



PRO INNO EUROPE

**INNO
GRIPS**

Global Review of Innovation Intelligence
and Policy Studies

Mini Study 07 Innovation in an Age-Integrated Society

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April 2009

This mini study is prepared as part of the EU funded INNO-Grips project. It is intended to contribute to a continuing discussion begun at the INNO-Grips third Innovation Policy Workshop (Brussels, 18-19 December 2008).

Disclaimer

The views, opinions, findings, and conclusions or recommendations expressed in this mini study are strictly those of the authors. They do not necessarily reflect the views of the European Commission. The European Commission takes no responsibility for any errors or omissions in, or for the correctness of, the information contained in this mini study. The mini study is presented with a view to informing and stimulating wider debate.

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1 INTRODUCTION

As history has shown, major demographic changes affect every aspect of society; the current trend of population ageing is no exception. But what this means for the future of innovation in Europe is difficult to decipher at best. Innovation is a complex amalgam of cultural, policy and management structures at play with individual and group forces in ways that may be more, or less, affected by a change in the age structure of society. This review of academic literature and government policy will look at the crossroads where ageing meets innovation- in both expected (i.e. on the job) and unexpected (i.e. video games) places. Moving towards a truly age-integrated society will require new approaches in research and strategic thinking.¹ Creating an effective nexus of science and technology to support a good society to grow old in may well be no easy matter.

1.1 *Defining old age*

The shift toward an older demography in Europe raises some fundamental issues, not least of which are culturally specific notions of what it means to be old in the early part of the new millennium. These notions are contested and in flux, as the constituents of this new demography challenge conventional notions of what it means to be 'old.' Ageing, whilst a biological fact, is difficult to define as the concept has different meanings and connotations across a wide range of cultural groups within and across societal and geographical borders. At the same time, 'old age' is located within real parameters of life expectancy rates. The latter vary considerably in and between countries and genders. In some demographic analyses, age 60 is taken as the transition between older and younger population cohorts. But many people think of 65 as a cut-off point because this is often when individuals become eligible in some countries for full pension and social security benefits. In recognition both of the contested and political nature of the definition of 'old age' and its superfluity to this study's purpose, the age of older adults will not be demarcated herein. It is sufficient to recognize that Europe is ageing: Currently about 700 million (or 10%) of the global population are in the 60 plus age group and the projections are that this will rise by 2050 to two billion (or 20% of projected global figures).² These long term demographic trends of population ageing are most pronounced across OECD countries, albeit at differing rates of advance. Within the European Union, some 36% of the current population are over 50 years old with projections set for this to rise to 50% over the next 25 years.

¹ The Danish Council for Strategic Research. "The Ageing Society 2030 " In: Report by the Steering Group for the strategic foresight on the ageing society 2030. Copenhagen: The Danish Research Agency, 2006.

² Rob Vos, Richard Kozul-Wright, Ana Cortez, Simon Cunningham, and Hiroshi Kawamura. "Managing Health Care in an Ageing World." In UN-DESA Policy Brief No. 2. New York: United Nations, 2007.

1.2 Macro and micro views of ageing

Demographic ageing is not a new topic within economic and policy research. This amassing body of literature has tended to focus on the macro-economic implications (such as pensions and healthcare financing) and on the development and forecasting of science and medicine to mitigate age-associated disability. But, it is important to remember that population ageing does not homogenize the needs and wants of individuals in a particular societal cohort, thus it does not only mean adapting existing policies and practices to cater for those who are designated 'elderly.' Rather a nuanced approach is needed, whereby the ageing demographic is not seen as an abstract conglomerate but rather a compilation of unique individuals who define quality of life through very different personal calculations. Of course generalizations can be useful and in this instance it is worth reiterating the apparent gender dynamic of ageing whereby women are more likely to be carers at younger advanced ages, and are more likely to be employed part-time in unsecure jobs; but as age increases more women survive than men and are thus more likely to be disabled than men of the same age.³ The following micro-bios are provided to substantiate the demographic ideation of ageing by offering a glimpse of some of the disparate individuals this macro-concept encompasses:

There is 65-year-old Mr. Smith, a former lawyer, who needs help in all activities of daily life due to suffering a very severe stroke; or 72-year-old Mr. Klein, who just got married to a 39-year-old woman and who is looking forward to becoming a father in the near future; or 92-year-old Mrs. Miller, who is studying at the University of Dortmund and will complete her doctoral thesis end of next semester; or 101-year-old American Mr. Snow, who decided to move away from the retirement community in Montreux to a hotel, because there were too many elderly; or 88-year-old Mrs. Donald, a widow of 12 years, who has lost 3 of her 5 children, is physically severely handicapped and lives in a nursing home in a double room where she never wanted to be; or 96-year-old Mrs. Apple, who is severely cognitively impaired, lives in a special care unit, wanders around many kilometers per day, wears a helmet to protect her when she falls, and enjoys eating with her fingers.⁴

1.3 Innovation in, and for, a changing demographic

Innovation, in the context of demographic change- and because it is bound to be responsive to social developments- will be a crucial vector not just in terms of medical and scientific advance, but also within public services and the private sector, in proposing novel solutions to the problems and opportunities generated by population ageing. This shift will create opportunities associated with the active participation of increasing numbers of older adults in the economy and society at large. But it also poses important challenges, especially those related to the financial viability of pension systems, the costs of health-care systems and the full integration of older people as active agents in social life. Prospering and

³ F.M. Antonini et al. "Physical Performance and Creative Activities of Centenarians." Archives of Gerontology and Geriatrics 46, no. 2 (2008).

⁴ A. Hoffmann. "Quality of Life, Food Choice and Meal Patterns - Field Report of a Practitioner." Annals of Nutrition and Metabolism 52, no. SUPPL. 1 (2008): 21.

thriving in fast-changing societies in an increasingly interconnected and competitive world will require vital mental and material resources from all citizens to ensure the future prosperity and wellbeing of each Member State and of the EU as a whole.

1.4 Opportunities for novel products and services

Population ageing opens up new opportunities and paradigms in terms of economic, social and technological developments. There may well be an increasing demand for products and services geared to the needs of older people and products that support an active ageing process give rise to a higher level of social benefits (merit goods). Innovative solutions in the market, including new technologies, products and services, will emerge by understanding and taking account of the specific needs of older people.⁵ New technology⁶ will be able to transform the delivery of care, putting patients at the centre of care systems that engage and empower them and their families, directly connecting patients to caregivers, and personalizing services in response to patients' unique needs, preferences, and values. Leveraging a synthesis of technology, disease management and home health can more efficiently and effectively meet the needs of a rapidly aging society.

⁵ Thomas Bachofner and Margrit Bossart. "Innovation for Successful Ageing (Isa)." In *Aspekte aus Seniorenoptik*. Bern: Federal Office for Professional Education and Technology, 2006.

⁶ Joseph Coughlin, James Pope, and Ben Leedle. "Old Age, New Technology, and Future Innovations in Disease Management and Home Health Care." *Home Health Care Management & Practice* 18, no. 3 (2006).

2 GROWTH AND DEPENDENCY

People everywhere, on average, are living longer. The growth of the old age cohort gives rise to issues of dependency, both financial and social. The new demography means that the transfer of resources (in pensions and public health care spending) from those in work to the retired population will increase, with potential consequences for long term growth and the sustainability of public finances. However, the fear of increased dependency ratios that this shift has engendered must be met with some criticism; the seeming certitude of the resultant strain on socio economic systems may be problematic.⁷ There is, however, the real issue of physical and mental disability, the incidence of which increases with biological ageing. Disability (regardless of age) creates social and or technological dependency. In this context, family and informal carers are at the heart of enabling greater independence for older adults while providing society with a monumental 'free' healthcare service. These issues of dependency provide a framework for understanding the potentialities for innovation that are discussed in following sections.

2.1 Age and early retirement

The current median age of Europeans is 37.7, by 2028 it will be 52.3. Recent analysis⁸ indicates that from now on in Europe the population aged 60 years and above will grow by two million every year for the next 25 years. The size of the working age population will begin to shrink by 1 to 1.5 million every year from 2015. In light of these projections, the Lisbon Strategy aimed, among things, at expanding the employment of older persons. In 2007, in the EU, some 50% of men and 40% of women were still in employment at age 60. For those in the age range of 65-69 only about 13% of men and 7% of women were employed. Statutory retirement ages, combined with public pension schemes, have thus far discouraged working beyond 60 or 65 - although many people can now expect to live for 20 years or more after retirement⁹ (see Figure 1).

In some countries, disability unemployment benefit schemes and dedicated early retirement schemes have provided incentives for many people to retire before statutory requirement age. However, a number of other countries, noting the shift toward longer life spans and acknowledging the desire of people to stay active in the labour market, have increased retirement ages to lessen pressure on social security and pension systems. For instance, there is no official retirement age in the UK although age regulations introduced a default retirement age of 65, which is not mandatory. UK employers do not need to set a retirement age at all. In the USA, the age at which a person becomes eligible for full

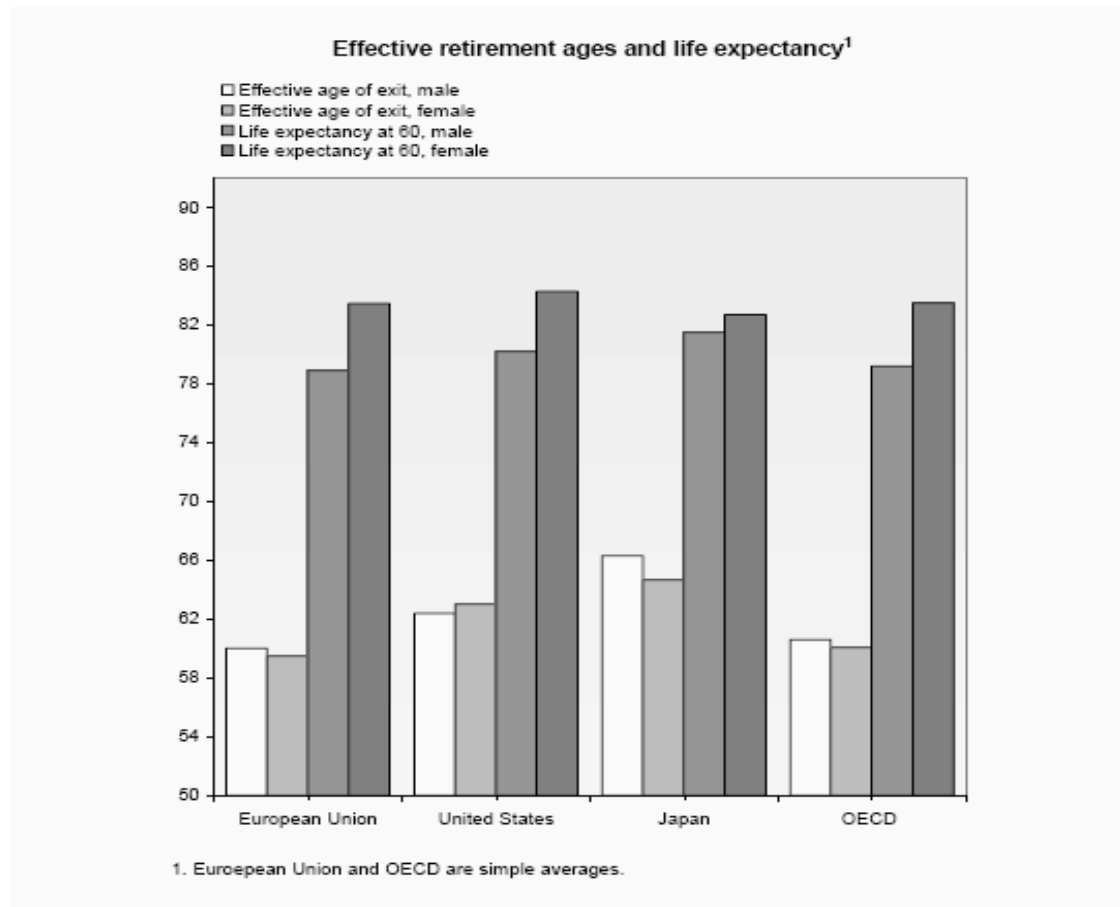
⁷ E. M. Gee, "Misconceptions and Misapprehensions About Population Ageing." *International Journal of Epidemiology* 31, no. 4 (2002): 750-53: p.751

⁸ EC. "Commission Staff Working Document: Demography Report 2008 Meeting Social Needs in an Ageing Society." In *Full Report Plus Annexes SEC(2008) 2911*. Brussels: European Commission, 2008.

⁹ OECD. "Ageing & Employment Policies: Live Longer Work Longer." Paris: Organisation for Economic Co-operation and Development, 2006. (several countries studied, 2003-2005)

social security benefits will increase gradually until it reaches 67 in 2027. France has changed the number of years during which an individual must contribute to pension schemes dependent on changes in life expectancy. The 2005 OECD study and other work¹⁰ indicate that if incentives for early retirement were modified or even removed then labour force participation (and the impact on total-factor productivity) of people in the 55-65 age group could rise by up to 20%. Welfare systems and employment policies that fail to acknowledge trends towards increasing longevity and extended well-being of older populations may be more harmful to growth and innovation prospects than the ageing process itself.

Figure 1: Retirement Ages and Life Expectancy



Source: OECD, 2005

2.2 Projections for state expenditure

Beyond retirement age, there are significant differences in cohorts of older adults. For discussion purposes, at a minimum two subgroups must be recognized: the young old (including newer retirees), which is sometimes

¹⁰ Joaquim Oliveira Martins, Frédéric Gonand, Pablo Antolin, Christine de la Maisonneuve, and Kwang-Yeol Yoo. "The Impact of Ageing on Demand, Factor Markets and Growth." In Economics Working Papers no. 420. Paris: Organisation for Economic Co-operation and Development, 2007.

called the 'third age,' and the oldest-old or the 'fourth age.'¹¹ These cohorts have different impacts in relation to the potential financial burden of an increase in dependent older adults both on the pension and healthcare systems. These cohort expansions have led to projections of drastically increased long-term state care expenditures between 2000 and 2050; as a percent of GDP, Germany's expenses may rise 168%, Spain's by 149% and Italy's by 138%.¹² The EC, in its 2008 Demography Report, commented on this expected rise in pension and healthcare costs by urging governments to address the issue of sustainable public financing, perhaps by reducing national debt to free up would-be interest flows for these increased social spending needs. In 2007, government debt amounted to 60% of annual GDP in EU-27, the lowest level for the past twelve years. The total amount of budget deficits of the Member States represented 1% of GDP for EU-27, down from 3% five years earlier. However, the situation varies considerably across Member States and ranges from a budget surplus of over 5% of GDP to as large a deficit. The amount of government debt ranges from more than 100% of GDP to less than 10%, and this is also reflected in interest payments: in 2007, Italy had to use more than 10% of its public spending on debt interest.¹³ Thus the call to reform in this way may be something of a challenge in view of the current economic crisis. Reforms of social protection systems, making them more efficient and encouraging older workers to stay longer on the labour market, should also be employed to help curb the projected increases in expenditure.

2.3 Dependency ratios: A contestable arena

Many commentators¹⁴ have suggested that the evidential support that the ageing demographic will necessarily create a burden on welfare systems is not definitive. Demographic projections for future population growth and the widely cited dependence ratios rest on assumptions made about complex drivers such as fertility and morbidity and therefore the results vary across organizations producing these figures. The statistical projections for dependency ratios are always in flux. For example, "projections of the size of the American population aged 65 and over in 2040 range from 92 million (high variant) to 59 million (low variant) - a difference of 33 million people.... these substantial differences are rarely reported and we are led to believe that there is real certainty about how

¹¹ Josef Hilbert and Rainer Fretschner. "Meeting the Needs of Older People: Adaptations Required in the Provision of Public and Private Services and New Market Opportunities." Gelsenkirchen: University of Applied Sciences, 2008.; A. Kruse and E. Schmitt. "A Multidimensional Scale for the Measurement of Agreement with Age Stereotypes and the Salience of Age in Social Interaction." *Ageing and Society* 26, no. 3 (2006): 393-411.

¹² Adelina Comas-Herrera et al., "European Study of Long-Term Care Expenditure: Investigating the Sensitivity of Projections of Future Long-Term Care Expenditure in Germany, Spain, Italy and the United Kingdom." In Report to the European Commission, Employment and Social Affairs DG: PSSRU Discussion Paper 1840, 2002.

¹³ EC. "The Long-Term Sustainability of Public Finances in the EU." In COM(2006) 574 final. Brussels: European Commission; EC. *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)*, (European Economy. Special Report: 1). Luxembourg: European Commission, 2006.

¹⁴ R.B. Bhagat and S. Unisa. "Ageing and Dependency in India: A New Measurement." *Asian Population Studies* 2, no. 2 (2006); S. H. Gorin. "The United States Can Afford the Boomers." *Health and Social Work* 32, no. 3 (2007); James Schultz and Robert Binstock. *Ageing Nation: The Economics and Politics of Growing Older in America*. Westport, CT: Praeger Publishers, 2006.

many older people there will be in the future.”¹⁵ Room must be made then to exercise the idea that dependency as a result of population ageing will not be the drain that many projections would suggest.

Furthermore, demographers have, for want of quantifiable data, defined ‘dependence’ as a label applicable to any person who falls outside of the work-age range (often defined as those younger than 18 and older than 64). Conceptualizing society in these terms creates a dichotomization of cohorts - the dependent v. independent, “which may obscure the interdependent nature of social life and sets the backdrop for an intergenerational equity debate based on fictive assumptions that homogenize people on the basis of age.”¹⁶ It cannot necessarily be assumed that older adults are dependent as many remain active beyond retirement age, either formally in full or part-time work positions or informally as caregivers, volunteers and social activists.¹⁷ Recognizing the uncertainty around this debate is useful as it helps to temper fears that the ageing population will be a financial drain on Member States.

2.4 *Dependency and eldercare*

Consideration of dependency in later life must include the incidence of disability and its concomitant demands for facilitative assistance or care. As a result of improvements in health care across Europe and increases in life expectancy, more people in general, and therefore more older adults, are living with chronic conditions that require daily management.¹⁸ Not all chronic conditions lead to disability, so it is useful to understand ‘disability’ in terms of experiencing difficulty in the daily activities of living such as bathing, dressing, eating, shopping, housework and transportation.¹⁹ Disabled older adults are dependent on others to assist them in these daily activities. This dependency is at odds with the ideals of many older Europeans who tend to value independence as they age above all else.²⁰ They are therefore often acutely concerned with becoming dependent in later life. Health issues associated with ageing, such as impaired sight, hearing, mobility, and brain acuity, will necessitate varying levels of dependence on carers, devices, systems, and supportive environments.

In Europe, care and assistance for older less-abled adults (eldercare) has historically been provided through familial networks and/or social welfare programmes. The benefits of familial care are well recognized; a recent EU wide survey of eldercare concluded that, “*the family care of dependent older people is being increasingly recognised as a significant issue, related*

¹⁵ E. M. Gee "Misconceptions and Misapprehensions About Population Ageing." *International Journal of Epidemiology* 31, no. 4 (2002): 751

¹⁶ *Ibid*, 752

¹⁷ R. B. Bhagat and S. Unisa. "Ageing and Dependency in India: A New Measurement." *Asian Population Studies* 2, no. 2 (2006).

¹⁸ M. McKee and E. Nolte. "Responding to the Challenge of Chronic Diseases: Ideas from Europe." *Clinical Medicine, Journal of the Royal College of Physicians of London* 4, no. 4 (2004).

¹⁹ Ü. Tas et al., "Prognostic Factors of Disability in Older People: A Systematic Review." *British Journal of General Practice* 57, no. 537 (2007): 319-23.

²⁰ A.T. Hoffmann "Quality of Life, Food Choice and Meal Patterns - Field Report of a Practitioner." *Annals of Nutrition and Metabolism* 52, no. SUPPL. 1 (2008).

*as it is to the three keystones of accessibility, quality and sustainability of health care systems, to social inclusion and work.*²¹ Whilst the familial care model is still very strong in many southern Member States, there is evidence to suggest that the social trends of dispersion and dissolution of families, coupled with workforce gender equalization (both of which are currently more prevalent in northern member states) will continue to progress and spread geographically.²² These cultural trends suggest that as the population ages more older adults in Europe will live alone and at increasing geographical distance from their kin whether by choice or necessity. Changing family dynamics are not only structural or legal, but there is also the perception that attitudes and values are shifting such that the kin of future older adults may be less willing to give of themselves as carers in the often demanding ways that are needed to enable a sustained quality of life and the ability to age in place.²³ However, as Europe gets older and family configurations continue to become less traditional, kin will still play a very important role in the lives of most older people.²³

Due to the shifting nature of family, in the absence of traditional kin networks, some older adults find themselves developing kin-like relationships with friends, neighbours, social and community workers and volunteers. These organic relationships cut across age, gender, and other social divides. Such informal care is often more sensitive to the particular rhythms of an individual's life and can more conveniently meet the older adult's needs than could a formal care relationship. In many cases an informal carer provides essential daily support to the disabled older adult, including emotional and psychological support. Informal community support provides an invaluable resource pool of wide ranging benefits that reduce dependence, including delaying or preventing entry into nursing homes.²⁴ Such support is culturally and historically formed²⁵ generating a complex ecosystem of relationships and networks, which is often easily damaged. Informal care networks will increase in importance as traditional family structures continue to change across Europe. Maintaining and enhancing these networks requires reflexive policy approaches and new ways of empowering decision making for those both receiving and giving support. In the case of voluntary carers, policy has a role to play in supporting networks to ensure caring is sustainable mentally, emotionally and physically.²³

Family and community care for disabled older adults is an unaccounted social good. In the UK alone, the government estimates that there are

²¹ E. Mestheneos and J Triantafillou. "Supporting Family Carers of Older People in Europe." In The Pan-European Background Report, edited by H. Dohner and C. Kofahl. (Hamburg: University of Hamburg) 2005: p.14

²² EC. "Commission Staff Working Document: Demography Report 2008 Meeting Social Needs in an Ageing Society." In Full Report Plus Annexes SEC(2008) 2911. Brussels: European Commission, 2008.

²³ J. Gaymu, P. Ekamper and G. Beets. "Future Trends in Health and Marital Status: Effects on the Structure of Living Arrangements of Older Europeans in 2030." European Journal of Ageing 5, no. 1 (2008).

²⁴ Lynne C. Giles, Gary F. V. Glonek, Mary A. Luszcz, and Gary R. Andrews. "Do Social Networks Affect the Use of Residential Aged Care among Older Australians?" BMC Geriatrics 7 (2007): 8

²⁵ J.C. Barker "Neighbors, Friends, and Other Nonkin Caregivers of Community-Living Dependent Elders." Journals of Gerontology - Series B Psychological Sciences and Social Sciences 57, no. 3 (2002).

over six million informal, unpaid carers. Of those, less than 1 million receive government support for performing social services that, if provided by the state, would cost an estimated £23 billion.²⁶ It is suggested that, across Europe, the number of informal carers will need to drastically increase within a generation in order to adequately support the ageing of the population.²⁷ The importance of family and informal care in creating a sustainable society that is good to grow old in cannot be underestimated.

Dependent eldercare across Europe is rooted not only in family and informal networks but also, importantly, in public welfare structures. Many disabled older adults receive the benefit of a regular home health worker or state sponsored nursing aid. Others live in institutional settings, such as nursing homes, hospitals or assisted living communities. Living arrangements in these settings are very varied across member states.²⁸ Institutional care often becomes necessary when disabilities become too severe, particularly in the case of dementia which presents particular difficulties for informal carers.

Changes in the governance of eldercare provisioning begun in the last century have meant increasing heterogeneity in the quantity and quality of services available to older adults. Such changes have resulted from trends which include encouraging competition for public funding among private and voluntary sector healthcare provisioning organizations.²⁹ This has often created an uneven playing field of care, where some regions are able to coordinate and provide excellent care but others fall behind. Recognising the need for better coordination, a Europe-wide non-profit making group, AGE PLATFORM has been organized to address the issues of low quality care and widespread notions that being old means being helpless. They also aim to redress the idea that care for the elderly is a low skilled service function rather than a knowledge based intervention in response to complex individual needs.

In the case of social systems, services and technologies, all are insufficient in their current deployments. Forward thinking innovative strategies are needed to ensure that at least a baseline quality of care is available for those older adults who require it, especially for those who cannot rely on informal care. A continuing challenge is how to assist older less-abled adults to live as independent a life as possible and, when it is needed, how best to provide sustainable care both formally and informally.

²⁶ NAO. "Supporting Carers to Care." London: National Audit Office: Department for Work and Pensions, 2009.

²⁷ K. Purdam and P Norman. "Geography of Unpaid Caring in England & Wales." Paper presented at the Census Microdata: Findings and Futures Conference, Manchester 2008.

²⁸ M. W. Ribbe et al., "Nursing Homes in 10 Nations: A Comparison between Countries and Settings." *Age and Ageing* 26, no. SUPPL. 2 (1997).

²⁹ I. Bode. "New Moral Economics of Welfare: The Case of Domiciliary Elder Care in Germany, France and Britain." *European Societies* 9, no. 2 (2007).

3 OPENING UP NEW MARKETS

A new consumer segment demanding innovative products and services customised to the specific needs of older adults is expected to grow within Europe in response to the new demographics. The 'silver economy', as this segment has been coined, is well established in Japan where examples can be drawn from.³⁰ The new or expanded markets would include: easy-to-use products and technologies; general and luxury products and services for the wealthy; gerontechnologies and supportive care devices and services. In addition to novel products in robotics, smart homes and other assistive technologies, there have also been adaptations of well developed consumer products, such as mobile phones, to enhance usability for older adult and other users who desire streamlined technology.³¹ Older adults with greater disposal incomes have also opened up growth in the leisure and financial management service sectors. The leisure travel industry is hoping to harness the benefits of more older travellers by offering experiential travel packages that cater to the profile of retired travellers looking for an active or educational experience over a longer holiday periods than work-age travellers.³²

3.1 *The Silver Economy*

Among the favorable consequences of population ageing is the potential for a large new consumer segment to provoke innovation in products and services that are tailored to their specific needs. The advent of the term 'silver economy' to describe this consumer segment and its potentialities highlights the benefits inherent in the opportunities of the demographic shift. Japanese businesses are leading in this market, and may serve well as case studies for future innovations in the European market.⁴² Kohlbacher⁴⁵ identifies three important segments for new market growth, and innovation in products and services; easy-to-use products and technologies, general and luxury products and services for the wealthy and gerontechnologies and supportive care devices and services.

The market segments opening up to the wealthy older adult market in particular include niche leisure travel and financial management services.³³ The leisure travel industry is hoping to harness the benefits of an increase in older travelers by offering more experiential travel packages that cater to the profile of retired travelers who are often looking for an active or educational experience over a longer period of time than work-age travelers³⁴ There is the potential here to offer creative courses, trips tailored to single older adults, and trips coordinated with

³⁰ Florian Kohlbacher and Cornelius Herstatt. "The Silver Market Phenomenon: The Aging and Shrinking Society Has Huge Implications for Businesses in Japan." J@pan Inc 2008, September.

³¹ Ibid; Sri Kurniawan, Yanuar Nugroho and Murni Mahmud. "A Study of the Use of Mobile Phones by Older Persons." Paper presented at the Interact. Inform. Inspire - Conference on Human Factors in Computing Systems, Montreal, April 22-27 2006.

³² Ursula Lehr. "Demographic Change and Its Consequences for the Tourism Branch." Paper presented at the Third Silver Economy Conference, Seville, Nov 2007.

³³ Florian Kohlbacher. "Innovation Strategies for the Silver Market." Paper presented at the INNO GRIPS Innovation Policy Workshop "Innovation in an ageing society" Brussels, Dec 2008.

³⁴ Lehr, 2008

nursing or assisted living communities. As concerns new financial products for this market, there is an increasing need for skilled financial personnel who are competent in dealing with issues unique to retirees' financial wellbeing. In response to this, the UK Financial Services Skills Council, an industry group, in consultation with civil society groups and NGOs such as AgeConcern, has developed the novel 'Later Life Adviser Accreditation' to address the needs of older adults.

According to the Silver Economy Network of European Regions, or Sen@er, (a cross-Europe initiative to create, identify and support economic growth based on the projected increases of older-adult consumers in society), the positive growth possibilities in this consumer sector are formidable; "calculations for Germany as a whole predict more than 900,000 new jobs in the *Silver Economy* within the next two decades. There are no other sectors or businesses with a higher growth potential. These calculations should be comparable to other regions and countries in Europe".³⁵

3.2 Responsive organisational strategy

Some companies have already adopted a strategy based on 'Silver' market segmentation, whilst others adopt a more inclusive approach. The recent INNO-GRIPS workshop on Europe's ageing demographic formulated that strategies adopted by companies seeking opportunities presented by the new demographics could be broadly analysed in the following categories (Figure 2).

Figure 2: Firm strategy for the Silver Economy

<p>No specific age-related strategy</p>	<p>Opportunities of demographic change not perceived</p> <p style="text-align: center;">OR</p> <p>Perceived through the ageing lens, as possibly harmful for the company's brand, image, especially in terms of design, marketing, communication...</p>
<p>"Silver market" strategy</p>	<p>Development of products and services specifically targeted at elderly people ("third age" travels)</p> <p style="text-align: center;">OR</p> <p>Adaptation of products and services to fit the elderly (easy to use cell phone with optional, progressive functions)</p>
<p>Age-neutral / Inter-generational strategy</p>	<p>Voluntary development of age neutral products (luxury goods and services)</p> <p style="text-align: center;">OR</p> <p>Development of products that are accessible to all, possibly even with the aim of connecting generations together (Wii games).</p>

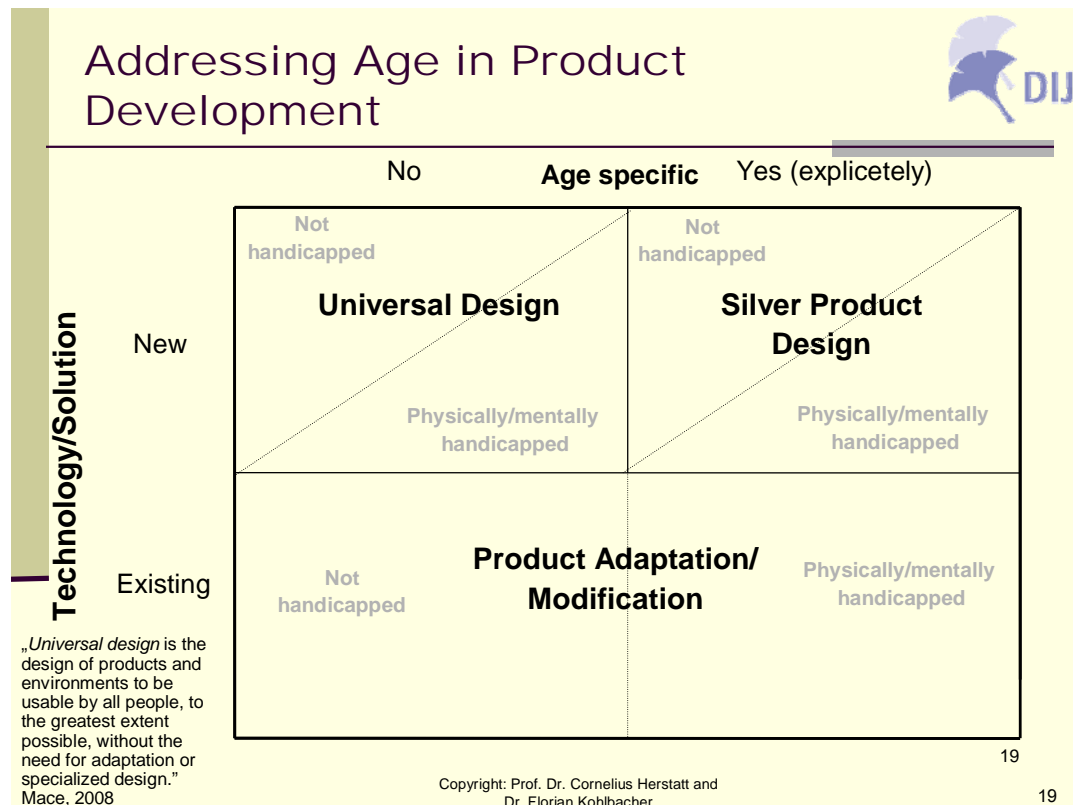
³⁵ Armin Laschet. "Sen@Er External Newsletter No. 1." Bonn: Silver Economy Network of European Regions, 2006, Jan: p.1

Source: Kohlbacher, 2008

As outlined here, the relevance of firm strategy is dependent on the organisation’s activities whereas age profile appears not to be a relevant marker for segmentation. Segmentation based on functionality – on specific customer needs - is applicable across age cohorts and so can be customized to specific user groups. Following from this, Kohlbacher and Herstatt³⁶ proposed an organized approach in addressing age in product development that is dependent on the needs of either all or specific user groups (see Figure 3).

Innovative approaches are needed to meet emerging needs while helping to reduce costs. The INNO-GRIPS workshop concluded that, depending on the identified needs and on each company’s activity and strategy, innovation can take several forms: Radical innovation to create new solutions to specific situations (for example: new medical devices that moderate the effects of declining health to sustain independence): Disruptive innovation to provide adapted solutions to consumers and thereby enlarge the group of potential customers for the concerned products, this would encompass low-end innovation and new market disruptions (for example, simplified cell-phones for people who could not use these technologies before).

Figure 3: Addressing Age in Product Development



Source: Florian Kohlbacher. *Innovation Strategies for the Silver Market*. Paper presented at the INNO GRIPS Innovation Policy Workshop “Innovation in an ageing society”, Brussels, Dec 18 2008.

³⁶ Florian Kohlbacher and Cornelius Herstatt. "The Silver Market Phenomenon: The Aging and Shrinking Society Has Huge Implications for Businesses in Japan." J@pan Inc 2008, September.

3.3 *Tempering expectations*

Whilst innovative approaches are needed to address product developments in any emerging market, Perez³⁷ points out that opening up new trajectories to enable new products is often more difficult on the ground than thought in the boardroom. She notes that *"even radical innovations... are not usually isolated events, nor are they mainly the replacement of obsolete products or processes... they come in clusters... (and) are not disconnected random agglomerations of new things."* Importantly, production and financial capital are attracted by future high returns to the investment and innovation opportunities that new products and/or new markets are seen to offer and therefore there resources must be expended to ensure capital is available to make any new system, product or service viable.

³⁷ Carlota Perez. "Finance and Technical Change: A Long Term View." In *The Elgar Companion to Neo-Schumpeterian Economics*, eds. H. Hanusch and A. Pyka. Cheltenham: Edward Elgar, 2004: 3.

4 NEW PRODUCTS AND SERVICES

Innovations that assist in creating a society that is good to grow old in will become increasingly marketable as populations age. Innovations in workforce management, social care systems and public services will be necessary if the levels of service are to be maintained while the costs of an ageing demographic are kept at manageable levels. This section looks at a sample of up-and-coming approaches to design as well as nascent products and services geared toward harnessing the opportunities inherent in this demographic shift.

4.1 Universal Design

Universal design (UD) is defined as, *"the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design,"* and as such does not encourage the creation of products exclusively for older user groups or those with disabilities.³⁸ Adopting universal design in planning or product creation means that spaces, services and products can be accessed and enjoyed by everyone whilst concomitantly creating a good society to grow old in. As a leader in this arena, Japan is actively engaged with the UD philosophy through policy measures such as the Heartful Building Law of 1994, Transportation Barrier-Free of 2000, general principles of UD Policy of 2005 and the u-Japan strategy for 2010. Japanese business culture has quickly adopted these principles as evidenced by the recently formed International Association of UD.

Japan is not alone in its embrace of UD, there are significant lobbying efforts taking place in some countries, such as the US, to have UD principles included in building standards for new homes.³⁹ Universal design of homes would create environments conducive to the needs of an ageing population, as well as others with chronic conditions or disabilities, whilst providing indoor spaces that are pleasing and easy to live in for all people. This is an innovative approach to maintaining independent living for more people regardless of age or ability.⁴⁰ The list of considerations for designing a home that is good to grow old in is comprehensive, as such the time and thought which must go into the creation of such a useable space is considerable when compared to standard design practice.⁴¹ In view of this, guidelines are readily, inexpensively, available to the building trades and there is a flurry of research being carried out to further investigate specific design elements which will be most conducive to

³⁸ Ron Mace. "Universal Design: Housing for the Lifespan of All People." Washington, D.C.: U.S. Department of Housing and Urban Development, 1998.; A. Macdonald. "The UD Phenomenon in Japan: Product Innovation through Universal Design." In *Universal Access in HCI*, edited by C Stephanidis. Berlin: Springer, 2007.

³⁹ Center for Universal Design. "Universal Design in Housing." Raleigh: North Carolina State University, 2006.

⁴⁰ S. Kose. "Universal Design for the Ageing." In *International Encyclopedia of Ergonomics and Human Factors*, edited by Waldemar Karwowski. London: CRC Press, 2006.

⁴¹ (Crews & Zvotka, 2006).

improving the liveability of homes for all ages.⁴⁸ Some of the considerations may be obvious, such as locating the master bed, bath, and kitchen on the ground floor; others however are not, "in the dining room proper consideration to seat and table height with the seat lower than popliteal height and the table at the same height as the individual's seated elbow height, along with contrasting colors of dishes, table, and floor provide improved abilities to see edges and items"⁵¹. Whilst the movement for universal design in homes came out of earlier movements such as barrier-free design, which was specifically targeted at disabled people, the current form aims to create homes for everyone and may therefore garner more widespread uptake than previous proposals.⁵⁰

Universal design principles are being applied outside of home building as well- to consumer products, services and the outdoor, built environment. An interesting example of a very successful product innovation using UD is the Nintendo Wii gaming system. The system has created a new market where older adults, who had not previously been consumers of video games, are now able to engage in a trans-generational social game that has been shown to improve quality of life.⁴² The phenomenon of Wii uptake in residential care facilities for older adults with disabilities has been cited in the popular press since the system's introduction in 2007. Wii has been well received in nursing homes because many of the residents enjoy virtually playing sports, such as bowling or tennis, that they are no longer able to play in reality.⁴³ In a recent New Zealand study of the effects of video gaming in residential homes, researchers concluded that, overall, they are beneficial; for instance, some residents have made new friends when they most likely would not have if the Wii was not present.⁴⁴ The gaming system has not only made residents more sociable with one another but also with younger visitors, as Wii is able to bridge a once impassable divide.⁵⁸ The system has even found its way into hospital led rehabilitation regimes for older adults, disabled veterans and the like, resulting in the term *Wiihab*.⁴⁵ Wii is a universally designed product that is user friendly, physically stimulating and fun while encouraging socialization; it is therefore a good example of the kinds of UD innovation that have broad appeal while improving the lives of older adults. However, it must be noted that UD principles can be problematic in that they homogenize very disparate groups of people and needs, especially when applied to products with global reach.

4.2 Assistive technologies

The use of assistive technologies, particularly in the home, is increasing. These range from low-end tech, such as an ergonomically curved spoon or entry ramp to higher end functions, such as internet ready computers and

⁴² F. Kohlbacher and C.C Hang. "Disruptive Innovations and the Greying Market." Paper presented at the IEEE International Conference on Industrial Engineering and Engineering Management, Singapore, Dec 2007.

⁴³ Suttie, Alisdair. "Scottish Care Home Group Provides Nintendo Therapy." CommunityCare.co.uk, www.communitycare.co.uk. 2009

⁴⁴ Vickers, Lucy. "Wii Love the Sports." *North Shore Times* www.stuff.co.nz/auckland/1997647/Wii-love-the-sports. 2009.

⁴⁵ AP. "Hospitals Discover the Power Of "Wiihab." www.cbsnews.com. 2008.

a range of ambient technologies in smart homes. Some EU Member States provide or subsidise services to modify homes for the disabled through government programmes. These modifications range from threshold levelling to modifying kitchens and bathrooms and installing stair lifts.⁴⁶ More innovative assistive technologies are likely to become available to older adults in the near future. Among these are developments in the new interdisciplinary field of 'gerontechnology' which has emerged in response to the perceived needs and aspirations of older people coupled with recent significant advances in technology. Gerontechnology has so far made use of robotic technologies to deliver physical and cognitive therapy and to extend traditionally clinic based therapy into the home through tele-health solutions. The field is opening up and promises to deliver more innovative products and services for an ageing population in the years to come.

Some types of personal robots are also classed as assistive technologies and are already available on the market. They are designed to provide potentially useful everyday services such as cooking, heavy lifting and bathroom cleaning. In this field there is also the recent advent of animaloid or pet-like robotics that have multiple sensing capabilities. Some also provide mental stimulation in the form of cognitive games which may serve to slow or reverse certain forms of dementia.⁴⁷ The field of robotics research is excited about the potential use of such systems in the future; they envisage that *"humanoid robots will become more and more common in the house helping the elders to satisfy their needs. In this case, the humanoid assistant will be able (as a nice old friend) to anticipate the needs of the user and to help him/her only when necessary and disappearing otherwise"*.⁴⁸ However it may be the case that the positive outlook of those driving this innovation should be tempered as consumer uptake of such robots has been lacklustre. Foulk⁴⁹ reporting from Japan, describes how older adults in institutional care do not appreciate the robotic 'friends' that have been purchased for their home, *"Among the most high-profile failures was Hopis, a furry pink dog-like robot capable of monitoring blood sugar, blood pressure and body temperature."*

The development of technologies to counter cognitive decline is a very promising field. Cognitive impairment due to ageing and age-related diseases, such as dementia, is increasing in incidence, rendering more people unable to navigate their daily life independently. Current trends point towards increased prevalence of dementia, linked to the increasing median age of the population. People exhibiting cognitive impairment symptoms require the presence of a carer, to help with performing daily activities. Given this trend, more people will seek support and providing

⁴⁶ K. Johansson, S. Josephsson and M. Lilja. "Creating Possibilities for Action in the Presence of Environmental Barriers in the Process of 'Ageing in Place'." Ageing and Society 29, no. 1 (2009); K. Purdam and P Norman. "Geography of Unpaid Caring in England & Wales." Paper presented at the Census Microdata: Findings and Futures Conference, Manchester 2008.; R.O. Smith, M. Bange and M. Hall. "Using Assistive Technologies to Enable Self-Care and Daily Living." In Ways of Living edited by C. Christiansen. Bethesda, MD: American Occupational Therapy Association, 2000.

⁴⁷ K. Wada et al., "Robot Therapy for Elders Affected by Dementia." Engineering in Medicine and Biology Magazine, IEEE 27, no. 4 (2008).

⁴⁸ S. Micera et al., "Gerontechnology." IEEE Engineering in Medicine and Biology Magazine 27, no. 4 (2008): 13.

⁴⁹ Emi Foulk. "Robots Turn Off Senior Citizens in Aging Japan." <http://www.reuters.com/>. 2007

this kind of continuous support is costly and could strain the healthcare system of many Member States. Various institutions are increasingly seeking solutions to mitigate this problem, by enabling those with dementia to lead an independent life at home for as long as possible, thus postponing the need to move to a residential care facility. These technologies can be deployed at home, and range from simple, low-cost sensors, up to smart assistive robots and interfaces as mentioned above. They also include video analysis to detect patient behaviour, memory aids and other cognitive prosthetics.

4.3 Tele-health solutions

Tele-medicine, such as the use of wireless technology within the home to assist in physical rehabilitation, is another nascent field of innovation created to address the needs of the disabled. The technology links wireless remote sensors on a patient's body to a distant physical therapist, enabling the therapist to guide the patient through a therapy session without physically being in the same location.⁵⁰ This kind of teleconferencing means that the patient does not have the hassle of travelling to a remote centre to receive individualized therapy. Developments in wireless infrastructure, such as body-area networks or pervasive health-monitoring systems, have proved beneficial to deliver telemedicine services regardless of a patient's physical location. Wireless applications for this kind of healthcare are an emerging cross-disciplinary activity and recent advances in hardware design and wireless communications along with the evolution of new generations of embedded wireless devices facilitating reliable, comprehensive, and high-standard healthcare, have potential for creating entirely new products and services. Marketing of these products and services is, however, not immanent due to requirements for reliable signal propagation, low network latency, low packet loss, robust data and image transmission and the real need for safe, secure, and dependable operations. The cost issue is another key concern for worldwide utilization of wireless devices for pervasive healthcare. Within this field, nonetheless, developments are being researched, solutions being sought and prototypes being built.

Remote monitoring is another tele-health solution, it works by remotely sensing a person's activities in the home, providing alarm and status reports to distant caregivers. Such systems can include motion detectors to determine a person's location, contact switches on cabinets and refrigerators doors to indicate whether they have been opened, pressure sensors that indicate whether a person is sitting in a bed or chair and thermometers that indicate whether a stove has been turned on. Biosensor monitors measure vital signs such as heart rate and body temperature, the resultant data is regularly transmitted to authorized carers.⁵¹ One such biosensor system is used by the US Veteran's Administration and allows care coordinators to remotely monitor an older

⁵⁰ M. Hamel, R. Fontaine and P. Boissy. "In-Home Telerehabilitation for Geriatric Patients." *Engineering in Medicine and Biology Magazine*, IEEE 27, no. 4 (2008).

⁵¹ M. E. Pollack. "Intelligent Technology for an Aging Population: The Use of AI to Assist Elders with Cognitive Impairment." *AI Magazine* 26, no. 2 (2005).

veteran's chronic illness, such as diabetes or high blood pressure. The monitoring is complemented by education and self-management strategies and has been producing beneficial results, including an increase in care-coordinator initiated clinic visits but with a concomitant decrease in hospitalizations as a result of vigorous monitoring enabling early intervention.⁵² There is an additional class of systems under development that are designed to proactively assist with cognitive impairments. These more advanced systems are envisaged as offering navigational support, aid in remembering daily schedules or multi-step tasks, assistance in recognizing faces and help in locating misplaced objects.⁶⁰

As touched upon above, telecare has several different functions: facilitating access to existing services, expanding services to encompass health promotion and maintenance, and creating and delivering new services.⁵³ Telecare is thus a *package of care* to individuals in the community which may include domiciliary visiting, assistive technologies (including home adaptations and 'smart' homes), medication and therapy among other things. Appropriate business models capable of delivering telecare need to be developed to encourage financial viability. Business and service delivery models for telecare to be sustainable must fit into the more general political and economic environment of health and social care delivery. This implies the need for close collaboration between public and private sectors, a change in roles of existing actors and the emergence of new players.

While not strictly classed as a telehealth solution, much of the literature addressing innovation for Europe's ageing demographic discusses the potential benefits of the new field of 'smart home' technologies. These homes would harness the benefits of ICT discussed above to create living spaces where older adults could remain independent for longer.⁵⁴ A 'smart home' is defined as, *"a residence equipped with technology that facilitates monitoring of residents and/ or promotes independence and increases residents' quality of life. The technology is integrated into the infrastructure of the residence and does not in principle require training of or operation by the resident"*.⁵⁵ Smart homes offer individuals of any age the ability to remain in place through changing health care needs. Demiris and Hensel⁶⁴ have completed an exhaustive literature review of existing smart home projects, where the emphasis is on health related technologies (as opposed to energy efficiency). The European Commission is currently funding a large scale pilot project of smart homes called SOPRANO. The goal of this project is to, *"design the next generation of systems for ambient assisted living in Europe: highly innovative context-aware, smart home environment services, built to an innovative and*

⁵² Roxanna Bendixen, Charles Levy, Emory Olive, Rita Kobb, and William Mann. "Cost Effectiveness of a Telerehabilitation Program to Support Chronically Ill and Disabled Elders in Their Homes." *Telemed J E Health* 15, no. 1 (2009).

⁵³ James Barlow. "Mainstreaming Telecare in the UK. Overcoming the Barriers " Paper presented at the Southern Institute for Health Informatics Conference, University of Portsmouth, June 2003.

⁵⁴ Josef Hilbert and Rainer Fretschner. "Meeting the Needs of Older People: Adaptations Required in the Provision of Public and Private Services and New Market Opportunities." Gelsenkirchen: University of Applied Sciences, 2008.

⁵⁵ G. Demiris and B. K. Hensel. "Technologies for an Aging Society: A Systematic Review Of "Smart Home" Applications." *IMIA Yearbook of Medical Informatics* 2008 (2008): 33.

integrative standards and service-orientated architecture and supporting a uniquely broad set of natural and comfortable interfaces for older people at affordable cost, so elderly people can live independently in their preferred environment".⁵⁶ The kinds of technologies intended for smart homes are extensive, encompassing most of those aforementioned.

4.4 The ethics of technological assistance

The range of assistive technologies mentioned above, especially those that are more innovative and complex, pose a number of ethical questions around issues of privacy, effects on personal relationships, potential for overdependence on fallible technology and inequality in access related to ability to pay. Ultimately, the design of such homes and the use of such technologies must be based on the needs of end users rather than novel or cutting edge technologies. The success of such innovations will rely on their ability to address the host of ethical implications involved. Whilst, *"it would be ridiculous to rely on high-tech devices for everything,"⁵⁷* certainly there are some interesting innovations in assistive technology that may enable older adults to live more independently and in their own homes longer and therefore deserve further research, development and diffusion.

4.5 EU initiatives to fund new products and services

The European Union has been proactive in funding a wide range of projects concerned with exploring most, if not all of the developments mentioned above and issues surrounding these developments. Some examples can be found in Appendix 2 of this report.

⁵⁶ Soprano. "Service-Oriented Programmable Smart Environments for Older Europeans." Athens: EXODUS SA, 2007: 1.

⁵⁷ S. Kose. "Universal Design for the Ageing." In International Encyclopedia of Ergonomics and Human Factors, edited by Waldemar Karwowski, 227-30. London: CRC Press, 2006: 229.

5 ENHANCING SOCIAL NETWORKS

Social and community networks provide important support for ageing adults. Many such networks are inter-generational and are increasingly being seen as arenas to provide opportunities for collective and collaborative knowledge exchange. The resultant intergenerational solidarity improves social cohesion, cooperation and mutual respect. The creation and support of these intergenerational social networks provides a conduit for the tacit knowledge of older adults to be relayed to younger generations, thus ensuring the continuity of society's amassed knowledge. The Madrid Action Plan⁵⁸ has noted mentoring, mediating and advising through such networks as a means to achieve the goal of *"full utilization of the potential and expertise of persons of all ages, recognizing the benefits of increased experience with age."*

5.1 Face-to-face social networks

Older adults engage in a wide range of activities organized by religious, political, trade union, charitable and recreational networking organizations. Fostering wider growth of such informal activities is perceived as a virtuous policy aim. Overall, however the proportion of older people participating in such activities is not very high: around one quarter in church and religious activities, 3% in political parties and trade unions and around 20% in recreational groups.⁵⁹ The Survey on Health and Retirement in Europe (SHARE) provides detail about the informal activities of over 50s in some EU Member States. SHARE found that one of the most common activities, far removed from the aforementioned recreation or political involvement, was regular caring for grandchildren. The survey identified significant country differences in volunteering rates, informal helping, caring for other adults and civic or social organization involvement. Older people most involved in these activities (and especially in the 65-74 age group) were to be found in the Netherlands, Sweden and Denmark with the lowest participation rates in Southern and Central Europe.

These figures highlight different cultural constructs concerning attitudes to social participation but they may also reflect on differing social welfare regimes, including healthcare regimes and pension disparities across Member States.⁶⁰ The trend towards more involvement, while contingent on cultural conditions, has the possibility to create societies that are good to grow old in, as older adults continue to be contributing members of a

⁵⁸ UN. "Report of the Second World Assembly on Ageing." New York: United Nations, 2002: p.16

⁵⁹ EC. "Commission Staff Working Document: Demography Report 2008 Meeting Social Needs in an Ageing Society." In Full Report Plus Annexes SEC(2008) 2911. Brussels: European Commission, 2008.

⁶⁰ Karsten Hank and Stephanie Stuck. "Gesellschaftliche Determinanten Produktiven Alerns in Europa." In Societal Determinants of Productive Aging in Europe. Mannheim: Mannheim Research Institute for the Economics of Aging, 2007.

socially inclusive community and feeling useful in this way is positively correlated with longevity and health.⁶¹

5.2 Internet access and virtual networks

New internet learning environments can offer positive arenas for facilitating social exchange in and between age groups. The ability to access and utilize information technology particularly the Internet, has become important for many people in maintaining or creating social networks, accessing health care information, entertainment, or other forms of information that can contribute to an increased quality of life.⁶² For most older adults today, the Internet is simply not a part of their lives. However, the baby boom generation that is now entering retirement will perhaps begin a trend of increasingly computer and technology savvy older adults. There are issues of physical, social and cognitive barriers to some older adults' uptake of the Internet which must be considered in light of any discussion around the potential benefits it may offer this cohort.⁶³ Certainly, the Internet is not a necessary component to living a rich life, and perhaps in some cases the resultant information overload can be overwhelming. However, it is clear that access and ability to utilize select services would be beneficial if extended out across the digital divide regardless of physical or financial capacity.

Virtual social networks can overlap and reinforce traditional ones for older adults- especially given the increasing prevalence of geographical dissolution in European families. The ability to use the Internet for communication can provide a vital means for staying connected and staving off loneliness or isolation for both older adults and their distant kin.⁷¹ Innovations, such as the video conferencing solution Skype, are now widespread in Internet using parts of society. There is much anecdotal evidence in the popular press to suggest that older adults are using such Internet services to communicate with geographically distant friends and family. When interviewed about her video-conference use, an 88 year grandmother in the US spoke about keeping in touch with her great grandchildren in Germany, "*With the little ones, it's so important — I just feel so blessed...Some people say, 'I don't want a computer,' How can they live without a computer?*"⁶⁴ Local governments and service organizations can play a role in providing access to, and instruction on how to use, computers equipped for internet conferencing through institutions such as libraries and community centres.

Recent work in the UK has involved developing and assessing an innovative IT network has identified new potentials for social networking

⁶¹ T. Gruenewald et al. "Feelings of Usefulness to Others, Disability, and Mortality in Older Adults: The MacArthur Study of Successful Aging." *Journals of Gerontology - Series B Psychological Sciences and Social Sciences* 62, no. 1 (2007).

⁶² C. Seals et al. "Lifelong Learning: Becoming Computer Savvy at a Later Age." *Educational Gerontology* 34, no. 12 (2008).

⁶³ D. Harley and G. Fitzpatrick. "Creating a Conversational Context through Video Blogging: A Case Study of Geriatric1927 (Article in Press)." *Computers in Human Behavior* (2009).

⁶⁴ Jeffery Kurz. "Tech-Savvy Elders Keep Family Close: Seniors Communicate Via Internet." <http://www.telegram.com/article/20090215/NEWS/902150391>.

and e-information accessing for and by older adults.⁶⁵ In this pilot program researchers worked with older adults and their existing circles of support to develop a web based portal for accessing community and social information that was previously scattered and difficult to obtain. The first hurdle encountered was in developing a platform that would be easy to use for both older adults and their carers. Through iterations and user feedback, the research team was able to arrive at a suitable design. As the researchers point out, *"If developers relied upon Universal Usability when providing software, we would have more accessible systems ... many of the problems encountered by seniors were things that would not occur to the mind of a 25-year-old software developer who lacks the physical limitations caused by time."*⁶⁶ The key finding of this project was the importance of utilizing an older adults' circle of support to act as technology literate intermediaries for those older adults who can not or do not wish to use computers.

Another interesting potential for virtual networking is the development of Web 2.0 systems such as FaceBook, which are designed specifically for over 50s. These sites, such as SagaZone and Eons, provide a social networking interface specifically designed for older adults to socialize among themselves. Further, researchers have found at least one family who currently use a closed FaceBook group to coordinate care for an older family member.⁸⁷ This may indicate a nascent development for future complementary support for carers. Another web 2.0 application, YouTube, has been hosting intergenerational discussions for some time; there is, arguably, an emergent trend where older users socialize with younger users through video blogging on this popular website. Harley and Fitzpatrick⁶⁶ offer a case study of this phenomenon where an 80-plus year old man has been active on the video networking site since 2006. He originally began posting stories of his life and several younger users posted video comments about these stories. His involvement has since morphed and now he has a regular following of thousands and offers solicited advice to many younger YouTube users.

5.3 Life long learning and exchange

Innovations built using the Internet can play a role in knowledge transfer. Older adults necessarily have a wealth of life experience and tacit knowledge that can provide positive grounds for rich intergenerational exchange and the retention of knowledge in society. As the university has an important role to play in facilitating this knowledge transfer, especially of the more tacit and experiential knowledge of older adults who no longer participate in the workforce. Once these adults leave work, many would like to contribute to their community's but perhaps not in traditional voluntary roles of caregiver or charity workers. There is thus the need to offer diverse and meaningful ways for retirees and part retirees to continue contributing to society if they choose. Innovations in education

⁶⁵ Mary Godfrey and Owen Johnson. "Digital Circles of Support: Meeting the Information Needs of Older People." *Computers in Human Behavior*. In Press, Corrected Proof (2009).

⁶⁶ D. Harley and G. Fitzpatrick. "Creating a Conversational Context through Video Blogging: A Case Study of Geriatric1927 (Article in Press)." *Computers in Human Behavior* (2009).

delivery, such as the Open University model and online short-courses, offer a good starting point to enable this kind of knowledge transfer. However, to support older adult participation in such arenas, technology infrastructure, most notably broadband access, must first be rolled out to the often fringe geographical areas where retirees tend to congregate.⁶⁷

5.4 Policy directions for ICT and older adults

It is evident that ICT, and Internet access in particular, can already offer a host of benefits to older adults and their support networks. The onus of bridging the digital divide, especially for low-income older adults, lies with governments.⁶⁸ The European Commission has addressed the potential of ICT in supporting “active ageing” and ageing well by concluding that “*Holistic policies are needed to support learning opportunities in ageing societies.*”⁶⁹ Such policies include supporting local communities in providing accessible ICT facilities, encouraging ICT based networking to involve older adults in communities, virtual or otherwise, promoting ICT related learning opportunities, funding relevant R&D projects, and developing appropriate IT literacy courses.

The older adults of tomorrow promise to be increasingly technology savvy and demanding participants in virtual networks and communities. Multi-level policy response – at local, regional, national and supra national levels –involving all social partners is thus necessary to harness the benefits of virtual networking for older adults now and in the future. Policy should be focused on issues of fair access to ICT and education to enable the use of such access. Policy can also aid in enabling ICT assisted intergenerational knowledge exchange by supporting the creation of novel platforms for such networking. In this area, as in all others regarding ageing, the challenge is to develop innovative policy instruments and modes of communication that can be disseminated widely and adapted to local circumstances.

⁶⁷ S. Garlick and J Soar. “Human Capital, Innovation and the Productive Ageing: Growth and Senior Aged Health in the Regional Community through Engaged Higher Education.” Paper presented at the The 4th Annual AUCEA Conference, Alice Springs, AU, July 2007.

⁶⁸ J. Coughlin. “Ageing, Innovation and Policy.” Paper presented at the Symposium conducted at Civil Service College: Centre for Governance and Leadership, Singapore, Jan 2008.

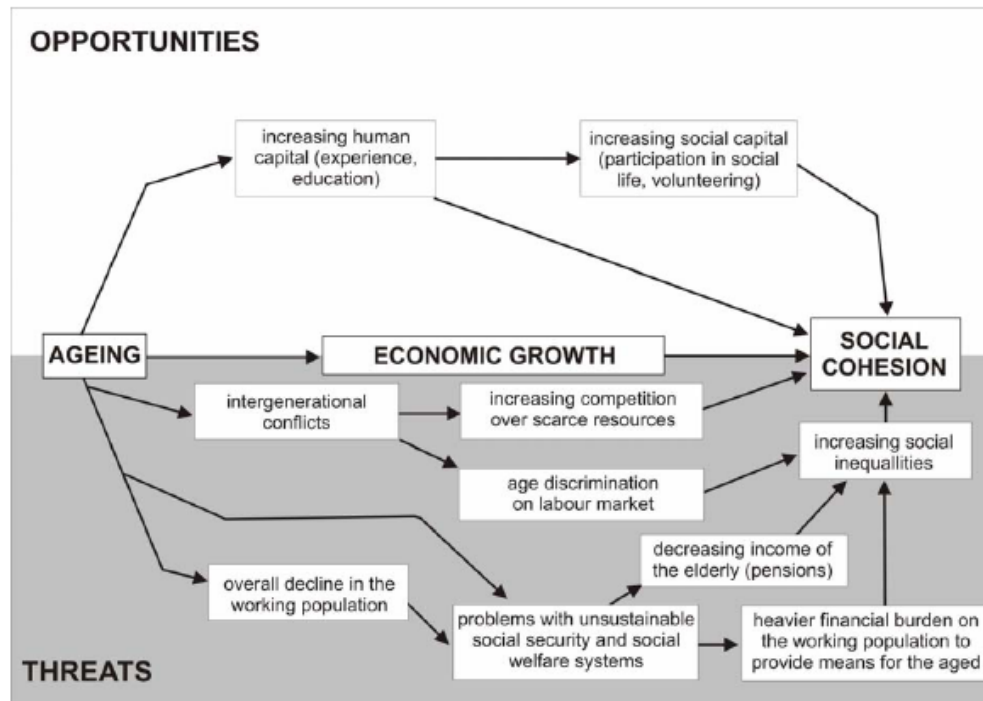
⁶⁹ Kirsti Ala-Mutka, et al. “Active Ageing and the Potential of ICT for Learning”: European Commission, Joint Research Centre and Institute for Prospective Technological Studies, 2008.

6 CONCLUSIONS

Across much of Europe, the populations of Member States are getting older; what this means for innovation in general is uncertain. Novel fields encompassing diverse services and products are emerging in response to the needs of new and enlarged groups of older consumers, whereas other sectors may suffer due to burdens on social care networks and productivity levels in organizations. What is most evident following this review of literature, is that a population shift such as that projected for the EU will touch many areas of social and work life in ways that are not yet truly foreseeable. Innovation is a complex amalgam that often coalesces in unexpected places; certainly an ageing population will not *necessarily* be either a boon or drag on a state’s ability to create and market innovations. In this fluid context, policy work can hope to steer outcomes so that the demographic shift is mobilized for the benefit of Member States’ innovative capacity.

Changes in familial and social structures mean that growing numbers of people will spend more years living alone as they age. Such trends challenge social cohesion and will require significant adaptations in our family, social, and work lives and in devising adequate methods for social protection. Minimising the threats posed and the opportunities available from the new demographics is complex (see Figure 4).

Figure 4: Threats and Opportunities in the New Demographics



Source: Impact of future demographic changes in Europe, CEFMR Working Paper 6/2006

High standards of state sponsored welfare provision in the latter half of the twentieth century have, in great measure, protected large numbers of vulnerable older adults and have contributed to reducing generational

disparities in longevity. However, recent decades have seen a degree of disengagement by public authorities in this arena and an increasing competitive commercialization of welfare services, which, combined with changing family structures, has in some areas exacerbated exclusion and damaged social cohesion. Overall, more effective safety nets have to be devised which reinforce the mediating role of state and regional authorities together with social partners in ameliorating risks associated with competition in the labour market, with the nexus of low income/high needs and high demands on time in the workplace and family over the entire life-course.

There is, however, a great opportunity for harnessing the benefits of a new, potentially vast, consumer market which has until now been underserved. Products and services geared toward older adults of all ability levels and wealth are needed as the population ages. Innovation in areas such as home design, products for disability and health delivery and financial and travel services will be met with enthusiasm by this expanding niche market. Policy can aid start-ups in fields geared toward the silver market economy, as well as offering support to nascent arms of established fields, such as the telehealth revolution in health care services.

As Europe ages, it has the opportunity to become a world leader in creating societies that are good to grow old in; as the world ages, it will then be able to look to Europe as a role model for development of the skills, services, products and policies that enable age-integration at all levels of society. Policy formulation at the EU level must strive to ensure each Member State becomes a good place to grow old in.

BIBLIOGRAPHY

- Arbetsförmedlingen. (2009). Swedish Public Employment Service. from <http://www.arbetsformedlingen.se/>
- Antonini, F. M., Magnolfi, S. U., Petruzzi, E., Pinzani, P., Malentacchi, F., Petruzzi, I., et al. (2008). Physical performance and creative activities of centenarians. *Archives of Gerontology and Geriatrics*, 46(2), 253-261.
- Ala-Mutka et al (2008) Active ageing and the potential of OCT for learning, CEC cited by Martin, A in *Digital literacy for the Third Age* (2009) at www.elearningpapers.eu
- AP. (2008, Feb 8). *Hospitals Discover The Power Of "Wiihab"*. Retrieved March 3, 2009, from <http://www.cbsnews.com/stories/2008/02/08/tech/main3810739.shtml>
- Bachofner, T. & Bossart, M. (2006). *Innovation for successful ageing (ISA)* (Aspekte aus Seniorenoptik). Bern: Federal Office for Professional Education and Technology.
- Barker, J. C. (2002). Neighbors, friends, and other nonkin caregivers of community-living dependent elders. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 57(3).
- Barlow, J. (2003, June). *Mainstreaming telecare in the UK. Overcoming the barriers* Paper presented at the Southern Institute for Health Informatics Conference, University of Portsmouth.
- Bendixen, R. M., Levy, C. E., Olive, E. S., Kobb, R. F. & Mann, W. C. (2009). Cost effectiveness of a telerehabilitation program to support chronically ill and disabled elders in their homes. *Telemed J E Health*, 15(1), 31-38.
- Bhagat, R. B. & Unisa, S. (2006). Ageing and dependency in India: A new measurement. *Asian Population Studies*, 2(2), 201-214.
- Biggs, S. (2001). Toward critical narrativity: Stories of aging in contemporary social policy. *Journal of Aging Studies*, 15, 303–316.
- Bräuniger, D., Gräf, B., Gruber, K., Neuhaus, M. & Schneider, S. (2002). The Demographic Challenge. Frankfurt/Main: Deutsche Bank Research.
- Bode, I. (2007). New moral economics of welfare: The case of demiciliary elder care in Germany, France and Britain. *European Societies*, 9(2), 201-227.
- Butler, R. N. (2002). The study of productive aging. *The journals of gerontology. Series B, Psychological sciences and social sciences*, 57(6).

- Cameron, R. (2005, April). *The mature aged in transition: Innovative practice for reengagement*. Paper presented at the AVETRA Conference, Brisbane.
- Center for Universal Design. (2006). *Universal Design in Housing*. Raleigh: North Carolina State University.
- Centre d'analyse stratégique. (2007). *Le vieillissement porteur de dynamique d'innovation au Japon ?* (La note de veille no. 77). Paris: Centre d'analyse stratégique.
- Comas-Herrera, A., Costa, J., Gori, C., Maio, A. D., Patxot, C., Pickard, L., et al. (2002). *European Study of Long-Term Care Expenditure: Investigating the sensitivity of projections of future long-term care expenditure in Germany, Spain, Italy and the United Kingdom to changes in assumptions about demography, dependency, informal care, formal care and unit costs*. (Report to the European Commission, Employment and Social Affairs DG: PSSRU Discussion Paper 1840)
- Coughlin, J. (2008, Jan). *Ageing, Innovation and Policy*. Paper presented at the Symposium conducted at Civil Service College: Centre for Governance and Leadership, Singapore.
- Coughlin, J., Pope, J. & Leedle, B. (2006). Old Age, New Technology, and Future Innovations in Disease Management and Home Health Care. *Home Health Care Management & Practice*, 18(3), 196-207.
- Crews, D. E. & Zavotka, S. (2006). Aging, disability, and frailty: Implications for universal design. *Journal of Physiological Anthropology*, 25(1), 113-118.
- Demiris, G. & Hensel, B. K. (2008). Technologies for an Aging Society: A Systematic Review of "Smart Home" Applications. *IMIA Yearbook of Medical Informatics 2008*, 33-40.
- EC. (2008). *Commission Staff Working Document: Demography Report 2008 Meeting Social Needs in an Ageing Society* (Full Report Plus Annexes SEC(2008) 2911). Brussels: European Commission.
- EC. (2006a). *The long-term sustainability of public finances in the EU* (COM(2006) 574 final). Brussels: European Commission.
- EC. (2006b). *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)*. Luxembourg: European Commission.
- Eurofound. (2006). *Age and employment in the new Member States*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

- European Social Fund. (2007). EQUAL: Paving the Way for Lifelong Learning and Age Management. Brussels: European Commission.
- Fisher, B. J. & Specht, D. K. (1999). Successful aging and creativity in later life. *Journal of Aging Studies*, 13(4), 457-472.
- Flood, M. & Phillips, K. D. (2007). Creativity in older adults: A plethora of possibilities. *Issues in Mental Health Nursing*, 28(4), 389-411.
- Foulk, E. (2007, Sept 7). *Robots turn off senior citizens in aging Japan*. Retrieved March 3, 2009, from <http://www.reuters.com/article/inDepthNews/idUST29547120070920?sp=true>
- Garlick, S. & Soar, J. (2007, July). *Human capital, innovation and the productive ageing: growth and senior aged health in the regional community through engaged higher education*. Paper presented at the The 4th Annual AUCEA Conference, Alice Springs, AU.
- Gaymu, J., Ekamper, P. & Beets, G. (2008). Future trends in health and marital status: effects on the structure of living arrangements of older Europeans in 2030. *European Journal of Ageing*, 5(1), 5-17.
- Gee, E. M. (2002). Misconceptions and misapprehensions about population ageing. *International Journal of Epidemiology*, 31(4), 750-753.
- Giles, L. C., Glonek, G. F. V., Luszcz, M. A. & Andrews, G. R. (2007). Do social networks affect the use of residential aged care among older Australians? *BMC Geriatrics*, 7, 24.
- Godfrey, M. & Johnson, O. (2009). Digital circles of support: Meeting the information needs of older people. *Computers in Human Behaviour, In Press, Corrected Proof*.
- Gorin, S. H. (2007). The United States can afford the boomers. *Health and Social Work*, 32(3), 165-168.
- Gruenewald, T. L., Karlamangla, A. S., Greendale, G. A., Singer, B. H. & Seeman, T. E. (2007). Feelings of usefulness to others, disability, and mortality in older adults: The MacArthur study of successful aging.
- Guile, D. & Migliore, M. (2006). *The issue of an ageing workforce and innovaiton in Italy*. Paper presented at the ECER Conference, Geneva. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 62(1).
- Hamel, M., Fontaine, R. & Boissy, P. (2008). In-home telerehabilitation for geriatric patients. *Engineering in Medicine and Biology Magazine, IEEE*, 27(4), 29-37.
- Hank, K. & Stuck, S. (2007). *Gesellschaftliche Determinanten Produktiven Aletrns in Europa* (Societal Determinants of Productive Aging in Europe). Mannheim: Mannheim Research Institute for the Economics of

Aging.

Hank, K. & Stuck, S. (2008). Volunteer work, informal help, and care among the 50+ in Europe: Further evidence for 'linked' productive activities at older ages. *Social Science Research*, 37(4), 1280-1291.

Harley, D. & Fitzpatrick, G. (2009). Creating a conversational context through video blogging: A case study of Geriatric1927 (Article in Press). *Computers in Human Behaviour*.

Helmuth, L. (2003). The wisdom of the wizened. *Science*, 299(5611), 1300-1302.

Hilbert, J. & Fretschner, R. (2008). *Meeting the Needs of Older People: Adaptations required in the provision of public and private services and new market opportunities*. Gelsenkirchen: University of Applied Sciences.

Hoffmann, A. T. (2008). Quality of life, food choice and meal patterns - Field report of a practitioner. *Annals of Nutrition and Metabolism*, 52(SUPPL. 1), 20-24.

Johansson, K., Josephsson, S. & Lilja, M. (2009). Creating possibilities for action in the presence of environmental barriers in the process of 'ageing in place'. *Ageing and Society*, 29(1), 49-70.

Kalmijn, M. & Saraceno, C. (2008). A comparative perspective on intergenerational support - Responsiveness to parental needs in individualistic and familialistic countries. *European Societies*, 10(3), 479-508.

Kohlbacher, F. (2008, Dec 18). *Innovation Strategies for the Silver Market*. Paper presented at the INNO GRIPS Innovation Policy Workshop "Innovation in an ageing society", Brussels.

Kohlbacher, F. & Hang, C. C. (2007, Dec). *Disruptive Innovations and the Greying Market*. Paper presented at the IEEE International Conference on Industrial Engineering and Engineering Management, Singapore.

Kohlbacher, F. & Herstatt, C. (2008, September). The Silver Market Phenomenon: The aging and shrinking society has huge implications for businesses in Japan. *J@pan Inc*, 22-23.

Kose, S. (2006). Universal Design for the Ageing. In W. Karwowski (Ed.), *International encyclopedia of ergonomics and human factors* (pp. 227-230). London: CRC Press.

Kruse, A. & Schmitt, E. (2006). A multidimensional scale for the measurement of agreement with age stereotypes and the salience of age in social interaction. *Ageing and Society*, 26(3), 393-411.

Kubitschke, L., Gareis, K., Lull, F., Müller, S., Cullen, K., Delaney, S., et al. (2008). *ICT & Ageing: European Study on Users, Markets and*

Technologies - Preliminary Findings. Dublin: Work Research Center.

Kurniawan, S., Nugroho, Y. & Mahmud, M. (2006, April 22-27). *A Study of the Use of Mobile Phones by Older Persons*. Paper presented at the Interact. Inform. Inspire - Conference on Human Factors in Computing Systems, Montreal.

Kurz, J. (2009, Feb 15). *Tech-savvy elders keep family close: Seniors communicate via Internet*. Retrieved March 5, 2009, from <http://www.telegram.com/article/20090215/NEWS/902150391>

Laschet, A. (2006, Jan). *SEN@ER external Newsletter No. 1*. Bonn: Silver Economy Network of European Regions.

Lehr, U. (2007, Nov). *Demographic change and its consequences for the tourism branch*. Paper presented at the Third Silver Economy Conference, Seville.

Macdonald, A. (2007). The UD Phenomenon in Japan: Product Innovation Through Universal Design. In C. Stephanidis (Ed.), *Universal Access in HCI, Part I, HCII* (pp. 224-233). Berlin: Springer.

Mace, R. (1998). *Universal Design: Housing for the Lifespan of all People*. Washington, D.C.: U.S. Department of Housing and Urban Development.

Martins, J. O., Gonand, F., Antolin, P., Maisonneuve, C. d. I. & Yoo, K.-Y. (2007). *The Impact of Ageing on Demand, Factor Markets and Growth* (Economics Working Papers no. 420). Paris: Organisation for Economic Co-operation and Development.

Martinson, M. & Minkler, M. (2006). Civic Engagement and Older Adults: A Critical Perspective. *The Gerontologist*, 46(3), 318-324.

McKee, M. & Nolte, E. (2004). Responding to the challenge of chronic diseases: Ideas from Europe. *Clinical Medicine, Journal of the Royal College of Physicians of London*, 4(4), 336-342.

Mestheneos, E. & Triantafyllou, J. (2005). Supporting family carers of older people in Europe. In H. Dohner & C. Kofahl (Eds.), *The Pan-European Background Report*. Hamburg: University of Hamburg.

Micera, S., Bonato, P. & Tamura, T. (2008). Gerontechnology. *IEEE Engineering in Medicine and Biology Magazine*, 27(4), 10-14.

Mollenkopf, H. (2008, April). *Ageing in Ageing Societies: Older People's Living Circumstances, Needs and Expectations*. Paper presented at the Hitachi Forum, Munich.

Murray, L. M. & Boyd, S. (2009). Protecting personhood and achieving quality of life for older adults with dementia in the U.S. health care system. *Journal of Aging and Health*, 21(2), 350-373.

Nasmith, W. & Parkinson, M. (2008). Senior citizens embrace change and make a new technology work for them. *Electronic Library*, 26(5), 673-682.

NAO. (2009). Supporting Carers to Care. London: National Audit Office: Department for Work and Pensions.

OECD. (2006). *Ageing & Employment Policies: Live Longer Work Longer*. Paris: Organisation for Economic Co-operation and Development.

OECD. (1998). *Maintaining Prosperity in an Ageing Society*. Paris: Organisation for Economic Co-operation and Development

Perez, C. (2004). Finance and technical change: a long term view. In H. Hanusch & A. Pyka (Eds.), *The Elgar Companion to Neo-Schumpeterian Economics*. Cheltenham: Edward Elgar.

Pollack, M. E. (2005). Intelligent technology for an aging population: The use of AI to assist elders with cognitive impairment. *AI Magazine*, 26(2), 9-24.

Prskawetz, A. & Lindh, T. (Eds.). (2006). *The Impact of population Ageing on Innovation and Productivity Growth in Europe* (Research Report 28). Vienna: Vienna Institute of Demography, Austrian Academy of Sciences.

Purdam, K. & Norman, P. (2008). Geography of Unpaid Caring in England & Wales. Paper presented at the Census Microdata: Findings and Futures Conference, Manchester.

Reeves, R. & Knell, J. (2009). *The 80 minute MBA: everything you'll never learn at Business School*. London: Headline Book Publishing.

Ribbe, M. W., Ljunggren, G., Steel, K., Topinková, E., Hawes, C., Ikegami, N., et al. (1997). Nursing homes in 10 nations: A comparison between countries and settings. *Age and Ageing*, 26(SUPPL. 2), 3-12.

Riemenschneider, R. (2008, September 23-24). *Robotics Research and Innovation on Ageing Well*. Paper presented at the IROS Conference, Nice.

Roskos-Ewoldsen, B., Black, S. R. & McCown, S. M. (2008). Age-related changes in Creative Thinking. *Journal of Creative Behaviour*, 42(1), 33-59.

Rozario, P. A. (2006). Volunteering among current cohorts of older adults and baby boomers. *Generations-Journal of the American Society on Aging*, 30(4), 31-36.

Ruggles, S. & Heggeness, M. (2008, April 17-19). *Intergenerational Coresidence in Developing Countries*. Paper presented at the Population Association of America (PAA) Conference, New Orleans.

Scherbov, S., Mamolo, M. & Lutz, W. (2006). *Probabilistic Population*

Projections for the 27 EU Member States Based on Eurostat Assumptions (European Demographic Research Papers 2). Vienna: Vienna Institute of Demography of the Austrian Academy of Sciences.

Schultz, J. & Binstock, R. (2006). *Aging Nation: The Economics and Politics of Growing Older in America*. Westport, CT: Praeger Publishers.

Seals, C. D., Clanton, K., Agarwal, R., Doswell, F. & Thomas, C. M. (2008). Lifelong learning: Becoming computer Savvy at a later age. *Educational Gerontology*, 34(12), 1055-1069.

Smith, R. O., Bange, M. & Hall, M. (2000). Using assistive technologies to enable self-care and daily living. In C. Christiansen (Ed.), *Ways of living* (2nd ed. ed. pp. 333–361). Bethesda, MD: American Occupational Therapy Association.

Soprano. (2007). *Service-oriented Programmable Smart Environments for Older Europeans*. Athens: EXODUS SA.

Suttie, A. (2009, March 3). *Scottish care home group provides Nintendo therapy*. Retrieved 5 March, 2009, from www.communitycare.co.uk

Tas, Ü., Verhagen, A. P., Bierma-Zeinstra, S. M. A., Odding, E. & Koes, B. W. (2007). Prognostic factors of disability in older people: A systematic review. *British Journal of General Practice*, 57(537), 319-323.

The Danish Council for Strategic Research. (2006). *The Ageing Society 2030* (Report by the Steering Group for the strategic foresight on the ageing society 2030). Copenhagen: The Danish Research Agency.

Thenint, H. (2008). *Future Prospects of Care Facilities and Services for the Dependent Elderly in France* (Foresight Brief No. 139). Versailles: The European Foresight Monitoring Network.

Tilse, C., Wilson, J., Setterlund, D. & Rosenman, L. (2007). *The new caring: Financial asset management and older people* (Annals of the New York Academy of Sciences) (Vol. 1114, pp. 355-361)

UN. (2007). *World Economic and Social Survey 2007: Development in an Ageing World*. New York: United Nations.

UN. (2002). *Report of the Second World Assembly on Ageing*. New York: United Nations.

Vickers, L. (2009, March 4). *Wii Love the Sports*. Retrieved March 4, 2009, from www.stuff.co.nz/auckland/1997647/Wii-love-the-sports

Vignoli, D. & Ferro, I. (2009). Rising marital disruption in Italy and its correlates. *Demographic Research*, 20, 11-35.

Villosio, C., Pierro, D. D., Giordanengo, A., Pasqua, P. & Richiardi, M. (2008). *Working conditions of an ageing workforce* (European Working

Conditions Survey). Collegio Carlo Alberto, Italy: LABORatorio Riccardo Revelli, Centre for Employment Studies.

Vos, R., Kozul-Wright, R., Cortez, A., Cunningham, S. & Kawamura, H. (2007). *Managing Health Care in an Ageing World* (UN-DESA Policy Brief No. 2). New York: United Nations.

Wada, K., Shibata, T., Musha, T. & Kimura, S. (2008). Robot therapy for elders affected by dementia. *Engineering in Medicine and Biology Magazine, IEEE, 27(4)*, 53-60.

Wallis, A. E., Schachter, H., Ryan, J. & Fallica, N. (2008). Can Nintendo's DS lite Big Brain Academy be used as a cognitive rehabilitation tool? *Clinical Neuropsychologist, 22(3)*, 433-434.

WHO. (2002). *Active Ageing: A Policy Framework*. Geneva: World Health Organization.

Wintlev-Jensen, P. (2008). *ICT & Ageing Ethical Perspectives* (ICT for Inclusion). Brussels: European Commission.

WorkAge. (2002). *Handbook: WorkAge- Age-specific training and work for Europe*. In M. Frölich, D. Jonas, I. Schmidt & M.-C. Stemann (Eds.). Scion, CH: Swiss Occidental Leonardo.

Wray, S. (2004). What constitutes agency and empowerment for women in later life? *Sociological Review, 52(1)*, 22-38+137.

Zhao, C., Popovic, V., Ferreira, L. & Lu, X. (2006, Nov). *Vehicle Design Research for Chinese Elderly Drivers*. Paper presented at the 7th International Conference on Computer-Aided Industrial Design and Conceptual Design, CAIDC, Hangzhou, China.

APPENDIX 1: CASE STUDIES

Company/Enterprise/Organisation	Description of approach
<p>Agewell - Sandwell Primary Care Trust, West Bromwich, UK Public Hospital/Healthcare 1269 employees; 24% 50+</p>	<p>As a group working to strengthen the voice of people age 50+, Agewell connects older people with other voluntary and community sector groups. As part of their initiatives, the Midlife Future Planning program is available to all employees to consider the possible changes they will face in later life. Flexibility in work arrangements is treated as a priority so staff can find the appropriate work/life balance. In addition, Agewell has no mandatory retirement policies.</p>
<p>BT Group plc, London, UK Communications 108,505 employees; 29% 50+</p>	<p>BT offers a wide variety of flexible work arrangements through its Achieving the Balance portfolio, which can be hugely beneficial to older employees in making a transition from full-time employment to retirement. The Career Life Planning Tool is another innovative program, which assists employees in developing their careers at every stage, accounting for changes that may emerge during employment.</p>
<p>Deutsche Bahn AG, Berlin, Germany Transportation Services 192,887 employees; 35% 50+</p>	<p>Deutsche Bahn has taken a proactive approach to mitigating the effects of demographic change through ten special human resources initiatives and programs. One such initiative, DB Experience, focuses on preserving and enhancing the employability of older employees through qualification and advanced training. This is accomplished through seminars to promote the value of older workers as well as balanced composition of work teams by age to ensure appropriate knowledge transfer and intergenerational cooperation.</p>
<p>Horsens Kommune, Horsens, Denmark Municipal Government 5662 employees (969 teachers); 36% 50+ (48% 50+ among teachers)</p>	<p>Standing out among policies in the Municipality of Horsens is “The Good Working Life” project to motivate older teachers to continue working rather than enter retirement. Following implementation of this comprehensive policy to retain older teachers, employment among teachers age 60+ doubled from 4.1% to 8.3% of teachers from 2000 to 2006. Special mentoring programs also resulted from the initiative, through which younger teachers gain from the experiences of their older counterparts. New teachers benefit from the knowledge transfer as well as a work culture characterized by intergenerational teamwork.</p>

<p>Loewe AG, Kronach, Germany Electronics Industry 926 employees; 32% 50+</p>	<p>A particularly innovative aspect of Loewe’s approach to older workers is its emphasis on educating executives on the need to develop sound strategies within the context of an aging workforce. This is one of four action areas covered under Project 67, a company initiative aimed at addressing demographic developments in its workforce. A second action area aims to counteract the risks of decline in health and productivity associated with final assembly production by introducing job rotation and a greater variation in assembly line duties. Such policies help prevent joint and skeletal disorders arising from repetitive movements common to assembly-line workers.</p>
<p>SICK AG, Waldkirch, Germany Industrial Equipment and Commercial Machinery 1879 employees; 17% 50+</p>	<p>Mature workers at SICK AG serve as mentors for younger employees through mixed-age training groups and project teams. Moreover, the company maintains strong ties with retired employees by inviting them to company functions. SICK AG also puts significant emphasis on employee health with a project addressing how healthy aging can be achieved in the workplace, as well as through comprehensive flexible work options.</p>
<p>Alexandra Hospital, Singapore Public Hospital/Healthcare 1606 employees; 14% 50+</p>	<p>Alexandra Hospital initiated several programs beneficial to older workers to promote lifelong learning and wellness. WOW – Wellness for Older Workers – is a program that serves to empower mature workers with the skills, knowledge, and attitude to take charge of their health and lifestyle. The hospital has also implemented a series of workplace redesigns to make work less physically strenuous on its aging workforce.</p>
<p>Singapore Health Services Pte Ltd, Singapore Private Hospital/Healthcare 14,800 employees; 18% 50+</p>	<p>SingHealth’s approach to mature workers utilizes a “Silver Connection Consultant” who provides guidance on career transitions and management of older employees. In addition, a number of programs provide opportunities to upgrade skills and acquire new knowledge. SingHealth has also invested heavily in automation and mechanization to alleviate job-related physical demands, making work more suitable for older employees.</p>
<p>South Wales Forgemasters, Wales SME Engineering (forgings to the automotive industry)</p>	<p>South Wales Forgemasters has removed its fixed retirement age and some of its workforce is now choosing to work beyond retirement. To reduce the risk of sudden loss of skills and expertise, the company examines its age profile to determine when people are likely to retire and makes the necessary contingency plans. A current</p>

	<p>example of this is where a skilled toolmaker, shortly due to retire, now has a trainee working with him and learning all aspects of his job. Another previously retired individual has been asked to return to work within the CAD department to develop designs for a new project. The company was very keen to retain his services because his skills would have been virtually impossible to find elsewhere within the locality. The company factors age out of all of its recruitment and retention policies. Job application forms ask for basic personal details, including age, as well as education and work history. Although the company includes age on the application form, it makes no reference to it when selecting individuals for interview, or during the interview process itself. All employees undergo a formal induction period, after which the company and employee agree any necessary training and draw up a training plan. The company assesses the abilities of all employees annually, matching these to the work within the plant and arranging any necessary training. The company's approach : helps to recruit and retain skills in a business where it is hard to attract workers into heavy-duty metal processing, a dirty, noisy environment: age blind selection process means good skills match when recruiting and older workers providing excellent support to new workers from a practical and personal perspective.</p>
<p>Cooperative Group, HQ Manchester, UK</p>	<p>As well as being the UK's largest co-op food retailer, the Co-operative Group is also the UK's largest independent travel retailer, a funeral director, a pharmacist and a bank. The Co-operative Group has removed their contractual retirement age altogether. Employees who choose to continue working are able to continue in the Group's pension scheme, and it is also possible to draw pension whilst continuing to work for the Group. In the recruitment area, the Group has re-designed their job application forms so that date of birth is not visible to recruitment managers, and 'age-proofed' the way it assesses pay by focusing on the performance and contribution of staff, rather than how old they are. The company uses a performance management process which takes into consideration not only how well someone has performed, but how they went about doing it. The Group takes advantage of the fact that there is no official retirement age in the UK. Age regulations introduced a default retirement age of 65 but this is not</p>

	mandatory. Employers do not need to set a retirement age at all.
<p>Domestic & General Group Limited, UK Financial Services 712 employees; 9% 50+</p>	<p>Domestic & General Group Limited has sought to attract and retain older workers for their experience, loyalty, and reliability by implementing a number of age-positive recruitment strategies. Materials for recruitment and assessment were tailored to resonate with various generations. Telephone interviews have been used in the first stage of the hiring process to avoid age bias. The staff have also been encouraged to become Age Positive Ambassadors, some of whom represent the company at recruitment fairs.</p>
<p>Centrica plc, Windsor, UK Utilities 29,069 employees; 13% 50+</p>	<p>Centrica strives to create an age diverse workforce through many measures. Two such tactics include an Age Action Group, which convenes managers from across business units to coordinate delivery of a detailed action plan addressing the company's aging workforce, as well as an Age Awareness e-learning package for managers and employees to raise awareness about age diversity issues. They also support work-life balance through comprehensive flexible work policies and a carers' network</p>

APPENDIX 2: SELECTED EU AGEING PROJECTS

AALIANCE European R&D coordination platform for ageing well
<http://www.aaliance.eu/public>

CAPSIL International R&D cooperation with US and Japan
<http://www.capsil.org>

SENIOR Support Action on ICT and ethics in ageing domain
<http://seniorproject.eu>

HERMES Cognitive care and guidance for active ageing
<http://www.fp7-hermes.eu>

VITAL MIND Advanced interactive mental training for elderly people
<http://www.vitalmind-project.eu>

ELDER GAMES Improving cognitive skills of elderly people through gaming
<http://www.eldergames.org>

i2HOME Innovative interaction with home appliances for all
<http://www.i2home.org>

EASY-LINE+ Intelligent white goods for an ageing population
<http://www.easylinplus.com>

SMILING Support for mobility of an ageing population
<http://www.smilingproject.eu>

SHARE-IT Enhanced navigation with smart wheelchairs and walkers
<http://www.ist-shareit.eu/shareit>

CONFIDENCE Fall detection and protection for independent living
[n/a](#)

MPOWER Service oriented architectures for independent living
[n/a](#)

PERSONA Open platforms and tools for ageing applications/services
<http://www.aal-persona.org>

SOPRANO Advanced integrated care service platforms
<http://www.soprano-ip.org>

OASIS Ontology based interoperability for ageing applications
<http://www.oasis-project.eu>

Companiable Intelligent robotic companion for safety and social support
[n/a](#)

MON-AMI Ambient intelligence for independent living
<http://www.monami.info>

AMON Advanced care and alert portable telemedical monitor
www.wearable.ethz.ch/amon.0.html

ACTIVE HEALTH Environment for health promotion and disease prevention
www.hon.ch/project/activehealth.html

AAL Ambient assisted living, preparation for an art. 169 initiative
www.aal169.org

ASK-IT Ambient intelligence system of agents for knowledge-based
and integrated services for mobility impaired users
www.ask-it.org

BIOTEX Bio-sensing textiles to support health management
www.biotex-eu.com

eInclusion@EU Strengthening eInclusion and eAccessibility across Europe
www.einclusion-eu.org

H-LIFE Intelligent personal health assistant
[n/a](#)

HEALTHY MARKET A virtual marketplace for healthy nutritional plans
www.healthy-market.org

Health-eLife Doc@HOME Home based management for chronic disease
www.health-elife.co.uk

HealthService24 Continuous mobile services for healthcare
www.healthservice24.com

HealthyAims Nano scale materials, sensors and microsystems for
medical implants improving health and quality of life
www.healthyaims.org

IntelliDrug Intelligent intra-oral medicine delivery micro-system to treat
addiction and chronic diseases
www.intellidrug.org

MAPPED Mobilisation and accessibility planning for people with
disabilities
www.bmtproject.net/mapped

MCC Medical care continuity
www.eten-mcc.org

MIMOSA Microsystems platform for mobile services and applications
www.mimosa-fp6.com

MobilAlarm Validating European mobile alarm services for inclusion and independent living

www.mobilalarm-eu.org

MOVEMENT Modular versatile mobility enhancement technology

www.fortec.tuwien.ac.at/movement

MYHEART Fighting cardio-vascular diseases by prevention and early diagnosis

www.hitech-projects.com/euprojects/myheart

OFSETH Optical fibre sensors embedded into technical textile for healthcare monitoring

www.ofseth.org

PIPS Personalised information platform for life and health services

www.pips.eu.org

WEALTHY Wearable health care system

www.wealthy-ist.com