a declaration of intent in which it undertakes to make all public administration websites accessible according to W3C guidelines. The Dutch government is promoting accessibility of public internet services in general, not only to older people or people with impairments. This means that ideally accessibility is also enabled for Linux users, users with other browsers etc. In Denmark, DfA is directly addressed in the new IS Action Plan in relation to the design of Assistive Technolognies (AT), ICT and web pages.

Another recent concept that could help develop adequate "technological" supply in meeting the specific technology-related needs of older people is "Ambient Assisted Living" (AAL). It was developed as an initiative based on article 169 of the EU treaty. The founders of this concept are organisations from industry, science and government in Europe.[45] They received funding within the EU Research Framework Programme 6. AAL aims to prolong the time, older people can live decently in their own homes by increasing their autonomy and self-confidence. AAL also aims to relieve older people of monotonous everyday activities, to

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[44] http://ec.europa.eu/employment_social/news/2001/dec/cd_2001_903_en.pdf.
[45] http://www.aal169.org/members.html.

monitor and care for older or ill people, to enhance personal safety and to save resources. According to an ISTAG report (2004) ambient intelligence can be seen as a starting point for AAL.

Ambient intelligence is mainly based on three technological fields:
- ubiquitous computing, which consists of integrating microcomputers, sensors and actuators into everyday objects;
- ubiquitous communications, which enable objects to communicate with one another. Ad hoc networking, self-organisation, personalisation, and context awareness play an important role;
- human-computer co-operation, which means interaction with devices happens in a 'human' way. The main technologies are interactive and in some cases multimodal, and are based on speech, gesture, emotions, and artificial skins.

In a paper by the European Commission resulting from a stakeholder consultation workshop with experts of relevant fields of AAL,[46] it is stressed that the inclusion of the specific technology-related needs of older people and their carers is a key element of this concept. Since this concept is a newly developed one and its implementation is just starting, there is no scientific information available yet on its relevance in practice to industrial companies.

"Independent Living" has been one of the objectives of the many research programmes of the European Commission since 1990s. A technology initiative for disabled and elderly people - TIDE (pilot action in 1991) aimed to stimulate the creation of a single market in assistive technology in Europe with a view to enabling elderly and disabled people to live more independent lives and become more integrated into the community. In the Fourth Framework Programme (1994-1998), one of the activity areas was 'Telematics' for improving employment and the quality of life. Equal access, independent living and participation for all in the Information Society were also part of the strategic objectives of Framework Programme 6 of European Commission.

Independent living can be broken down into the following different aspects: control of one's life and empowerment, integration and full participation in society, independence, autonomy, self-determination, self-respect and self-reliance. All these aspects relate, in one way or another, to the values of human dignity as a universal right.

Central to independent living is the recognition that each individual has a right to the independence that comes from exercising control over his or her life, based on an ability and opportunity to make choices in everyday activities. These activities may include participating in community life; fulfilling social roles, employment, and citizenship; sustaining self-determination; and minimising physical or psychological dependence on others. Independent living addresses the question of all citizens having an equal right to participate in society, and sharing the opportunities, risks, and rewards. The independent living philosophy promotes full participation of older people and also of people with disabilities in our society. Its main objective is to diminish the physical, economic and attitudinal obstacles to independence, so

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[46] These were representatives of patients, older people, hospitals, mental health organisations, smart homes, science, design groups, industrial companies and representatives of the national welfare systems. European Commission (2005): Research, Development and Deployment of Ambient Assisted Living (AAL) for the Ageing Population, Brussels.

that, ultimately, integration is achieved. Independent living affects not only the well-being of the individual, but also the family, the local community, professionals and society as a whole.

The notion of Independent Living Services can be identified in very general terms as (culturally adapted) "enabling services". Independent Living Services (ILS) are designed to help people to gain independence and help communities to eliminate barriers to independence.

Independent Living Services are those services that help individuals who have a physical impairment (physical, mental, cognitive, or sensory impairment) or face other economic or social barriers to independence, to function independently in the community. These services assist these people in their efforts to maintain or obtain independence and control over the decisions and directions of their own lives. The goals of these ILS are to maximise empowerment, independence and productivity of individuals and their integration and inclusion in the mainstream of society.

Different kinds of independent living programmes to support older and disabled people can be identified. These may vary: the services they offer may be residential or non-residential and delivery methods may be direct or indirect. Most important is that the features of an independent living programme are adapted to the needs of the clients served, the availability of existing community resources, and the physical and social makeup of the community. Supportive environments can also prevent the future development of barriers, such as disease and disabilities by making the healthy choices the obvious and easy ones.

Any product, application or service that enables people, whose independence in daily life is challenged, to lead a more independent and participatory life falls under the ILS label. ICT-based ILS refers to ICT products and applications as well as services based on a salient deployment of ICT.

There are already a myriad of mainstream, everyday products, services and applications that could help older people to live independently. For example, generic ICT products, services and applications such as mobile telephony or e-mail and the Internet can open up new opportunities for people with restricted mobility to participate in many areas of social and economic life. For instance, they can offer opportunities for contact with distant family, relations and friends (through friendship networks), and for participation in cultural and political life. They can also improve technical preconditions to retain work.

Specifically designed ICT-based assistive technologies can be of great benefit to older people who are increasingly at risk of having functional difficulties in areas such as mobility, vision, hearing and some aspects of cognitive performance. Smart home and consumer electronic developments can make home management and everyday living a lot easier for older people. Workplace technologies and tools can help to prolong working life. Healthcare technologies can help in prevention, early detection, cure, and management of chronic conditions.

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 well-being and providing a secure home environment. Future developments in many of these areas are underpinned by some key emerging technologies - for example, robotics, new materials and biosensors. In addition, the 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. Some of these technologies are on the market today and could be used to support ILS.

ICT-based ILS services enhance a sense of community and combat alienation. For example, a peer elder computer education programme, such as SeniorNet,[47] enables its members to learn and teach others using computers and communications technologies to accomplish a variety of tasks. Also, ICT-based ILS services help foster inter-generational relationships. For example they can facilitate contact between grandparents and grandchildren who live some distance away from each other, and between school children and elders via online education projects.

4.2   Mapping ICT-based ILS with different policy fields

ICT-based ILS applications vary from general purpose and communication to specific e-learning, e-work and e-health applications. Therefore the policy fields linked to ILS include different policy arenas and concepts, such as telecom and information society policies, DfA policies, health, social, employment and ageing policies, and, central to all, e-Inclusion policies. Figure 1 aims to capture the complexity of constituents and shaping factors of ILS and the relation with ICT applications and relevant policies.

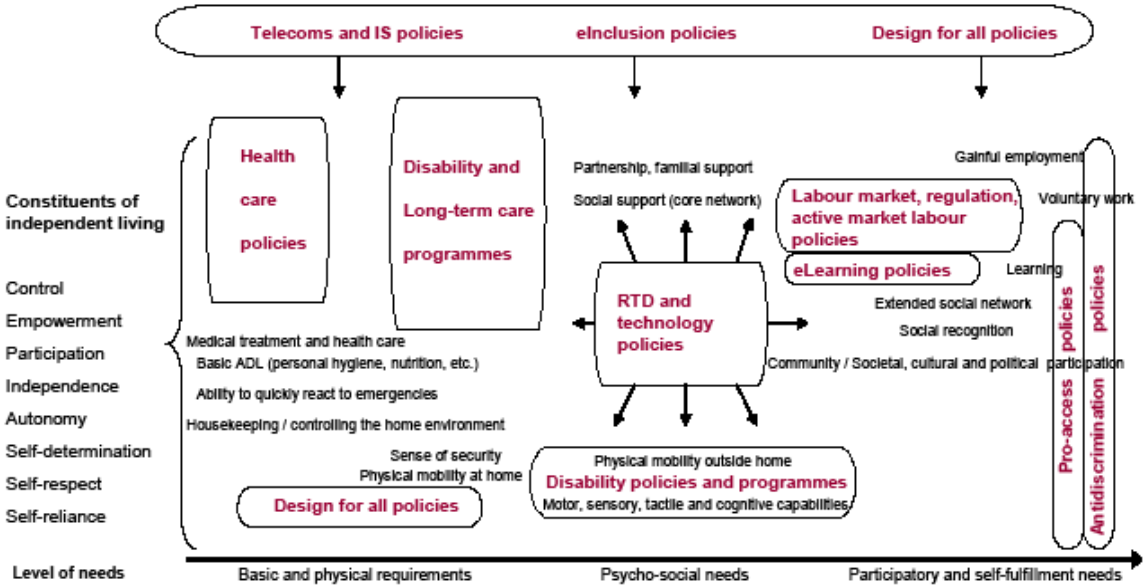**Figure 1: ILS policy/ICT policy intervention potentials**

Figure 1 shows which ILS constituents could be directly influenced to a greater or lesser extent by policy and which are not directly covered by policy. Figure 1 can also be used to show if there are shifts needed in the application area of certain policy fields and in what direction this could be.

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[47]   http://www.seniornet.org/php/default.php.

For example, the demographic ageing of western societies is not without implications for family structures and family functions. Societal shifts in generational proportions correspond with shifts in inner familial age proportions. The prolongation of life expectancy and the current low fertility rates go along with a shift in the main functions of care and maintenance, namely away from the descendant and towards the antecedent generations, or: from taking care of one's parents, rather than one's grandchildren. At the same time, family remains the main agent of intergenerational societal integration.

Although co-residence has decreased, one still finds that across Europe there is a widespread geographical proximity of the elderly and their adult children. This has, of course, implications for the availability of support and care for the elderly parents. Empirically there are also high rates of contact between the two groups. However, one already finds that the proportion of the population who are grandparents decreases dramatically in the "younger old" cohorts, due to the propensity of their children to have fewer children later.

According to the national correspondents on the SeniorWatch project, in 2001 only two member states made specific reference to the use of ICT in policy documents empowering family carers (Table 3). In the UK, a reference appears in the 'National Strategy for Carers' (1988), to the important role of carers in providing care and support to frail and disabled people. It states that it is government policy to support carers through better information, support and care services and it makes significant reference to the use of new technology as an important means of helping them. In Belgium, there is a regulation that addresses the use of personal alarm systems in providing homecare. This regulation has changed to allow for the use of more than one type of device (as was the case) and for the use of other emergency alarm systems, such as video telephony, thus providing more choice to family carers.

Table 3: The main clusters of countries addressing ICT in policy – empowering family carers (in 2001)

Specific IST/ICT-related policy empowering family carers	No specific ICT-related policy but ICT potential recognised, ICT-based concrete measures /initiatives exist	No ICT-related policy empowering older people or family carers and no concrete measures
Belgium, UK	Austria, Finland, Netherlands, Spain (Norway)	Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Portugal

Source: (SeniorWatch: Older People and Information Society Technology. 2002) (No information available for Sweden)

In 2001, several countries (France, Germany, Greece, Ireland, Italy, Luxembourg and Portugal) did not have explicit policy or initiatives that mention the use of ICT as an empowering tool for family carers in any policy area. However, some countries without any policy (Austria, Denmark, Finland and Spain) reported some potential interest and activity in this area. In Austria, for example, family carers are recognised in general policy that provides people with the freedom of choice to care for their relative and provides a fiscal allowance for this purpose. Although there was no explicit reference to the use of ICT in Austrian policy, some initiatives are already underway, including a web-based and free-phone information and advice service for family carers.

In Finland, the discussion surrounding ICT and family carers has intensified. One initiative to result from this discussion is the 'Satakunta Macro Pilot'[48] in which family carers are supported by a 'coverage system' with details of support and back-up carers held in a centralised information system. In 2001, the only ICT-based homecare technology used to support homecare and family carers were social alarm systems; and in some countries, e.g. Ireland, these systems were only available privately.

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[48]   http://www.seniorwatch.de/cases/10.pdf.

5. FURTHER STEPS IN ACTIVE AGEING AND INDEPENDENT LIVING SERVICES: POLICY OPTIONS

Active Ageing and Independent Living Services are emerging as very important issues in different national and regional health and welfare policies. These different developments have led to a segmentation and lack of co-ordination between social policies for health, employment and ageing. It is becoming evident that these policy domains must be better co-ordinated and they should, particularly in the case of ILS, be linked to RTD policy. One of the future priorities for developing ILS at European level is to co-ordinate and integrate a particular vision and approach to ILS issues, particularly for older people. Issues to do with technology, the efficient allocation of (public) resources, changes in habits and increased mobility of people underline the need for a major ILS debate at supranational (i.e. European) level.

Development of Active Ageing and ILS policies should be accompanied by impact assessments in order to both harness the opportunities and avoid the risks of wider ILS uptake. Impact assessments must consider the use and allocation of resources but they must also understand preferences, values, and norms. "Uniform" ILS policies on a transregional or national scale are inadvisable, since norms, values and preferences vary between groups and regions. Policies (including products and services) should be developed using a needs-based approach.

The generic structuring of the ILS domain set out in this report (Figure 1) reflects the fact that ICT-supported ILS emerge in given political, legal, regulatory, market, technological, etc. environments. The various ICT application fields relevant for ILS vary considerably in terms of the actors and value/service delivery chains involved and also in relation to market maturity. The potential of mainstream ICT, the basis for ICT-supported ILS, has not been fully exploited yet. This potential, however, is believed to be considerable. Simply 'getting people active online' opens up possibilities for enabling them to be better informed (prevention and lifestyle information), to meet peers (partner search, special interest communities, self-help groups) and thus fight depression and loneliness, and to enlighten and enable older people as powerful consumers. Though more specific technology domains like assistive technology (AT) can be described as a mature "market environment" in terms of established value chains/delivery schemes, the smart-home domain for instance has not really matured beyond the experimental/pilot stage. Although there are good reasons to assume that the potential generally provided by ICT for supporting the independence of older people has not yet been sufficiently exploited in any of these domains, the particular problems ultimately to be addressed within each of them may vary considerably. For example, in the AT domain, the dominance of SMEs operating under quite restrictive AT delivery schemes seems to hamper innovation, whereas smart-home technology seems to suffer from a lack of added-value as perceived by potential market actors such as older end users, community care providers, reimbursements, etc.)

Active Ageing and ILS are integrative policy issues: it requires input from different policy areas on national and European levels: e.g. social policy, labour market regulation, health/care, housing, RTD, telecommunication and information society policy. A major challenge for the future will be developing ICT policies which are integrated into welfare and health policies, social inclusion and adapted to a changing society. In Table 4, we tried to

describe a number of research and policy challenges relevant for an inclusive policy development process.[49]

Table 4: Challenges in the area of Active Ageing/ILS and policy options

Challenges	Policy options
One of the main challenges for policy makers has been on the one hand to deal with the dependency needs of the ageing population and on the other hand to promote and develop older people as vital resources of society.	The huge expansion in the use of Information and Communication Technology (ICT), if well adapted to the needs of different population groups, could create possibilities for older people to remain socially integrated and help them solve everyday problems. Awareness has to grow regarding the fact that the socially defined «older age» group is not a homogeneous group. The needs of the different «subgroups» might vary greatly. Therefore policymakers should not take the path of standardised support services in different life domains, but develop needs-based (and flexible) Independent Living Services. The focus should also be on the "needs" of individuals and groups in a life-course perspective, instead of limiting the perspective to particular age groups and offering standardized packages of support. Considering user needs and understanding "contexts of use" is going beyond usability and ergonomic research. Since the social conditions of people living at home will vary, no standardised, technology-push solutions can be developed. Future (European) Independent Living Services (including ICT services) policies need to take into account the particular contexts in which these services will be embedded. Finally, more attention should be paid to methodology development of user involvement and dissemination, and use of these methodologies.
A purely market-driven approach towards Active Ageing and ICT-supported ILS endangers equal access and affordability for	Policies are not solely to be determined by financial-economic imperatives to maintain public finances.

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[49] IPTS ILS Final Project Report, available at http://is.jrc.es/pages/EAP/iLS.html

all.	It is important to realise that technology implementation does not happen in a social/economic vacuum and there is a risk of unequal access to ILS owing to market dynamics. The situation must be avoided where high quality ICT-mediated services are only available to those who can afford them. This will probably need a better allocation of public money or sometimes also public provision of certain services.
	Policy-makers need to pay attention to affordability and inclusion issues, in order to spread the benefits of Active Ageing and ILS widely, avoiding the risk that emerging ILS solutions are exclusively geared towards the needs of high-income users.
Cost-benefit dynamics of some ICT-based ILS applications are often complex and not yet fully understood (e.g. in the case of the 'smart home' and in the field of telecare/telemedicine). Virtually all currently available cost-benefit analyses of ILS rely upon small-scale evaluations, many of which have been conducted in experimental rather than in real-life settings.	Active Ageing and ILS cannot be driven by cost-saving concerns only, since their potential lies in enhancing the quality of care for many, as well as in making care more effective. Helping to foster such a balanced notion of ILS will lay the foundations for pragmatic policies and realistic societal expectations.
	The real cost and benefits – particularly when it comes to more complex applications – are however likely to become apparent only when the stage of routine application has been reached. And even then, the non-monetary effects may be much more relevant than the direct cost savings that might be realized. To ensure cost-effective spending of public money, attention needs to be paid to reliable and holistic cost-benefit assessments, preferably on the basis of large-scale implementations under routine conditions.
There exists a persistent myth of ICT-supported ILS being developed only to achieve savings in costs and staff	This myth should be dispelled. As most ILS has not yet matured in terms of large-scale implementations, this is a little-understood area of concern. Concerns have been voiced that the inherent saving potentials of technology could become the main driving force for technology uptake in the health and social service sectors, at the expense of quality of service. Clearly, such a development would bear the risk of a

	creeping de-humanization of the living conditions of dependent people. There are two somewhat different aspects that need to be considered here. On the one hand, there is a risk that ILS may erode existing human support practices/networks – let them be operated by formal carers or by family members or friends. On the other hand, there is the issue of privacy and control. Here, the question arises whether the individual is able to keep control in procedural and/or informational regard (e.g. in the case of dwelling-based monitoring). Ultimately, these matters allude to the issue of self-esteem and dignity of the dependent individual.
ILS is developing in a complex field of different kinds of users, having particular roles and relationships.	Not only the end user should be taken into account but also the people in their context (partners, relatives, children), the wide spectrum of professionals and the organizations they work for, as well as the administrators.
	Policies should not limit their perspective to the older individual, but should include also the context of relatives, informal carers, and formal care (in its different forms).
	User involvement in the R&D chain needs to be strengthened. Too often R&D does not take into account the different needs of what is a very diverse and multifaceted group of users. Institutional mechanisms to systematically consult with and involve different user groups and their interest associations in the R&D process need to be strengthened and expanded.
	Rather than installing 'traditional' integrative platforms for enforcement of multidisciplinary 'joined' policy development, a real effort should be made towards integrating social mechanisms and channel user needs in ILS-related policies. Through these channels user parties should be able to join the development of and debate on ILS and the use of ICT for them.
ICT development in care and support settings is mainly focusing on professional and formal	Informal carers are the most important providers of care services in many contexts,

forms of provision of care	but changing lifestyles, socio-economic conditions and demographic co-ordinates put enormous pressure on these informal support systems. Their role needs to be recognized more firmly in inclusion and health policy-making and ways to support informal carers through ICT and to co-ordinate their work better with formal care needs to be systematically explored. Developments in health care and social care provision urge us to reflect on the structural integration of informal care in the formal models of welfare policy. In some countries first steps have been taken towards formulating policies that pay attention to the special situation of informal carers, although, generally informal carers are still neglected. Integrated health information systems that bring together patient information from different providers will provide the backbone architecture for the new model of care, which will require incentives to co-operate and share information across organisations.
Mediterranean countries have a great number of informal networks which are of central importance when ageing threatens to cause dependency among older people. However, social policies in these countries rely heavily on the role played by the family and this is something changing rapidly as a result of the incorporation of women into the workforce and the marked and sustained decline in the birth rate (leading to a convergence with other European countries in the short term).	Family care has proven to be an indispensable component in the welfare mix of contemporary societies. Home care needs professional intervention to support the families and prevent their exhaustion. Debate is needed on the topic of the transformations which are required in the welfare state in order to address such changes.
Awareness of Active Ageing and ILS and the opportunities they offer is limited among potential users, professional organisations and policy makers alike.	Outreach strategies of active ageing and ILS that familiarize all stakeholders with technological options already available and under development would be required. Such efforts would help not only to match existing demand and supply better, but also to prepare the ground for more interaction between users, policy-makers and industry in the development of ILS and supporting policies that are more closely aligned with user needs. More efforts to raise awareness of ILS could convey a more realistic image of ILS and

	allay some fears and misunderstandings about its negative impacts.
Active Ageing and ILS Research efforts are fragmented	Fragmented research efforts in both fields need to be better co-ordinated and lessons learnt/ best practices need to be shared more systematically. ILS and Active Ageing research is a multi-disciplinary affair, involving engineers, social scientists, economists, architects etc. Fostering a concerted dialogue between these experts is not easy. Agreeing on common definitions for key ILS concepts and on standards for measurement, service quality and technological interoperability can lay the foundations for easier communication flows and more systematic exchange of experiences.
Initiating RTD and piloting of desirable ILS:	All ILS sub-domains can be expected to benefit strongly from existing mainstream technological innovation (e.g. comparatively cheap interconnectedness of various kinds of ICT components, more natural/multimode user interfaces, miniaturization enabling to spread intelligence unobtrusively into the physical environment). Continued efforts are required to exploit such developments for independent living purposes. Policy has given this theme some visibility for some time already, e.g. in the context of RTD programmes. Such efforts need to be continued with increased emphasis on the independent living theme in all of the main fields of technological innovation. As the market environments within which ILS ultimately emerge tend to be quite complex, continued emphasis should be put on the involvement of key actor groups such as industry, formal/informal carers, older users, insurers, etc. from an early stage of RTD. Future RTD efforts should be needs-driven rather than technology-driven and this in a very "operational" way. Particular emphasis must be placed on achieving this goal on project-level rather than delivering lip services in this regard (e.g. promoting needs driven integration of ICT-mediated care processes and seamless care).

Since current policy competencies on health and social issues are limited to the regional or national level, a major revision and model have to be developed on methods to combine the different ideas and models of Active Ageing and Independent Living.	In the near future, the focus should be on the "sharing" of good and bad practices and experiences in developing Active Ageing and ILS policies and systems. A lot of resources and effort are now being wasted as different countries and regions and local initiatives develop pilots and demonstrators without sharing experiences and knowledge. The European policy level is the perfect platform to develop a kind of "brokerage" initiative, to connect the different policy and technological priorities, including the way different authorities deal with user needs.

Abstract

This report highlights the main policies related to active ageing and the policy fields, health, work and retirement, where ICT-based services will be determinant. Active Ageing, i.e. the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age, comes up more and more often in European political discourse. Quality of life is largely determined by the ability of older citizens to maintain their autonomy and independence, hence the importance of products and services that support Independent Living Systems (ILS) and the potential of Information and Communication Technology (ICT) to enable them. ILS are enabling services designed to help people gain independence and to assist communities in eliminating barriers to independence. Active Ageing and ILS are integrative policy issues. They require input from different policy areas on both national and European levels: e.g. social policy, labour market regulation, health/care, housing, RTD, telecommunication and information society policy. A major challenge for the future will be developing ICT policies which are integrated into welfare, health and social inclusion policies and adapted to a changing society.

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