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A Mapping of Smart Ageing Activity in Ireland and An Assessment of the Potential Smart Ageing Opportunity Areas

An independent report for the Department of Jobs, Enterprise and Innovation

A Mapping of Smart Ageing Activity in Ireland and An Assessment of the Potential Smart Ageing Opportunity Areas

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Preface

The Action Plan for Jobs 2014 identified Smart Ageing as a sectoral opportunity for economic growth and jobs for Ireland. As part of the Action Plan, the Government committed to map the current economic and social activity in Ireland, to identify our assets and strengths and to identify the enterprise and job creation potential for the country. This work followed on from a recommendation of the Global Irish Economic Forum in 2013.

Smart Ageing is defined as “...using technology and innovation both in the public and private sectors to produce products, services, solutions and systems to improve the quality of life of people aged 50 and over”.

An Interdepartmental Steering Group oversaw this work and was chaired by the Department of the Taoiseach, with research and technical support from the Department of Jobs, Enterprise and Innovation.

The Technopolis Group was commissioned by the Strategic Policy Division of the Department of Jobs, Enterprise and Innovation to assist in the mapping and assessment process and the following report sets out the key findings.

The Steering Group have welcomed the report and the relevant State Agencies and Departments will consider the recommendations therein.

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Glossary

AAL-JP	Ambient Assisted Living Joint Programme
AHA	Active and Healthy Ageing
APC	Alimentary Pharmabiotic Centre
ARCH	Applied Research for Connected Health Technology Centre
BDI	Biomedical Diagnostics Institute
DECLG	Department of Environment, Community, Local Government
DES	Department of Education and Science
DFI	Disability Federation of Ireland
D/Justice and Equality	Department of Justice and Equality
DJEI	Department of Jobs, Enterprise and Innovation
DSP	Department of Social Protection
DTTAS	Department of Transport, Tourism and Sport
EIP	European Innovation Partnership
ERDF	European Regional Development Fund
FHI	Food for Health Ireland
FIRM	Food Institutional Research Measure
H2020	Horizon 2020 EU Research Programme
HEIs	Higher Education Institutes
HIH	Health Innovation Hub
HRB	Health Research Board
HSE	Health Service Executive
IMDA	Irish Medical Device Association
IPR	Intellectual Property Rights
ISME	Irish Small and Medium Enterprise Association
IUNA	Irish Universities Nutrition Alliance
NCPOP	National Centre for the Protection of Older People
NPAS	Irish National Positive Ageing Strategy
NSAI	National Standards Authority of Ireland
REMEDI	Regenerative Medicine Institute
SBRI	Small Business Research Initiative
TRIL	Technology Research for Independent Living

Executive summary

Introduction

The number of people aged 60 and over will more than double by 2050, reaching 2 billion globally. An ageing society should be considered a sign of social and economic progress that, as a result of increasing longevity, brings about further opportunities for economic, social and cultural development. The 'older people' of the 21st century are better educated and in better health than generations ever before. They want to live independently, continue to contribute to their communities and enjoy their later lives in good health.

Older people are shaping economies; they constitute a large and growing market segment in very many consumer markets, with a combined spending power estimated to reach \$15 trillion by 2020. Living longer also poses challenges to both the individual and to society. An ageing population means a smaller working population must help support the incomes of a larger number of people of pensionable age. The worsening dependency ratio will also impact the affordability of public healthcare with national expenditure expected to rise by 25% as a share of GDP in EU Member States by 2050. Healthcare spending is already heavily skewed toward older people with three quarters of the healthcare budget in the EU spent on people over 60.

Ireland has a relatively young population compared with most other EU countries, and does not yet have to cope with the intense pressure on public finances of the changing demographics. Ireland has, however, made an early commitment to meeting the challenge and delivering inter-generational equity. It sees Smart Ageing¹ as an opportunity rather than a crisis. Given the rapidly changing situation internationally, Smart Ageing products and services will provide Ireland with a platform for new business creation, rising exports and increasing employment.

Ireland commissioned the Technopolis Group to help identify the specific developments that may benefit older people globally and where Ireland has a competitive advantage. The review was carried out between August and December 2014, for an Inter-Departmental Steering Group, chaired by the Department of the Taoiseach and supported by the Strategic Policy Unit in the Department of Jobs, Enterprise and Innovation (DJEI).

The primary objective was to identify major economic opportunities relating to Smart Ageing, where government support was likely to be decisive in helping Irish businesses capture income and market share internationally. The focus was on innovation-related opportunities, and the study began by mapping Ireland's various R&D activities, networks and enterprise base across key economic sectors² in order to provide a baseline of relevant skills and institutional capacity. The existence of technology and 'smart know-how' was considered a precondition for Ireland to exploit growth opportunities in new markets, where the competition is not yet fully established and Ireland emerging technological strengths may help secure a first-mover advantage. However, transition from R&D to a full economic activity requires the presence of

¹ Smart Ageing for the purposes of this study is defined as '...using technology and innovation in both the public and private sectors to produce products, services, solutions and systems to improve the quality of life for people aged 50 and over'.

² Healthcare and self-care, including biomedical solutions; Educational and training services for older people; Financial services for older people; Food and nutrition for older people; Connectivity and social participation; Lifestyle products and services including tourism; Employment; Housing and transport.

certain national framework conditions that would provide supporting infrastructure, reduce risks for stakeholders, and create a favourable business environment.

Global context

Ireland is one of the first countries to see the world's rapidly ageing population as a business opportunity and not just a societal challenge, however, there is a great deal of activity in this space internationally. The European Commission has launched several Smart Ageing platforms in the recent past, which have direct relevance for the Irish private sector. These large-scale, pan-EU initiatives not only operate at the technology frontier providing learning opportunities and potential collaborations across value chains, but also provide insight about potential future market trends and shifts in the regulatory landscape. The big three platforms are the Ambient Assisted Living (AAL) Joint Programme, the More Years Better Lives (MYBL) Joint Programme, and the European Innovation Partnership for Active and Healthy Ageing (AHA). Beyond these major EU initiatives, several countries have implemented new policies focusing on the ageing population and promoting the wellbeing of older people. Although most countries have not developed a national 'Smart Ageing' strategy, specific initiatives and policies are closely related to Smart Ageing and any window of opportunity for Ireland will be time-limited.

For example, the Dutch Ministry of Health, Care and Welfare has provided subsidies for the mainstreaming of independent living technology in the serviced housing sector, through the 'Dutch Domotics Programme' to enable people to live independently for longer. The programme stimulated a large amount of experimental activities concerning the introduction of smart home solutions and ICT-enabled service delivery in more than 5,000 homes of older people across the Netherlands. Another example is Innovate UK's Assisted Living Innovation Platform (ALIP), which seeks to enable the ageing population (and those with long-term health conditions) to live with greater independence. ALIP is wrestling with the main market failures identified around the development of these new, technologically enabled care models, which need to work across the triptych of private, social and healthcare systems and require a different mixture of investments. Innovate UK is running multiple demonstrators, information campaigns and market research in an attempt to showcase solutions to institutional barriers, systems and services interoperability, statutory and regulatory challenges and the level of awareness and enthusiasm for such solutions among older people. Further afield, Japan, the country with the highest age dependency ratio, has established a dedicated Smart Ageing International Research Centre (SAIRC) with a new programme launched in 2014 to restore Japan's global competitiveness with strategic reforms linked to "creative innovation."

Opportunities linked to Smart Ageing in Ireland

Ireland exhibits a 'small country effect,' with quite strong connections across different actors in the public and private sectors, including third level institutes, research institutes and industry. In particular, the Health sector has presented a large number of important initiatives via its major research institutes and strong enterprise base which, combined with a growing sector (and fast growing sub-sectors) internationally, represents a significant opportunity for Ireland in Smart Ageing. Similarly, the Food & Nutrition sector has a strong enterprise base with collaborative opportunities with research centres, innovative SMEs and large corporations, especially in the dairy sector that is well-connected across the entire food chain from improving resource efficiency, nutritional value to reducing food waste. Areas, including Housing & Transport, especially linked to mobility and independent living, and Lifestyle products and services, including Tourism, may also successfully target older consumers and develop products and services based on current activities and further policy support.

Other areas, Education and training, Financial services, and Connectivity and social participation, may not currently represent immediate economic opportunities for Ireland, however, these are important sectors in terms of enabling and strengthening Smart Ageing in other industrial sectors.

In the following sections we discuss the specific opportunities that were uncovered by the study and validated by experts and other stakeholders active in Ireland.

1. Functional food

Functional food is a food or food component that provides an additional function or benefit beyond the basic nutritional value of the food itself. It is an ever more popular area of food science, with functional foods custom-designed to meet the needs and the desires of specific groups of the population or even individual consumers to deliver ‘personalised nutrition.’ Older consumers are increasingly conscious of opportunities to improve their health, with products that aim to maintain and/or improve mobility and joint health the most popular, with an increasing trend in demand for functional food and drink in Asia. There are many other areas where functional foods can be exploited including heart health, cognitive health, digestive health, sarcopenia (muscle loss with ageing), “mood food” or nutricosmetics. Functional food represents added value and commands premium pricing with higher margins, in comparison with a majority of conventional ingredients or products.

Healthy food has a strong foundation in Ireland with a global reputation for quality natural products from dairy through to meat and seafood, which also offers increasingly popular links with agritourism. Ireland has an internationally competitive food industry, with connected actors across the food chain, and with exports of around €10 billion in 2014 (more than 12% of all exports). There is a strong research base (with access to target consumers, for example, in technology centres) with the additional scientific and technical capacity to support Irish businesses in their efforts to develop more and better functional foods, including for older consumers, which is a developing market segment. Ireland’s agri-food and drink output however is largely focused on primary agriculture and ingredient supply to multinationals. Prepared consumer foods is a smaller business sector as compared with dairy or beef, however, it is one where Ireland has seen growth in exports in recent years and especially around value-added products for consumers. Ireland’s research outputs could usefully be leveraged further so they translate into innovative products in a more timely fashion; and having a corresponding supporting infrastructure (including IP management) for functional food should then pay additional dividends from investments in terms of future exports and employment. Ireland’s innovative SMEs tend to be more resource constrained, in comparison with their multinational counterparts, and improved targeting of government support for these indigenous firms ought to accelerate development of functional foods designed specifically to deliver the kinds of health benefits commonly found in older consumers.

Ireland could be a pioneer in integrating all aspects of functional food: from nutrition to sensorial aspects and packaging to make it attractive to older people. It could also combine the high-quality know-how about nutrition with ‘smart appliances’ to enter the mNutrition space. A focused marketing campaign around functional food, highlighting lifestyle and other activities of older people could help grow the domestic market, and provide a platform for would-be exporters. Ireland has a unique resource with nutritional data available from TILDA to be explored further. An analysis of lifestyle and health data could lead to a better market segmentation and help develop products for the conditions that tend to affect older people disproportionately (e.g., dehydration, osteoporosis, and Alzheimer’s disease). These prepared foods will tend to have different routes to market as compared with dairy products or ingredients, and Ireland may need to strengthen its international visibility and links with retailers in order to build its exports, possibly via the various EU technology platforms targeting healthy ageing.

Functional foods have a shorter product lifecycle³ than more conventional food products, which demand faster rates of innovation and favour strong, pre-existing

³ Functional food in the European Union. <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1719>

distribution networks to guarantee market access and rapid growth. Manufacturers may also have to confront new and more exacting regulations, where they claim a specific health gain or suggest that the product may be used in the treatment or management of a specific condition.

The government could encourage and support Ireland's emerging functional food industry to focus on older consumers. In a highly competitive international environment there is a need to connect key players and help position their offering in the field. It could also work with industry interest groups to communicate the new Irish vision for functional food to the outside world and achieve a similar success as it did with baby food/formula milk. We recommend the following specific actions:

- Create a group and national champion to define a *vision and strategy* for functional food for older people, with a corresponding action plan.
- That strategy and action plan may include some or all of the following
 - Support a *coordination mechanism* that brings together the food industry with research, and other partners along the value chain;
 - Establish *flagship Functional Food projects* around specific conditions that tend to affect older people, i.e. osteoporosis or malnutrition;
 - Work with key stakeholders (DAFM, Teagasc, Food for Health Ireland, The Health Innovation Hub, Enterprise Ireland, etc) to *encourage new product development targeting the needs of older people* specifically;
 - Develop marketing materials for public institutions and businesses to increase *awareness* about the particular link between diet and health in older people and the potential positive role of functional foods to help;
 - Develop marketing materials to build brand awareness and promote Irish functional foods for older consumers (Bord Bia);
 - Include nutrition and older people as a *key module in education* of healthcare professionals in Ireland;
 - Support Irish SMEs ambitions to develop and export functional foods for older people through the marketing materials referred to already but also by commissioning *international market studies* to provide the kind of insight about market trends, routes to market, pricing, competitors and regulations that smaller businesses struggle to determine for themselves;
 - Encourage and support Irish functional food specialists to consider bidding into various EU platforms (e.g. European Technology Platform on Food For Life, NU-AGE, etc) as part of their product development strategy.

2. Connected health

Connected health is a model for healthcare delivery that uses technology to provide healthcare remotely. Connected health is especially relevant to older people, who are more likely to be affected by chronic health conditions than the population as a whole and need to access health services more frequently. People are increasingly using ambient and wearable sensors to generate continuous data through connected devices, whether that is blood pressure or distance walked. These personal devices are being used more for medical applications too. Appropriate data analytics methods and wireless technology to enable remote patient monitoring, point of care diagnostics, and self-care will transform healthcare. Connected health is a large and growing global market encompassing mobile health (mHealth) through healthcare IT to telecare and telehealth. Europe's tech and software companies are prominent players and Europe is the biggest market for mHealth with an estimated \$7bn market size by 2017.

There is an opportunity for Ireland to tap into this growing market, developing sensors and communications technologies that facilitate the remote delivery of care and

software applications specifically for older consumers, designed to improve the collection of health data and information for practitioners and even the direct provision of care, remotely.

Ireland has significant research expertise in its various research centres as well as strong industrial capacity (both indigenous and multinational) and high-quality manufacturing capability of medical devices. There are a few good examples of industry-friendly test-bed activities with connected actors including the older people as users. The government's eHealth Strategy, under eHealth Ireland, is helping to coordinate clinical and industrial activities.

Connected health is a fast moving space with individual apps or products quickly becoming obsolete as new variants are developed or new approaches to old problems. It is also very challenging for smaller players to develop and market products that can sell anywhere at a global scale due to the lack of interoperability and standards in product development. Product development is also made more expensive by the need to cope with changing expectations around data access and data security, as policy makers and regulators continuously refine the rules to protect against emerging risks. Ireland's health system has a limited capacity at present to test new connected health solutions, which is something of a brake on national innovation on the one hand, and reduces opportunities for would-be exporters to test new concepts and products in their domestic market on the other hand. However progress is being made in terms of developing an infrastructure around the Health Innovation Hub. The fact that public health and care budgets are separate in Ireland reduces the incentive to adopt connected health technologies. The drive towards more integrated health and care would provide the necessary flexibility to enhance adoption rates in connected health.

Demand for managed and personalised care is flourishing worldwide offering a large and growing export market for Ireland's businesses to address. Ireland could integrate its already existing technologies and develop interoperable, adaptable and scalable systems to export innovative products to this global market. For example, integration of telecommunication and healthcare will spill over to other areas, e.g., early detection of diseases or medication compliance. TILDA research data could once again help better understand factors relevant to the socio-economic wellbeing of older people and develop smart products and services.

Ireland's SMEs have good technologies but may struggle to gain access to strengthening international markets for connected health solutions, which tend to be dominated by institutional customers and large businesses with established supply chains. Government-backed demonstration programmes allow smaller companies to refine their prototypes in real-world settings and showcase their novel products and applications to prospective customers and supply chain partners. By facilitating early market traction and gathering real-world data on the costs and benefits of their innovative technologies compared, Ireland's SMEs will be in a better position to address global markets and supply chains. Exploiting connected medical technologies and chronic disease management systems will ultimately mean cost savings in public health expenditure and hence a significant public sector presence in the potential consumer base is expected in many countries. The government could help remove barriers in a fragmented technology landscape, facilitate the convergence of technologies, and create better incentives for developing and adopting connected health technologies in hospitals and care homes. We recommend the following specific actions:

- *Facilitate multidisciplinary experimentation* with novel systems by connecting research, industry, clinicians and users that could lead to new products / services, including linking up with international centres of excellence.

- *Support innovation in smaller businesses through public procurement* following the US Small Business Innovation Research (SBIR) programmes,⁴ focusing on smart and connected health. Consider intermediate markets, those between public healthcare and private individuals, such as care homes and sheltered housing.
- *Scale up demonstrator projects to the national level* to test system-level innovations and to provide a platform for a larger number of products and services. Ensure the demonstrators give sufficient weight to researching the costs and benefits of the solutions on trial, with a view to supporting prospective exporters in developing their sales pitch and possibly even bringing in international service providers (clients) to see the new systems in action. Expanding the Health Innovation Hub could be a practical way to increase health innovation in general, but targeting older people in particular.
- Build on existing primary healthcare IT infrastructure and support the development of a national electronic *scorecard and telehealth data system for chronic conditions*.
- Create awareness programmes and *training for frontline staff* and end-users about the benefits of connected health solutions.
- Explore the feasibility of a *health and welfare technologies programme*, a self-financing scheme with industrial stakeholders involving large hospitals. The introduction of such an innovation programme may be linked to the review of objectives of existing infrastructure.
- Raise awareness of and support applications for EU funding in areas related to connected health and assisted living.

3. Assisted living

‘Assisted living’ encapsulates the idea that we want to live our later years socially engaged and as independently as possible and away from hospitals or care homes. Assisted living opportunities are closely linked to ‘Connected health’, discussed above, and ‘Adaptable housing’, discussed below. This opportunity area includes the use of sensors, communication technology, as well as mobility aids, actuators, gaming concept, and human-machine interface to support people’s needs and wishes. The assisted living market is very large globally; in the USA \$41bn was spent on assistive technology in 2011, while the smaller, European market is predicted to grow with 22% to \$525m in 2015. The low consumer awareness and product adoption rates in Europe are expected to change in the near future.

The opportunity for Ireland is to develop and commercialise physical and electronic devices connected to communication technologies that enable older people to monitor and manage their health, thereby living longer, healthier and happier in their homes.

Ireland has a real research expertise in its various research centres, as well as a strong industrial capacity, especially in high quality manufacturing. There are a few good but somewhat limited examples of industry-friendly test-bed activities exist with older people as active participants. Ireland is also part of the European network of living labs.⁵

Ireland could focus on selected areas of assisted living where it has genuine strength. For example, researchers have developed solutions that maintain mobility as key to independence that prevents physical and cognitive decline. Adoption of new technologies by older people will require the development of novel human-machine interfaces and the introduction of gaming concepts (and social connectivity) into

⁴ For more detail, see <https://sbir.nih.gov/>

⁵ See, for example, <http://www.openlivinglabs.eu>

everyday tasks. Integration of assistive technology with the built environment will ultimately result in adaptable ‘smart homes’ for everyone to benefit from.

There are current challenges and barriers linked to data security and regulatory issues preventing convergence of technologies and industries (i.e., gaming, entertainment, and health). We recommend the following specific actions:

- Coordinate activities across research, industry, clinicians and users to support better design methodologies, to understand data collected about behaviour and needs, and to ensure maximum economic and social benefits.
- *Scale up living-lab* projects to the national level in order to demonstrate utility for the end user and profitability for private enterprises on a large-scale.
- Create an *innovation programme in the assisted living* space and attract international firms to Ireland to import specialised know-how and technology.
- *Challenge entertainment industry to develop games* for older people, linking health benefits and fun.
- *Promote the concept of assisted living*, including ‘social inclusion technologies’.
- Establish training and *awareness programmes* for designers, entrepreneurs, and end-users.
- *Expand the coverage* of national telecommunication and broadband infrastructure.

4. Adaptable housing

There is a substantial need for the adaptation of the existing housing stock to better meet the needs of an older population. This international ‘adaptation’ market requires architecture and design services, and such Irish know-how and services may be exported. Products in this space include Modular building systems, Energy efficient building products, Intelligent building management systems, Multifunction devices, and Access systems. Although Ireland has a large repair and maintenance industry in the housing sector, it represents predominantly conventional design and construction services. The local authority sector or EU regions are more likely to be able to establish a sizeable and growing market by bringing together adaptable housing and assisted living application areas. There is a large ‘smart homes’ market in North-America and while Europe’s smart home market is much smaller and highly concentrated (around Germany, France, Netherlands), it is growing.

Adaptable and smart homes will be the future in the developed world with advantages from saving energy to creating homes suitable for a lifetime. It is noted that older people may not be the direct target as consumers for smart homes, but they will be beneficiaries of this trend.

The opportunity for Ireland is to develop the know-how and commercialise the knowledge of smart housing adaptation to support assisted living for older people in their homes. This represents an export opportunity for architectural and design consultancies and specialised manufacturers.

Ireland has a design / built environment research base with an interest in adaptation and universal design. Ireland also has tech start-ups and software companies that could develop smart building products or sell into global supply chains for ‘smart housing.’

Ireland could try to link up adaptable housing with assisted living concepts to develop unique solutions for older people living in homes not suitable to their needs. Design expertise developed in the domestic market may then be exported to the growing European market if privacy concerns and significant installation costs are addressed.

The government may consider as policy objective to provide incentives and support Ireland’s design and building products sector in expanding its international sales within the smart homes and retrofit markets in general, and with a specific target

concerning the older people, in particular. Ireland launched new construction and social housing strategies in 2014, which target building (new and adapted) for older people. We recommend the following specific actions:

- Bring *housing and assisted living* together to create added value for both application areas.
- Identify links between ‘solutions for adaptable housing’ and *energy efficiency* for older people. Promote the case for ‘adaptation’ within related policies and initiatives.
- Review the possibility of creating an *international competition for Adaptive design*, for housing and for retrofit, as part of Irish Design 2015. This will bring in solutions from around the world as well as building relationships between Ireland’s design and construction industries and global leaders.
- Support efforts around *Universal Design*, which are seeking to develop solutions for lifetime homes / lifetime neighbourhoods.
- Consider supporting the Royal Institute of Architects of Ireland (RIAI) and the Construction Industries Federation in *developing working groups* to conduct market research and international promotional campaigns.
- Consider launching a scheme like the SBIR to give greater focus/innovation to that procurement activity.
- Expand the volume of underpinning research, in both the design space and technology space, perhaps by creating a virtual centre of excellence for ‘adaptation in housing for the older person’.
- Replicate demonstration projects, which bring together the HSE and Local Authorities with designers, academic groups and technology firms to develop and showcase smart buildings and smart building technologies for retrofit.
- Review planning rules with a view to increasing flexibility in terms of use and reuse of dwellings and mixed use in neighbourhoods. Look at ways to expand the Housing Adaptation Grants scheme, so it is available to a larger number of people.

5. Tourism

A thriving tourism industry for older people not only offers an economic opportunity, but beyond that it also provides social benefits in Ireland and international reputation. Tourism is an important service traded globally, and it is also an integral component of the enterprise sector in Ireland. Tourism in Ireland has returned to growth with 7.3m visitors generating €3.7bn in 2014. Most visitors, traditionally from the cohort of people aged 50+, come from the UK and USA and spend mainly on accommodation and food. Nevertheless tourism from Continental Europe is increasingly important and growth from long-haul markets (both developed and developing) is noticeable albeit from a low base. It is recognised that consumer demand has been changing and emphasis is now on visitor ‘experience’ and niche markets. Ireland can continue to tap into the growing trend of older people travelling abroad, and build on its strong market position in this space. The success of tourism is closely linked to the quality and inclusiveness of systems of transport, ICT, food, and housing.

The opportunity for Ireland is to develop globally competitive (smart) tourism market considering older travellers’ needs thereby contributing to economic growth, utilising and enhancing existing capacities in Ireland.

Ireland has several attractive points. First, it is readily accessible from Europe and the US via direct air links and it caters well for English-speaking visitors and the Irish Diaspora. Second, the government has made strides with the Irish Short Stay Visa Waiver Programme and the British Irish Visa Scheme to facilitate entry for overseas travellers. Finally, Ireland is a safe and clean destination, often important priorities for the older people looking for nature-inspired leisure programmes.

Ireland could create a unique experience for older people, blending technological innovation, cultural heritage, and natural beauty. An enhanced hospitality dimension of visitors' experience could be achieved with a blend of social interactions with the local communities and cultural heritage. We recommend the following specific actions:

- Enhance tourism services in Ireland by continuing to *improve infrastructure*, especially in rural areas, linked to the needs of the older visitors: accessible transport, age-friendly hotels and B&Bs, and communication technology.
- Support *overseas marketing of tourism* in Ireland and create a strong image / brand around 'experience', 'cultural heritage', 'environment' and 'wellness'.
- Continue to *promote* 'inclusive' and 'culturally curious' tourism in established markets (UK, US, Germany) as well as for tourists with high disposable income from emerging markets in Asia and South America.
- Create a new or extend an existing *annual event* (e.g., Bealtaine Festival), with the involvement of the entertainment industry, so that older people return to Ireland as tourists.
- Offer *advice and training* to staff on how to build technology into services to older people.
- *Review regulation* so that it facilitates the introduction of innovative approaches such as those attractive to older international visitors.
- *Provide specific incentives* from government for innovative entrepreneurs to invest in this space both in the short-term, e.g., to build age-friendly hotels, and longer term, e.g. to build a brand in untapped markets.
- Build networks with other EU regions so that Ireland is part of EU-wide offerings, e.g., via the Irish Regions Office and local authorities town twinning schemes.

Conclusions

Smart Ageing is a broad concept that combines innovation and technology to produce products and services to improve the quality of life for people aged 50 and over. It is based on the assumption that older people form a potential consumer or interest group that can be treated similarly. It is likely however that further development and differentiation will be required to meet the needs of the sub-groups within this cohort.

The private sector in Ireland has the innovative and technical capacity to excel in the field and effectively compete in the international arena. Ireland already has a strong presence in many of the application areas considered in this study and focusing on its relative strengths will help enterprises turn existing knowledge into economic returns. These emerging successful businesses will be underpinned by crucial enabling sectors including the financial services and education.

Although the scale of global markets are enormous, very few countries have set up the kind of political leadership Ireland is currently aiming at and which are necessary to help indigenous businesses with niche products and services to successfully enter fiercely contested international markets and maximise the commercial opportunities. Therefore, focused political commitment may be the single most potent action Ireland can take to exploit international opportunities in a coordinated, multi-disciplinary approach.

A central government department is best placed to 'own' Ireland's national 'Smart Ageing' strategy, as the issues are clearly cross-departmental. In terms of structures, it may be appropriate for the Inter-Departmental Steering Group to be transformed into a standing committee that would bridge departmental interests and deliver the necessary political commitment. An *Inter-Departmental Committee on Smart Ageing*

(IDCSA) would deliver leadership and oversight, while leaving the detailed planning and implementation to the most relevant department or agencies.

In addition, a *Smart Ageing Leadership Council for Ireland* (SALCI) could be set up to engage the private and third sectors, alongside central and local government, to ensure political leadership is mirrored in industry and third sector strategies. SALCI would develop the detailed Smart Ageing strategy and drive forward that agenda in multiple policy and industry settings, through advocacy, communication, and coordination. SALCI would need the authority/capacity to convene and support working groups, with the expertise and resources to drive forward the Smart Ageing agenda in a specific area.

There are a number of cross-cutting (multi-disciplinary and multi-stakeholder) issues that are contingent on the domestic research organisations, health sector, local authorities, users and enterprise working together in a safe and collaborative environment to develop products and services for older people worldwide. Based on an improved national physical and communications infrastructure, Ireland will be able to establish a Smart Ageing ecosystem that can validate the feasibility and socio-economic benefits of innovations in the Smart Ageing space.

Consequently, any implementation strategy needs to recognise there are many pre-existing initiatives/investments in Ireland, to which they should add value by galvanising actors around a bigger vision or national agenda. A national Smart Ageing competition may be an economical model, offering a small number of sizeable and high-profile prizes for major innovations related to different aspects of Smart Ageing. This could be organised as a 'National Design Challenge' for Smart Ageing.

Finally, Ireland should consider creating a *National Centre for Smart Ageing*, to bring together Ireland's research capabilities across thematic application areas, based on the opportunity areas outlined in this study. A multidisciplinary approach dedicated to Smart Ageing is currently missing in Ireland that would catalyse, incentivise and operationalize collaborative activities, and help to translate, promote and disseminate the knowledge generated through the various programmes. The new centre would provide a much needed focal point for businesses interested in Smart Ageing in Ireland. The 'Silver Valley' knowledge hub in Paris could be a model to emulate with a sustainable, public-private partnership business model. Establishing a National Centre for Smart Ageing even as a 'virtual organisation' will demonstrate Ireland's commitment and help to capture the attention of the wider public as well as the government and business communities. This may in practice be a 'Federation of Centres' working together in the background. Without a flagship organisation, however, the Smart Ageing project of the Irish government and the older population may well risk to be forgotten and the corresponding economic opportunities not fully exploited.

1. Introduction

1.1 Aims of the study

Smart Ageing has been identified as one of eleven sectoral opportunities in the Action Plan for Jobs 2014 as was also identified as a key priority through the Global Irish Economic Forum 2013. The Action Plan for Jobs 2014 sets out actions that will contribute to a better understanding of opportunities for Smart Ageing in Ireland. The Action Plan also suggests that Smart Ageing presents an opportunity for the creation of new businesses that will deliver increased value, grow exports and create further employment. At the same time, Smart Ageing activities will have a positive impact on the health-related expenditure on public finances as well as improve citizens' quality of life.⁶

The topic of this study, activities and opportunities of Smart Ageing in Ireland, is highly relevant today for a number of stakeholder groups in order to better prepare for the shifting demographics in Ireland and beyond. This can be achieved by studying the current situation in Ireland and learn from other countries that have introduced new policies and programmes, and exploited emerging opportunities. The primary objective of the study is to identify economic opportunities for Irish businesses where there is significant opportunity for the government to add value and intervention may be required:

“Carry out a mapping exercise of the activity in Ireland, both in the economic and social spheres, to provide a baseline of the activity and to identify Ireland’s strengths in Smart Ageing”

(Action 383)

“Assess the opportunities that may arise from this mapping exercise and agree next steps as appropriate”

(Action 384)

The study was conducted by Technopolis Group for a Steering group, chaired by the Department of the Taoiseach and supported by the Strategic Policy Unit in the Department of Jobs, Enterprise and Innovation (DJEI). The aims of the study commissioned by DJEI are therefore to help deliver Actions 383 and 384, specifically:

1. Map Ireland’s ecosystem for Smart Ageing from a broad economic and social perspective based on information provided by DJEI;
2. Assess the relative strengths for each element of that ecosystem for Smart Ageing;
3. Assess the potential opportunities for Ireland in the area of Smart Ageing from both a domestic and international market perspective;
4. Identify the policy enablers and policy objectives that are necessary to exploit the identified potential opportunities and propose policy actions and next steps.

It is noted that while the present study focuses primarily on identifying economic opportunities for Irish businesses, it effectively complements the National Positive Ageing Strategy, published by the Department of Health in 2013, which is focused on

⁶ Smart Ageing for the purposes of this study is defined as ‘...using technology and innovation in both the public and private sectors to produce products, services, solutions and systems to improve the quality of life for people aged 50 and over’.

developing policies and actions for the promotion of health, wellbeing and quality of life of people as they age in Ireland.

This is the final report of the study that was conducted between August and December 2014.

1.2 Methodological approach

We have approached the tasks above via four separate work packages that fed into one another, enabling subsequent data analysis and the synthesis of findings. The individual work packages are as follows:

- Mapping of the Irish Smart Ageing landscape;
- Global context analysis;
- Assessment of potential opportunity areas;
- Workshops and validation.

1.2.1 Mapping of the Irish Smart Ageing Landscape

We analysed and mapped the Irish Smart Ageing landscape based on the data that were collected by DJEI on Irish policy, programmes, and projects. The data included information from Higher Education Institutes (HEIs), NGOs and various government departments and agencies, as well as other background material, including the Research Prioritisation Exercise Reports and the Silver Technology Business Study. It is remarked that no detailed data were available from private enterprises that are active in relevant commercial activities. The mapping and analysis of the structured data were conducted in three steps:

- Identification and characterization of stakeholders and actions;
- Identification of relationships within sectors;
- Network analysis of the Irish Smart Ageing landscape.

The first task of mapping involved the organisation of all projects, programmes, strategies, policies and other initiatives and the mapping of these along a standard set of dimensions for further analysis. A master spreadsheet was prepared where each entry links a specific initiative to a primary target sector (and where possible to a secondary sector) with additional information (if available) related to the executive organisation, project value, funding source, beneficiaries, and other key words to help identify links between sectors and actors in the ensuing analysis.

Our Smart Ageing analysis comprised of a broad set of industries / thematic areas to reflect the opportunities that may be pursued via a range of channels including (but not limited to) a longer and more flexible working life, volunteering and community contributions, redesigned environments, new markets and new consumers, inter-generational transfers, caring and family cohesion, providing more tailored health care support; increasing mobility of older people; and providing a platform for social inclusiveness. According to the Terms of References of the study, the relevant industries / application areas to be considered are

- Healthcare and self-care, including biomedical solutions;
- Educational and training services for older people;
- Financial services for older people;
- Food and nutrition for older people;
- Connectivity and social participation;
- Lifestyle products and services including tourism;

- Employment;
- Housing and transport.

Following the characterisation of individual initiatives for each industry sector / thematic application area, we identified any logical links between policy, programmes, and actions by various actors. We focussed on describing the relationship between the different inputs and outputs within the individual sectors. This task relied on the master spreadsheet prepared in the first step and was queried according to descriptors and key words. This task also uncovered a few gaps in the data, which needed to be substantiated to establish whether these were related to the lack of information in our documentation or the lack of policy, programmes and actions currently implemented in Ireland.

In the final step of the mapping exercise we identified connections and synergies between stakeholders, actors across the industry sectors / thematic application areas. The network analysis made use of the master spreadsheet where entries of policies, programmes, and actions were organised and aggregated according to the various industry sectors. We illustrated the resulting relationships by visualising the following dimensions:

- Centrality of actions;
- Clusters within and across industries active in Smart Ageing;
- Intensity of links (project value and number) between stakeholders and industries.

1.2.2 Global context analysis

In order to assess the current and future position of Ireland in the area of Smart Ageing and where the potential opportunities lie, we reviewed the position of a sample of other countries. We first quantitatively analysed indicators and social models relevant to the ageing population globally, based on data from the World Bank Indicators, OECD statistics and Eurostat. Next we identified countries with varying dependency ratios, populations, economy, and levels of public investment in healthcare as a ratio of GDP. Specifically, we focussed on policies and programmes in Japan, the EU, and member states Finland, Netherlands, and the UK. The analysis aimed at describing approaches and strategies to Smart Ageing adopted by various countries, providing insight and potential examples for Ireland to address the challenges of an ageing population.

1.2.3 Assessment of potential opportunity areas

We identified potential opportunity areas for activities Ireland could engage in based on information obtained in the mapping exercise and global context analysis. We also conducted targeted interviews with experts of the relevant application areas to obtain additional information (see list of interviewees in Appendix E). We defined the following indicators for selecting the potential commercial opportunities through a SWOT-type of analysis where the government may consider need for action:

- Preconditions exist in Ireland
 - Enterprise base
 - Institutional research capacity, technology and ‘smart’ knowhow
 - Interconnections / collaborations within a cluster
 - Current government policy with a focus on the older people
- Growth opportunities
 - Evidence of (latent) demand
 - Important export markets, size and growth

- Limited international competition
- Leap-frogging opportunities
- Rationale for government intervention
 - Risk and uncertainty blocking interest, market failure
 - Institutional and coordination failures
 - Facilitate private sector engagement and growth
 - Opportunities to reduce future public sector expenditure
 - Social returns and social equity

1.2.4 Workshops and validation

In the final phase of the study, we presented the findings of the study to stakeholders and experts who are involved in Smart Ageing activities but also to those who can potentially be drawn into such activities at two workshops held in November 2014. The main objectives of the workshops were to validate the opportunity areas identified based on the different data sources (Figure 1), expand the potential opportunity areas, and propose corresponding actions to realize such opportunities via a broad stakeholder consultation. The workshops brought together a range of different stakeholders to emphasise interdisciplinary and a systems approach that is required for Smart Ageing. Workshop 1 discussed Connected health; Assisted living; and Food; while Workshop 2 discussed Housing, Transport, & tourism; Employment & education; and Finance. The key points of the two Workshops are recorded in a report (see Appendix A).

Figure 1 Summary of information from individual data sources

	Mapping	Global context analysis	Targeted interviews
Public and private sector R&D capacity	Presence of projects and programmes in Smart Ageing Degree of collaboration within a cluster and across clusters	Comparison of indigenous market opportunity and international market opportunity / growing sectors Strong/weak international competition Size of relevant market sectors	Technology and other 'smart' know-how in specific application areas
Opportunity for development	Opportunity to coordinate actions with other sectors Opportunity to promote initiatives towards the 50+ population	Capacity to learn and/or rapidly catch-up	Knowledge sharing and transferable skills within and across application areas
Government support	Current government policies and actions	Strong/weak international public sector support Social responsibility to invest in different application areas Opportunity to reduce costs in the short or long-term across application areas	Need to coordinate actions and actors Need to stimulate research in strategic directions

1.3 Structure of the Report

After the brief introduction to the study and its methodology in the current Chapter 1, the report discusses the indicators, social models, and programmes / policies relevant to Smart Ageing in various countries (Chapter 2). The results of the mapping exercise are presented in Chapter 3, highlighting the various activities in each thematic application areas. The opportunity areas identified in this study are presented in Chapter 4, before drawing conclusions and recommendations in Chapter 5.

Background material relevant to the study are presented separately in Appendices: Appendix A provides a summary of the two workshops that discussed the opportunity areas relevant to Smart Ageing in Ireland; Appendix B details the submissions of summary information collected from the various government departments and relevant organisations following a request by DJEI; Appendix C provides a full account of a network analysis of the relevant actors in the thematic application areas; Appendix D provides a case study on Silver Valley, a knowledge hub for Smart Ageing in France; and finally Appendix E lists the key informants who were interviewed as part of the study.

2. Global context analysis

2.1 Introduction

Increasing longevity is an indicator of social and economic progress, however, with it also comes some profound economic, social and political challenges with increased strain on public finances and in particular on health and pension systems. The number of older people (60+) is expected to more than double from 841m in 2013 to 2bn+ by 2050E (UN).

Alongside some of the implications highlighted here, an ageing population also brings with it an enormous opportunity for economic, social and cultural development. Several studies point to a dramatic shift in the long-held views about the career and life of the 50+ population. An increasing number of older people are better educated and in better health than previous generations and with this in mind, later life should be a time for active citizenship, continued contribution and participation in local community affairs, for engaging in activities that enhance physical and mental health and a time for involvement with family, friends, neighbours and the wider community. The “older people” want to live independently the longer healthy life years. They also represent an economically active and important consumer group with distinct characteristics.⁷ According to market research, spending power of 60+ consumers globally will reach US\$15tn by 2020E (Euromonitor); the spending power of American citizens 50+ (106m people) was estimated to be \$7.1 trillion in 2010, or 60% of all consumer spending, growing to \$13.5 trillion by 2032 (Oxford Economics, The Longevity economy 2013). Therefore, the 50+ population represent almost 80% of US aggregate net worth. According to Merrill Lynch (2013), 71% of American pre-retirees would like to do some work in their retirement years. Indeed, in the US, start-up rates are double for people in their 50’s and 60’s relative to people in their 20’s, a phenomenon termed “silver entrepreneurship”.

Innovation and technological developments provide new and exciting opportunities for Smart Ageing. It is important to note that Smart Ageing is not limited to dealing with the 5% of the population that are frail and vulnerable and need holistic healthcare solutions but also the needs of the other 95% of the population who are fit and healthy.

Living longer however also brings with it a number of challenges. It is estimated that the change in the dependency ratio may increase public healthcare expenditure by 1-2% of GDP in EU Member States by 2050. On average this would amount to about 25% increase in healthcare spending as a share of GDP⁸. Healthcare spending is already heavily skewed toward the older people with 75% of healthcare budget spent on the older people. This is due to the fact that 80% of the older people have one chronic condition, 50% have two (CDC). Typical age-related health conditions include dementia, arthritis, cardiovascular disease, diabetes, cancer, visual impairment and incontinence. In terms of pensions and financials, the US estimates its pension and annuity exposure at \$15 - \$25 trillion by 2050, ca. 50% of US GDP in 2010.

Nevertheless, Merrill Lynch identifies three main entry points for investors in its recent report (The Silver Dollar, 2014):

- Pharma & Healthcare;
- Financials (incl. insurance, asset & wealth management);

⁷ Turning silver into gold. Consumer Insights Panel. (2015)

http://consumerinsightspanel.org/assets/docs/Turning_Silver_Into_Gold_Research_CIP.pdf

⁸ The impact of ageing on public expenditure: projections for the EU25 Member States on pensions, health care, long-term care, education and unemployment transfers (2004-2050) Report prepared by the Economic Policy Committee and the European Commission (DG ECFIN) (2006).

- Consumer (incl. senior living, care, managed care, healthcare REITs, ageing in place, death care, pharmacies & drug stores, anti-ageing, travel & leisure, retail, VMS, and technology).

2.2 Social models and demographics

2.2.1 Social budget in relation to Smart Ageing

The objective of undertaking an analysis of socio-economic and demographic indicators is to provide insight into the incentives or obstacles that hinder the development of the Irish private sector in Smart Ageing industries. We compare the position of Ireland to that of other EU and OECD countries. The analysis relies on data from the World Bank Indicators, OECD statistics and Eurostat.

Figure 2 illustrates a social budget model, which typically is used to compute the total social budget and associated government expenditure and revenue. Because this social budget model is modular it is a useful tool to identify the relevant socio-economic and demographic indicators relevant to Smart Ageing and to grasp the dynamics of the relationship between different socio-economic and demographic factors. This dynamics is outlined below.

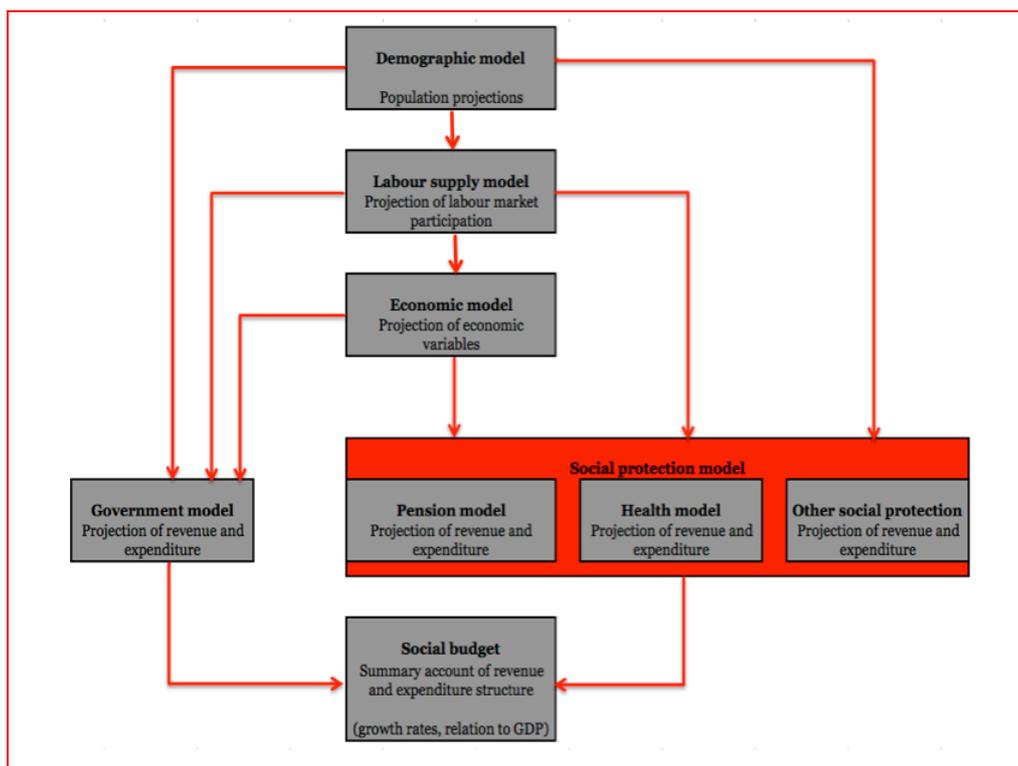
The first sub-model is the demographic model that is used to look at population projections. The demographic model feeds into the second sub-model, the labour supply model, which is used to make projections regarding the supply of labour. The labour supply model feeds into the third sub-model, the economic model, which is used for the projection of the economy. For simplicity, we limit our analysis of the economic model to an overview of GDP levels although, of course, the economic model includes many additional factors (productivity, productivity growth, labour demand, prices, etc.). These three sub-models (directly or indirectly) influence the social protection model.

The social protection model has two major components – the pension model and the health model – and also include other revenue and expenditures such as social assistance, unemployment and, particularly relevant in the context of Smart Ageing, old age provisions such as residential care. The aggregate expenditures for each of the social protection models are summarized in the social budget model.

The representation of the public revenue and expenditure (related to Smart Ageing) makes evident that the social protection model is sensitive to changes in demographics, labour supply and the economy and, in return, the social budget is sensitive to changes in the social protection model. Thus, if all other factors remain constant, an ageing population decreases the labour supply, decreases the level of economic activity, decreases the inflow of pension contributions, increases the pension payments and increases health related expenditure as well as some other social protection expenditures. One perspective is that when the costs related to an ageing population increase, there is more pressure to identify opportunities around Smart Ageing.

The following sub-sections provide an overview of indicators that can be used to make projections for each of the above-described (sub-)models. The social budget model represents the perspective of the government but, of course, there also is space to compare and contrast the role of the private sector.

Figure 2 Social Budget Model⁹



Source: Adapted from Scholz et al. (2000)¹⁰, based on ILO Social Budget Model

2.2.2 Demographic model

Demographic factors have a considerable impact on the cost of social provisions. The age dependency ratio indicates the ratio between the elderly population (above 65) and the population of working age. The age dependency ratio for 2014, OECD countries, is illustrated in Figure 3. The age dependency ratio for Ireland is close to 18%, which is at the lower bound of the selection of countries. Countries that score particularly high are Japan (39%), Germany (32%), Italy (32%), and Greece (29%).

Changes in the age structure of a country can either decrease or increase the cost of social provision. Across the OECD, the dependency ratio is projected to increase in the coming years, 2014-2020 and 2014-2050. Factors that impact this trend are (past) fertility rates, mortality rates, as well as migration.

Figure 4 presents the population pyramids for Ireland, Japan, the United Kingdom, Italy, Finland and the Netherlands. The difference in the shape of the population pyramid reflects differences in the relative percentage of population in each age cohort. As a result of fluctuations in fertility rates, longevity and migration, none of the population pyramids are actually pyramid shaped. Japan, the country that currently has the highest dependency ratio, has a population pyramid that has a particularly “thin” base. In Ireland, when the population that currently is 30-49 years of age will retire, the dependency rates will increase substantially. The full effect of this demographic change will be realized in about 30 years time. The full impact of the changing ageing population will hit Italy much sooner, i.e. in about 15 years time.

¹⁰ Scholz et al. (2000). Social Budgeting, ILO, Geneva

Age dependency ratio

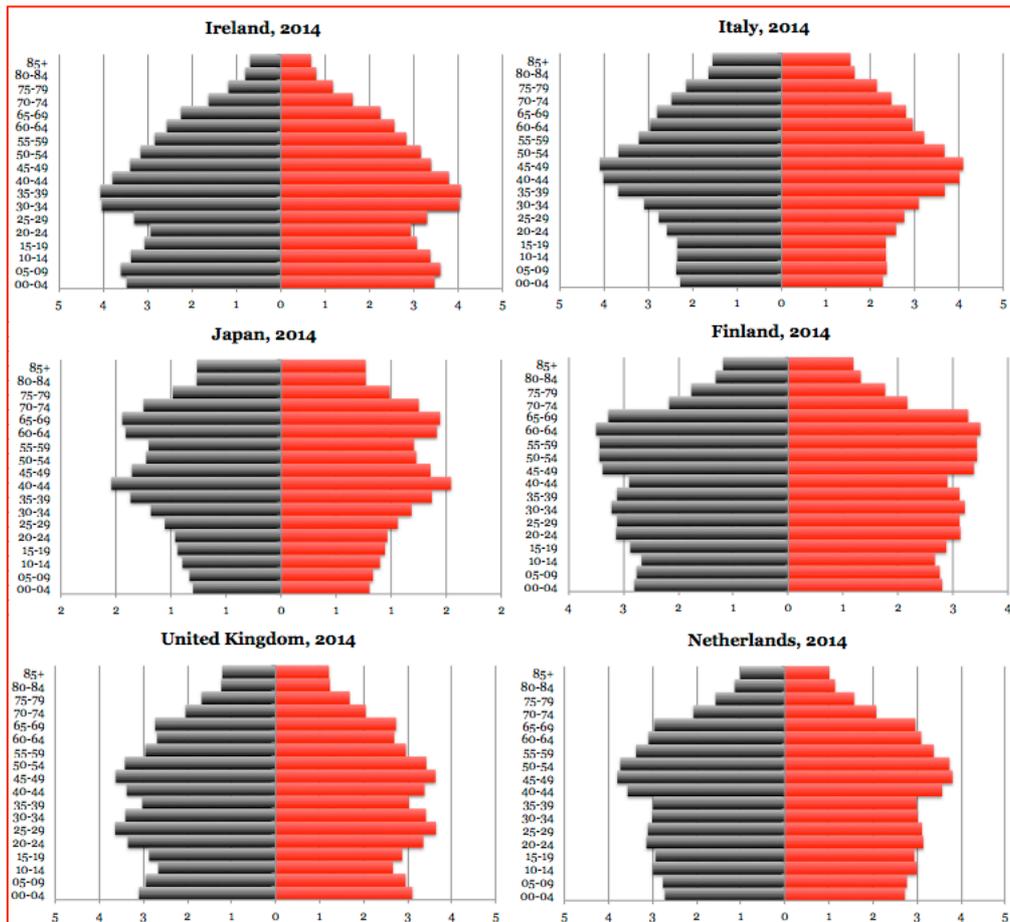
The ratio of older dependents - people older than 64 - as a proportion of the working-age population - those aged 15-64. The ratio reflects the proportion of dependents per 100 working-age population.

Figure 3 Age dependency ratio as a % of working age population (2012)



Source: World Bank Indicators

Figure 4 Population pyramids for selected countries



Source: OECD population projections

2.2.3 Labour supply model

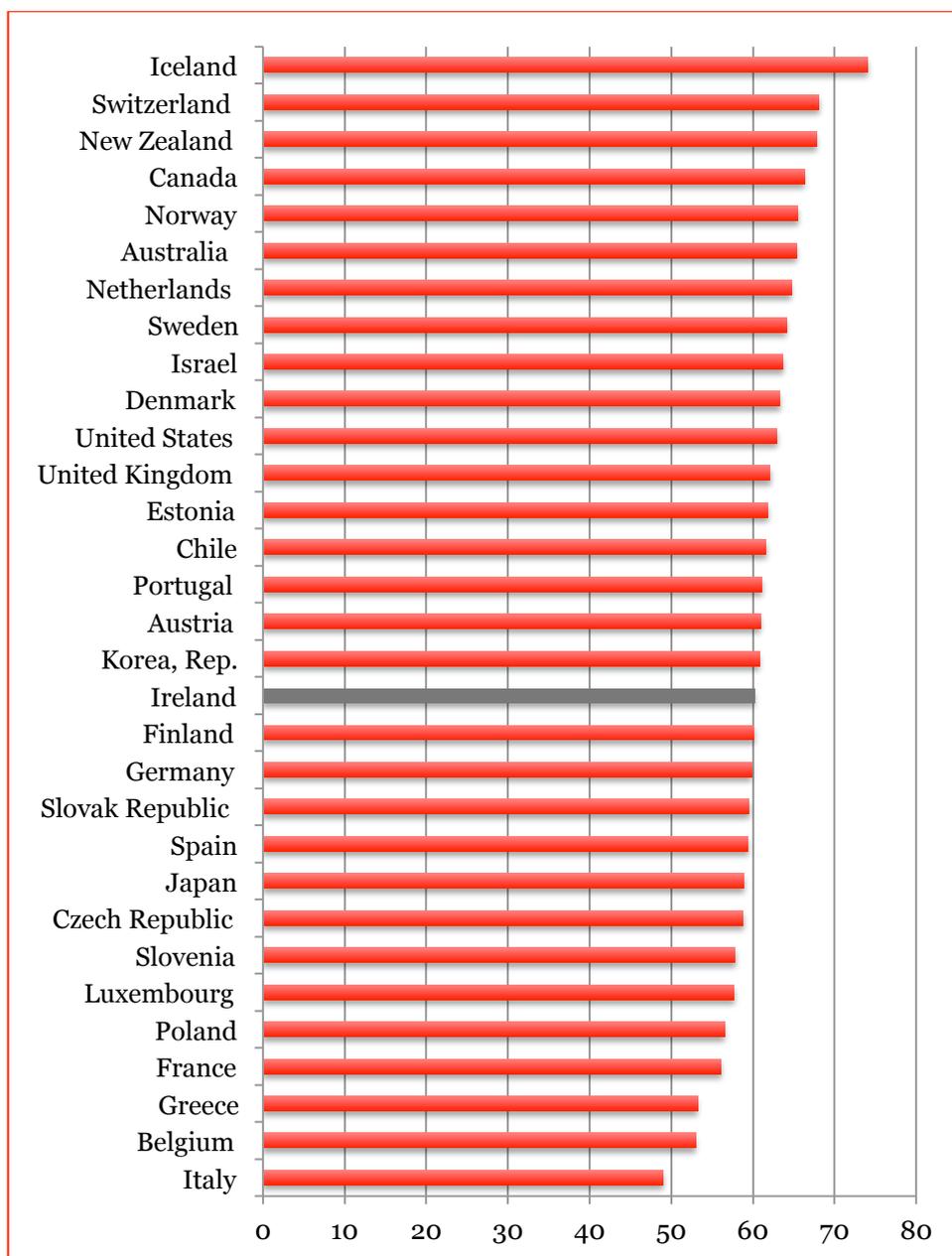
The population pyramids and age dependency ratios do not account for the fact that only part of the working age population is active on the labour market. The labour force participation ratio illustrates that in most developed economies the rate of employment ranges between 50%-65%, when looking at the population aged 15 and older.

In Ireland, 60% of the population is active on the labour market, and 40% is not (2012, ILO). We also have seen that in Ireland close to 18% of the population is above 65 years old (2012, ILO). Thus 22% of the population of working age is inactive for various reasons (e.g. in training, unemployed, disabled, or providing child care). Southern European countries typically have relatively low labour participation rates whilst Nordic countries have relatively higher labour force participation rates (Iceland up to 74%).

Labour force participation rate

The proportion of the population of age 15 and older that is economically active: all people who supply labour for the production of goods and services during a specified period.

Figure 5 Labour force participation rate as a % of total population aged 15+ (2012)



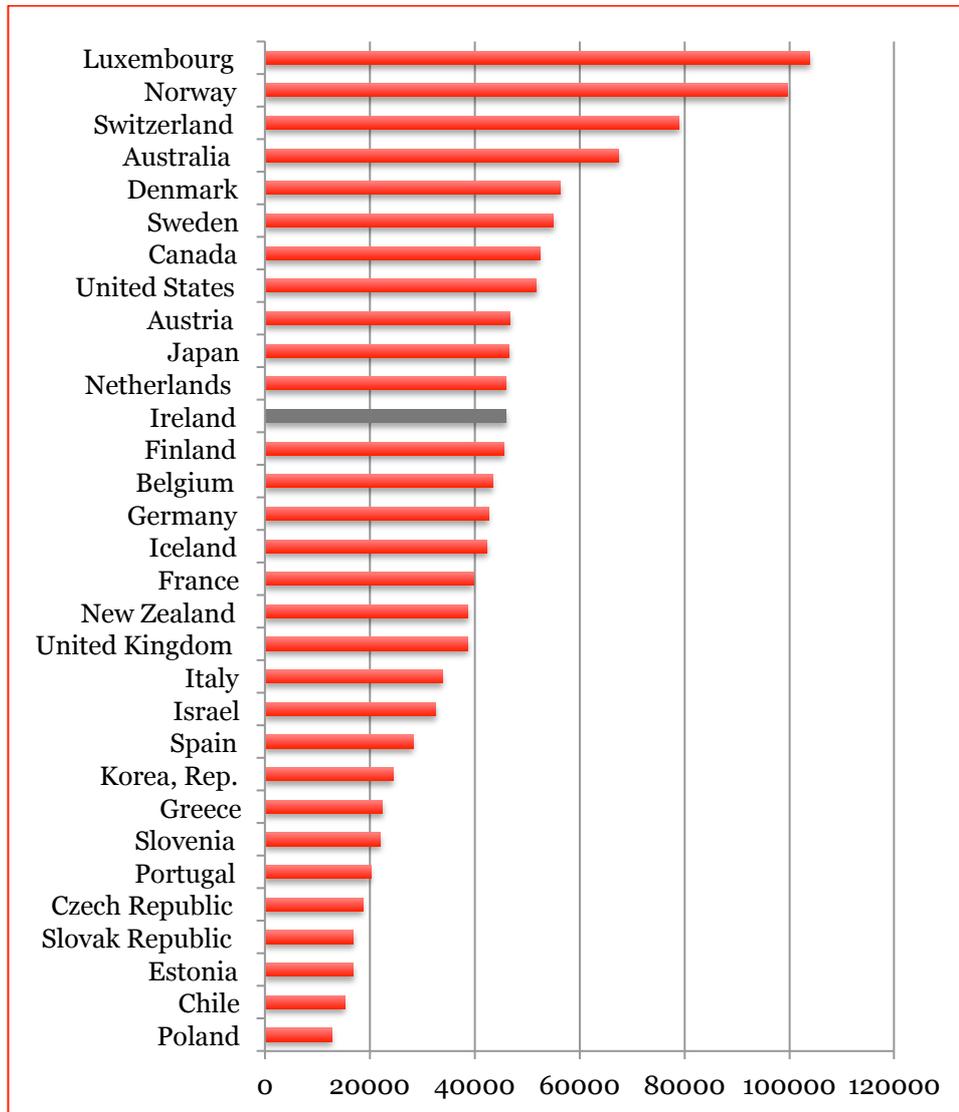
Source: ILO labour market statistics (downloaded from World Bank Indicators)

2.2.4 Economic model

GDP per capita is a broad benchmark of a country’s level of economic development. Also, this indicator is relatively stable to economic fluctuations and cyclical trends. GDP per capita, or income per capita, can be related to Smart Ageing from both the income and the expenditure side. On the one hand, a higher level of income per capita is generally associated with a higher level of tax revenue. On the other hand, a higher level of GDP per capita is generally associated with a public sector that is accountable to deliver a more comprehensive overview of social protection and health care and with an overall higher level of social expenditure. The Irish annual income per capita is around US\$45,921 (in 2012), comparable to the level of GDP per capita of Austria, Japan, the Netherlands and Finland, restating the fact that, globally speaking, Ireland is one of the more developed economies. Income per capita in Ireland is higher than

e.g. the UK, Greece, Israel, and emerging economies such as Poland, Czech Republic, and Slovenia.

Figure 6 GDP income per capita, current US\$ (2012)



Source: World Bank national accounts data, and OECD National Accounts data files (downloaded from World Bank Indicators)

2.2.5 Social expenditure on old age

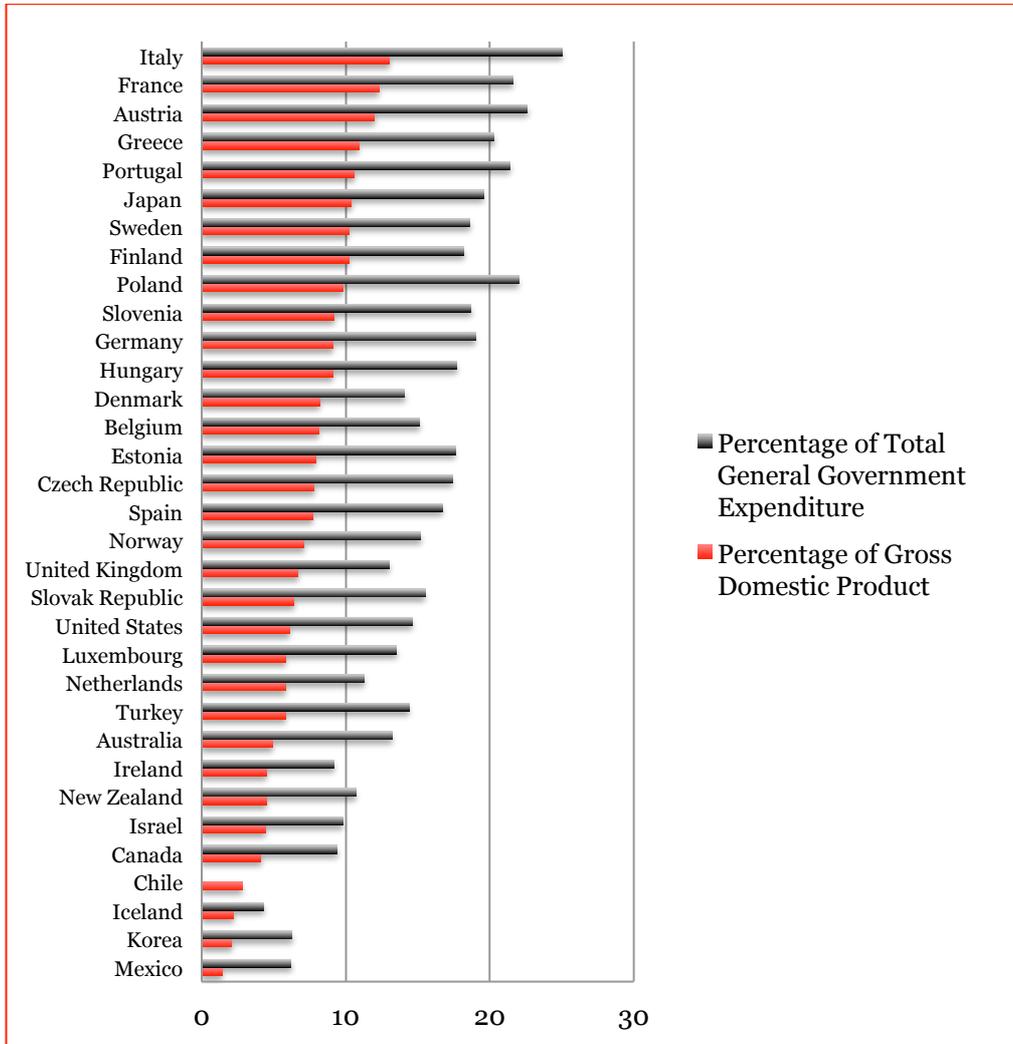
There are several types of public expenditure related to ‘old age’. We first provide an overview of aggregate expenditure on:

- Pensions;
- Early retirement pension;
- Other cash benefits;
- Residential care / home-help services;
- Other benefits in kind.

Figure 7 presents an overview of old age expenditure as a percentage of GDP and as a percentage of total government expenditure and Figure 8 presents an overview of the per capita level of old age expenditure (\$US, 2009). Ireland scores low on both

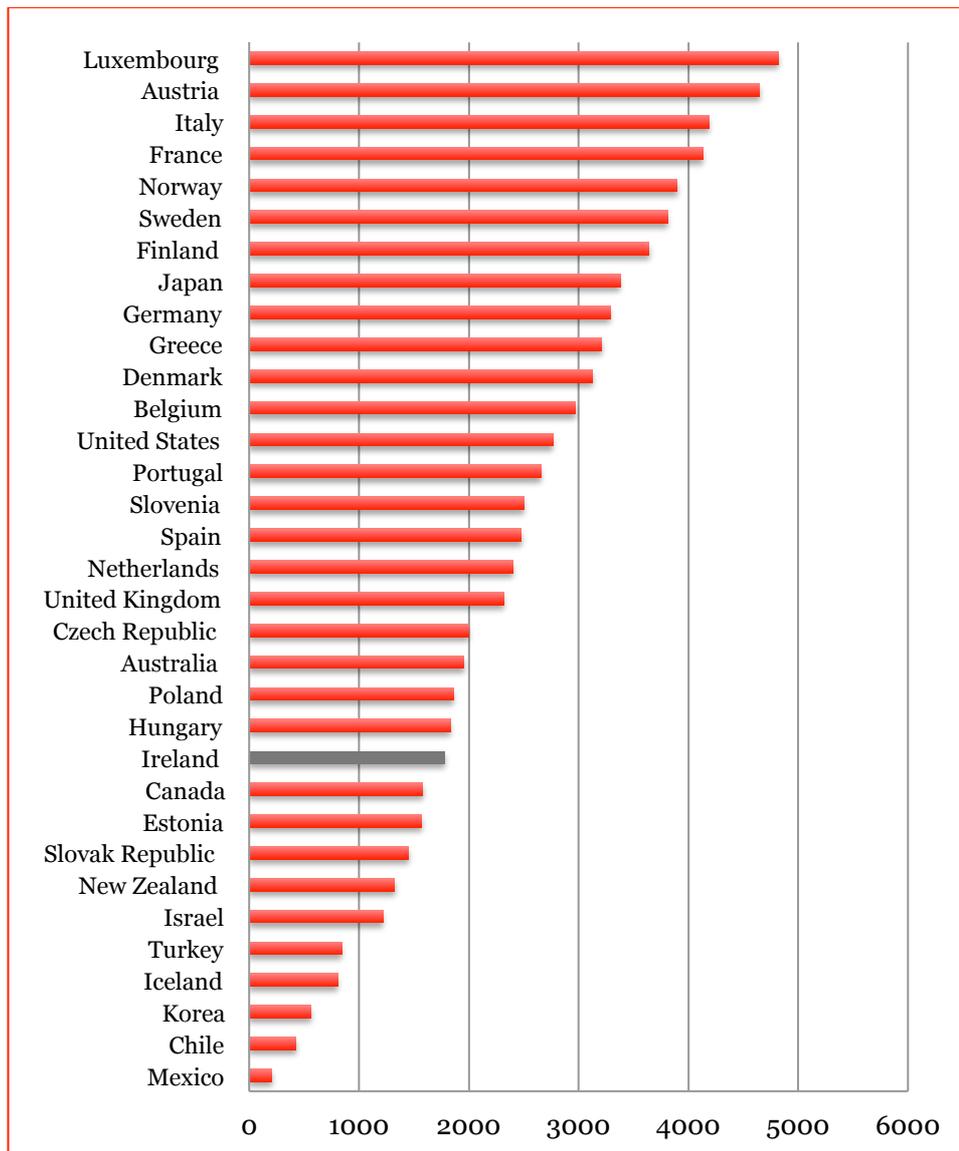
indicators relatively to the other OECD countries. Ireland invests just over 9% of total government expenditure on old age social security and over 4.5% of GDP on old age social security. Total per capita government expenditure on old age in Ireland amounts to \$1,783 (2009). In comparison, Luxembourg per capita expenditure on old age is \$4,819 (2009). Also in comparison, Italy scores relatively high, investing 25% of total government expenditure on old age social security (despite the low pension rate) and over 10% of GDP on old age social security.

Figure 7 Public social expenditure on old age, % (2009)



Source: OECD Social Expenditure Database

Figure 8 Per capita public social expenditure on old age, current US\$ (2009)



Source: OECD Social Expenditure Database

2.2.6 Pension Model

The biggest components of social expenditure on old age are pension expenditures. One way to summarize countries' pension models is to study the proportion of pension entitlements over pre-retirement earnings, in other words, (wage) 'replacement rates'. Replacement rates provide an indication of how effectively a country's pension system provides income during retirement as a replacement for (household) income. The income reference is the level of income earned prior to retirement. Net replacement rate adjusts the gross replacement rate for personal and income taxes and social security contributions.

Countries that score high on this indicator are the Netherlands, where the net replacement rate is close to 100% of the pre-retirement wage. Ireland scores on the lower bound of this indicator; the net replacement rate is just above 40%. Scoring slightly below Ireland are Japan and the United Kingdom. These countries just score marginally higher than Mexico (net replacement rates just above 30%).

This suggests that in Ireland, at the age of retirement, disposable income drops substantially. This compromises the spending power of elderly.

It is perhaps quite surprising that the welfare states Ireland and the UK score rather low on this indicator. To some extent this could be explained by recalling that the income per capita in Ireland and in the UK is higher than that of e.g. Greece, Italy, and Portugal. Thus, when looking at the \$US equivalent of pension entitlements, Ireland's pension entitlements may be more comparable. With respect to Figure 8, illustrating the per capita old age expenditure, we find that the per capita expenditure on old age (including pension entitlements) in the UK is close to the median. However, the per capita expenditure on old age in Ireland is low relative to several other OECD countries. A similar trend of low per capita old age expenditure and low replacement rates is found for New Zealand, Canada, Chile and Mexico. In Japan, replacement rates are relatively low and per capita expenditure on old age is relatively high. It is interesting to note that, similarly to Ireland, the dependency ratios of these countries (New Zealand, Canada and Chile) are also low.

Gross replacement rate

Gross pension entitlement divided by gross pre-retirement earnings. It is a measure of how effectively a pension system provides income during retirement to replace earnings, the main source of income prior to retirement. Based on national retirement age, gross earnings 1.00.

Net replacement rate

Individual net pension entitlement divided by net pre-retirement earnings, taking account of personal income taxes and social security contributions paid by workers and pensioners. Based on national retirement age, gross earnings 1.00.

2.2.1 Health model

As illustrated in Figure 10, there is a wide discrepancy between public and private health expenditures, as a proportion of GDP, across the OECD countries. In all countries, excluding Chile and the US, public health expenditure is higher than private health expenditure. Countries where public health expenditure is highest as a proportion of GDP, is the Netherlands and Denmark. In comparison to the other countries, Ireland has a relatively high private expenditure on health and a relatively low public expenditure on health, as a proportion of GDP. In terms of total health expenditure per capita, Ireland scores slightly below the medium (just below \$4,000 per capita in 2012).

Total health expenditure

The sum of public and private health expenditures as a ratio of total population. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation.

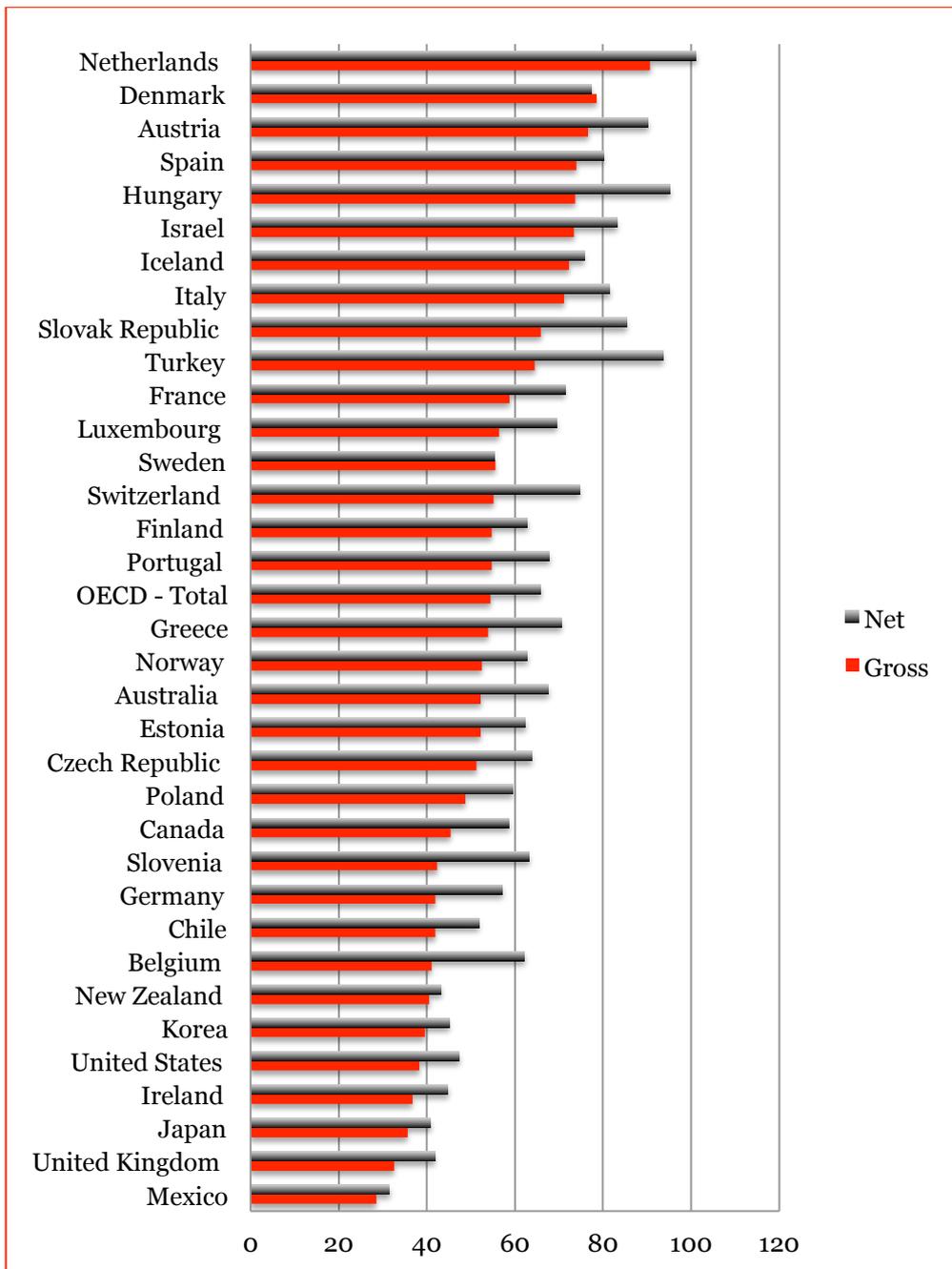
Public health expenditure

Recurrent and capital spending from government (central and local) budgets, external borrowings and grants (including donations from international agencies and nongovernmental organizations), and social (or compulsory) health insurance funds.

Private health expenditure

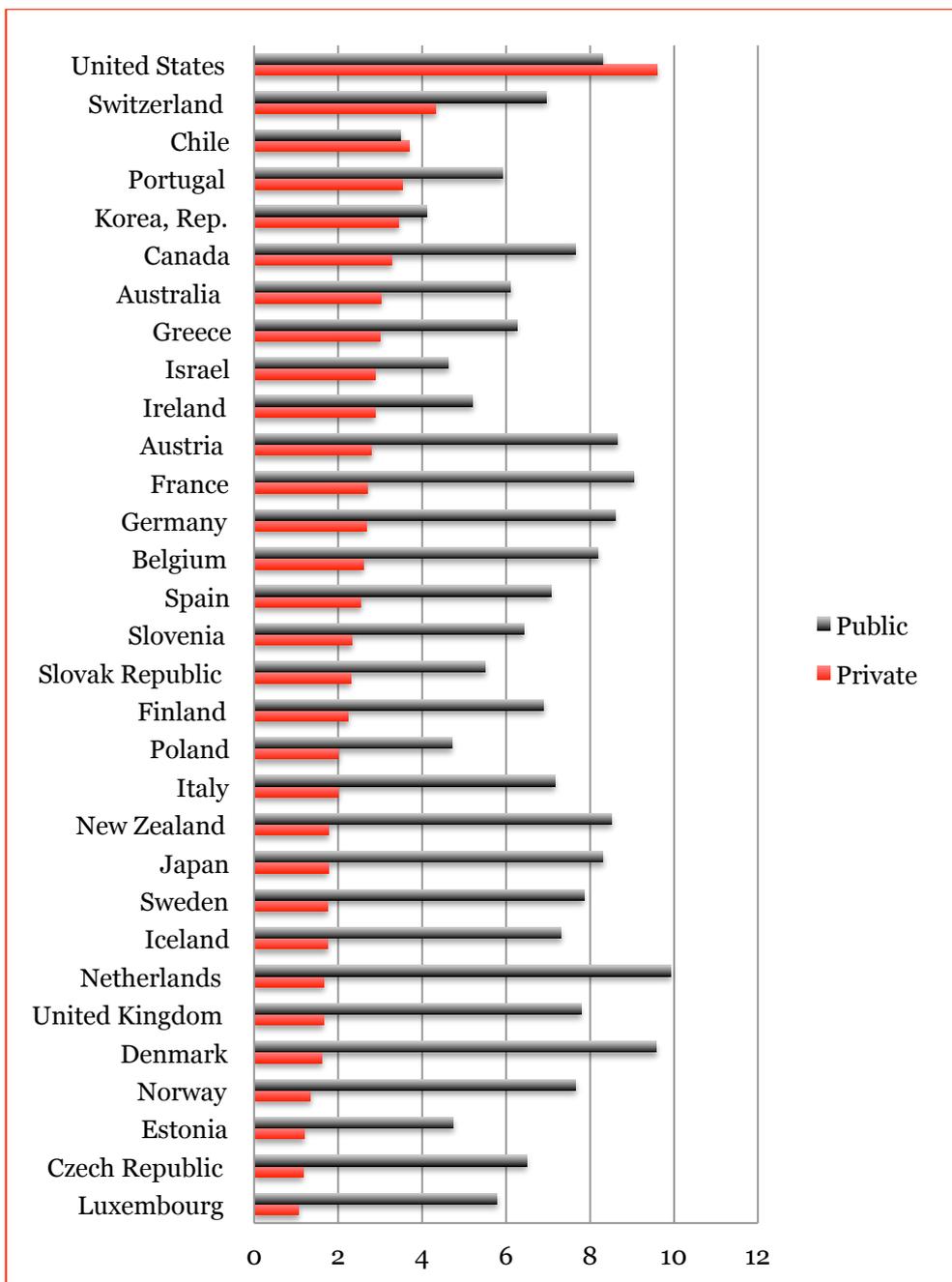
Direct household (out-of-pocket) spending, private insurance, charitable donations, and direct service payments by private corporations.

Figure 9 Replacement rate of the male population, % (2012)



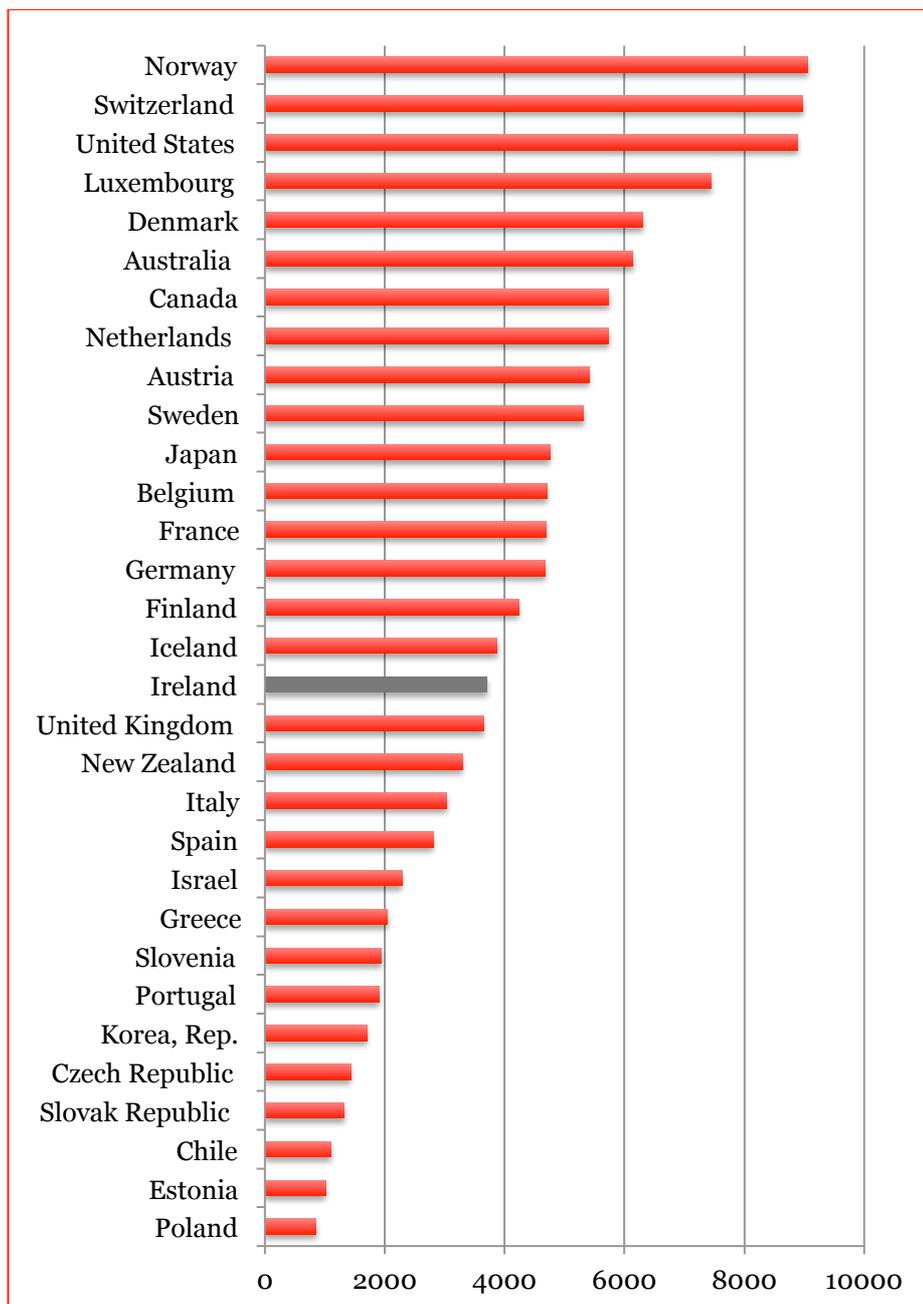
Source: OECD Database

Figure 10 Health expenditure as % of GDP (2012)



Source: World Health Organization National Health Account database (downloaded from World Bank Indicators)

Figure 11 Health expenditure per capita, current US\$ (2012)



Source: World Health Organization National Health Account database (downloaded from World Bank Indicators)

2.2.2 Summary of findings

Figure 12 provides a summary overview of the high/medium/low score of the OECD countries on the social-economic, demographic and social expenditure indicators. We note the five countries that score on the upper/lower bounds of (most of) the indicators studied above. We rank these countries as countries that have either a high/low cost of ageing population and a high/low cost to the ‘Smart Ageing’ social

budget¹¹. This cut-off is used with the idea of identifying outliers, i.e. countries that score relatively high/low.

Ireland, scores in the middle range in four of the sub-models and scores low with respect to the age-dependency ratio and scores low with respect to the pensions cost, measured using the gross/net (wage) replacement rates. Relative to the other EU countries, Ireland only spends more than two other EU countries on per capita old age expenditure. Thus, overall, the public cost of the ageing population in Ireland is low relative to other EU and OECD economies. The labour force participation rate in Ireland is relatively close to the EU average.

Figure 12 Overview of the cost of the ageing population and Smart Ageing social budget, relative ranking

		Demographic model: Age dependency ratio	Labour supply model (Labour force participation rate)	Economic model (GDP per capita)
Cost of ageing population	High cost	High: Japan, Germany, Italy, Greece, Sweden, Finland	Low: Italy, Belgium, Greece, France, Poland	High: Luxembourg, Norway, Switzerland, Australia, Denmark
	Medium cost	Medium: Finland, Portugal, France, Austria, Denmark, Belgium, Estonia, United Kingdom, Spain, Switzerland, Netherlands, Slovenia, Norway, Czech Republic, Canada, Australia, New Zealand, Luxembourg, United States, Poland, Iceland	Medium: Luxembourg, Slovenia, Czech Republic, Japan, Spain, Slovak Republic, Germany, Finland, Ireland, Korea, Rep., Austria, Portugal, Chile, Estonia, United Kingdom, United States, Denmark, Israel, Sweden, Netherlands, Australia	Medium: Luxembourg, Norway, Switzerland, Australia, Denmark, Sweden, Canada, United States, Austria, Japan, Netherlands, Ireland, Finland, Belgium, Germany, Iceland, France, New Zealand, United Kingdom, Italy, Israel, Spain, Korea, Rep., Greece, Slovenia, Portugal
	Low cost	Low: Chile, Korea, Rep. Israel, Slovak Republic, Ireland	High: Iceland, Switzerland, New Zealand, Canada, Norway	Low: Poland, Chile, Estonia, Slovak Republic, Czech Republic
Social protection model				
		Pension (Gross replacement rate)	Health expenditure, per capita	Old age expenditure, per capita
Smart Ageing social budget costs to the Government	High cost	High: Netherlands, Denmark, Austria, Spain, Hungary	High: Norway, Switzerland, US, Luxembourg, Denmark	High: Luxembourg, Austria, Italy, France, Norway
	Medium cost	Middle: Israel, Iceland, Italy, Slovak Republic, Turkey, France, Luxembourg, Sweden Switzerland, Finland, Portugal, Greece, Norway, Australia, Estonia, Czech Republic, Poland, Canada, Slovenia, Germany, Chile, Belgium, New Zealand	Medium: Australia, Canada, Netherlands, Austria, Sweden, Japan, Belgium, France, Germany, Finland, Iceland, Ireland, United Kingdom, New Zealand, Italy, Spain, Israel, Greece, Slovenia, Portugal	Medium: Sweden, Finland, Japan, Germany, Greece, Denmark, Belgium, US, Spain, Netherlands, Slovenia, United Kingdom, Portugal, Czech republic, Australia, Poland, Hungary, Ireland, Canada, Estonia, Slovak Republic, New Zealand
	Low cost	Low: Mexico, United Kingdom, Japan, Ireland, United States	Low: Poland, Estonia, Chile, Slovak Republic, Czech Republic	Low: Mexico, Chile, Korea, Iceland, Turkey

Source: Technopolis Group

¹¹ Note that, a high level of GDP per capita is entered as a cost to maintaining an ageing population to the government. At the same time, a high level of GDP per capita represents a high level of (tax) revenue to the government.

Box 1

Key messages for Ireland

On the basis of the social budget model there are several socio-economic and demographic indicators relevant to the study of Smart Ageing in Ireland relative to other EU and OECD countries.

1. Population projections: Ireland has currently one of the youngest populations in the EU and OECD. However demographic projections show that the proportion of older people will continue to grow over the next 40 years with corresponding pressure on public expenditures including healthcare and home care.

2. Labour force participation: Low labour force participation puts further pressure on public expenditures. Labour force participation in Ireland is higher than in other countries such as Belgium, Greece or Italy, and comparable to that of Germany and Finland, close to the average of the EU and OECD countries. In order to increase labour force participation, most countries increase the retirement age.

3. Pension expenditure: Pension expenditure is largely dependent on the proportion of pension entitlements over pre-retirement earnings. Ireland ranks low on this indicator in comparison with most other OECD countries, slightly higher than the UK, and similar to the USA. This indicator shows that Irish retirees are to a large extent responsible to save up for their own pension pot. In contrast, the Netherlands offers replacement rates of more than 90%, bearing almost the full pension burden of its citizens.

4. Health and social expenditure: Ireland's per capita health expenditure amounts to \$3,700. This figure is similar to that of the UK (\$3,650), and slightly less than Finland's expenditure (\$4,200), an EU country of similar size to Ireland but with an older population. Health expenditure in the Netherlands, again a country with older population, was over \$5,700 in 2012. As with health expenditures, Ireland's current public (and private) old age expenditures are moderate in size in comparison to many other EU and OECD countries. It is clear however that the ageing population will exercise substantial pressure on both the public and private healthcare expenditures going forward.

Taken together, Ireland is a small country with a young population hence pressure on public finances are still relatively limited. Market opportunities in the field of Smart Ageing are however substantial elsewhere in Europe and in other OECD countries, and Ireland is well positioned to learn from and target the larger older consumer markets in other foreign economies.

Beyond the major EU initiatives, four countries, the Netherlands, the UK, Finland and Japan, were selected in relation to Smart Ageing, and the countries' policy and private sector are analysed in greater detail in the next section. We present below a succinct overview of how these four countries compare and contrast to Ireland.

- Japan is a particularly interesting case because it is the country that currently has the highest age dependency ratio (65+), which is an interesting contrast to the case of Ireland, a country with a relatively large 'young' age cohort. However, similarly to Ireland, Japan has a relatively low wage replacement rate. The low replacement rate may allow Japan to cope with the high cost of the ageing population.
- Relative to Ireland, Finland has a similar population size, labour force participation rate, and per capita GDP but, currently - and over the next 20 years - the country has a substantially larger proportion of the population in the 65+ age cohort. Thus, Finland has a high cost of an ageing population. As expected, relative to Ireland, the per capita old age expenditure is moderately higher. At the same time, the wage replacement rate is also moderately higher in Finland than in Ireland and the per capita health care expenditure is of comparable size.

- The Netherlands, in contrast to Ireland, has a high replacement ratio, per capita health expenditure is moderately higher and the Netherlands has a relatively higher dependency ratio. On the other hand, the labour force participation rate is relatively higher than Ireland, which positively contributes to reducing the cost of supporting an ageing population. One possibility is that the Netherlands has successfully implemented active labour market policy.
- The UK is a useful benchmark for Ireland. Aside from being the neighbour country, the UK has a comparable labour force participation rate, level of GDP per capita, gross replacement rate, per capita health expenditure, and per capita old age expenditure. However, the current age dependency ratio of the UK is higher than that of Ireland. As a result, the UK public sector may be one step ahead in tackling the challenge of the ageing population. And, the UK private sector may be one step ahead identifying economic opportunities in the area of Smart Ageing.

2.3 European Initiatives

EU joint initiatives in the field of Smart Ageing are organised in the challenges faced by many European countries associated with ageing populations. The average life expectancy in the EU has increased from 55 in 1920 to over 80 today. In combination with the baby boom generation reaching retirement, the number of people aged 65-80 will rise by nearly 40% between 2010 and 2030, posing a significant challenge to Europe's society and economy affecting both public and private finance. In the EU, government spending on healthcare, pensions, long-term care, unemployment benefits and education is expected to increase by almost 20% between 2010 and 2060 with expenditure for long-term care estimated to almost double.

In this section, we will present an overview of the prominent EU programmes related to Smart Ageing. The programmes and initiatives are dependent on funding, partnerships and collaborations from several EU member countries and are intended to benefit the EU as a whole. The programmes outlined are the following:

- Ambient Assisted Living Joint Programme;
- eHealth Action Plan;
- European Innovation Partnership Active and Healthy Ageing;
- Europe 2020 Strategy – Together for Health;
- Horizon 2020 – Health for Growth;
- More Years Better Lives Joint Programme Initiative.

2.3.1 Ambient Assisted Living Joint Programme

The Ambient Assisted Living Joint Programme (AAL-JP) is financed by the European Commission and was initially set up for a duration of 6 years from 2008-2013. It had a budget of €600M, of which, 50% was publically funded and 50% privately funded from participating organisations (compared to 25% on average in FP7). In total, more than 120 projects were run, each of which had at least 3 member states taking part with at least one SME, one knowledge institute and a user organisation.

The AAL JP is an applied research funding programme which seeks to support projects developing ICT solutions for ageing well with a 2-3 years to market time horizon. The first period of the Programme was undertaken jointly by 19 member states and three countries associated to the Seventh Framework Programme for Research and Technological Development. The programme also provided inputs for downstream innovation and market validation activities under the Competitiveness and Innovation Programme, closing the loop from basic research to market uptake, a key target of EU research and innovation policies.

The specific aims of the AAL JP are:

- Foster the emergence of innovative ICT-based products, services and systems for ageing well;
- Create a critical mass of research, development and innovation at EU level in technologies for ageing well in the information society;
- Improve conditions for industrial exploitation by providing a coherent European framework for developing common approaches and facilitating the localisation and adaptation of common solutions, which are compatible with varying social preferences and regulatory aspects at national or regional level across Europe.

The next phase of the programme has now been confirmed and will run from 2014-2020, with a further €700M of funding.

There are 5 AAL projects funded with Irish participation (Figure 13), including the BREATHE project (see box below).

Figure 13 AAL projects with Irish participation

Project	Topic	Total budget	Country partners	Irish organisations participating
BREATHE	Improving QoL of informal caregivers	€2,051,361	Spain (lead partner), UK, Italy, <u>Ireland</u>	Trinity College Dublin, Tunstall Emergency Response
eCAALYX	Health monitoring	€4,118,002	Spain (lead partner), Portugal, UK, <u>Ireland</u> , Germany	University of Limerick, National University of Ireland, Galway
INSPIRATION	Software development	€2,794,960	Switzerland (lead partner), Belgium, <u>Ireland</u>	OpenSky Data Systems, Waterford Institute of Technology
JOIN IN	Social platform creation	€3,033,000	Germany (lead partner), <u>Ireland</u> , Hungary, Norway, Netherlands, Finland	Institute of Technology, Carlow, Valentia Technologies
SOPHIA	Social platform creation	€1,000,420	Cyprus (lead partner) Spain, Germany, Slovenia, <u>Ireland</u>	Ilumya Limited

BREATHE – The BREATHE project aims to develop an ICT based solution for the caregiver and the elderly in order to mitigate the problems that informal caregivers face such as: lack of experience and formal education and the shortage of tools to manage the cycle of stress and depression, a significant problem amongst informal care givers. This solution aims to address this (i) at the personal level by increasing the quality of life and care by gathering information about daily life activities of the elderly at home, (ii) at the local and regional level by providing a tool which can be used by different stakeholders to effectively manage the reality of informal care as well as opening up opportunities of new business models and employment by providing structured information as well as non-structured sources of information and finally (iii) at the European level by reducing health system costs as a consequence of an effective management system of informal care¹².

BREATHE started in May 2013 and will run for 30 months and the project is expecting to develop a comprehensive working prototype which will be validated with real-end users in Spain, Ireland and the UK.

2.3.2 eHealth Action Plan

eHealth is the use of ICT in health products, services and processes combined with the organisational change in healthcare systems and new skills, in order to improve the health of citizens, efficiency and productivity in healthcare delivery and the economic and social value of healthcare. eHealth covers the interaction between patients and health-service providers, institution to institution transmission of data or peer-to-peer communication between patients and / or health professionals.

The market potential of eHealth is substantial:

- The global telemedicine market has grown from \$9.8bn in 2010 to \$11.6bn in 2011 and is expected to continue to grow to \$27.3bn in 2016 (compound annual growth rate of 18.6%).
- The well-being market enabled by digital technologies e.g. mobile applications, devices, is growing rapidly.
- The convergence between wireless communication technologies and healthcare devices and between health and social care is creating new businesses.
- Redesigning the delivery of care and the ‘silver economy’ are highly promising markets.

The first eHealth Action Plan was adopted in 2004 and several targeted policy initiatives aimed at fostering the widespread adoption of eHealth throughout the EU have been developed.

- Member states have responded to the eHealth policy agenda through their participation in large-scale pilot projects such as European Patients Smart Open Services (epSOS).
- Adoption of the 2011 Directive on the Application of Patients’ Rights in Cross Border Healthcare.
- Article 14 of the above Directive, which establishes the eHealth Network with the aim of maximising social and economic benefits through interoperability and the implementation of eHealth systems.

The eHealth Action Plan 2012-2020 seeks to address and remove these barriers. It outlines the vision for eHealth in Europe and clarifies the policy domain, in line with

¹² <http://www.aal-europe.eu/projects/breathe/>

the objectives of the Europe 2020 Strategy and the Digital Agenda for Europe. It presents and consolidates actions to deliver the opportunities that eHealth can offer, describes the EU's role and encourages Member States and stakeholders to work together.

2.3.3 European Innovation Partnership Active and Healthy Ageing

The European Innovation Partnerships (EIP)¹³ were proposed in the Europe 2020 Strategy and are Innovation Union's flagship initiative. The Innovation Union seeks to address a wide range of elements that impact Europe's innovation eco-system and succeed in changing it by building momentum around innovation, mobilising stakeholders and mainstreaming innovation in key European, national and regional policies. The overall aim of the EIPs is to tackle innovation barriers for major societal challenges. There are five EIPs in total in the areas of active and healthy ageing¹⁴, water, agriculture, raw materials and smart cities.

The EIP Active and Healthy Ageing (AHA), the first EIP to be launched, aims to make the EU a place of excellence in innovation for healthy ageing by (i) improving the health status and quality of life of European citizens (with a particular focus on older people), (ii) supporting the long-term sustainability and efficiency of health and social care systems and (iii) by enhancing the competitiveness of EU industry through an improved business environment providing the foundations or growth and the expansion of new markets. The European Innovation Union considers ageing as an opportunity as opposed to a burden, placing value on older people and their contribution to society and seeking to empower older people and their communities through user-centred innovation and service delivery.

Innovation in services and products for active and healthy ageing requires not only significant investment but also the development of fundamental knowledge and the integration of supply and demand along the whole research and innovation cycle. If effective, cost-efficient and evidence-based solutions are developed then active and healthy ageing can have economic returns and could be perceived as an economic multiplier. Added value can be created through better outcomes for older people, increased work satisfaction for health professional and care personnel, better quality of life and financial security of informal / family carers as well as improved efficiency and increased productivity of health and social care systems. The EU suggests that innovation can bring value to older people and at the same time deliver long-run budgetary savings, for example, one EU region significantly reduced hospitalisation days with a four-fold return on investment by introducing an innovative and integrated telecare model.

The EIP aims to double the average number of healthy life years in the EU by 2020. In doing so this will improve the health status and quality of life of European citizens, with a particular focus on older people, support the long-term sustainability and efficiency of health and social care systems and enhance the competitiveness of EU industry through an improved business environment providing the foundations for growth and expansion of new markets. The Steering Group leading the Partnership suggests that to achieve these goals work needs to focus on the following three pillars, reflecting the 'life stages' of the older individual in relation to the care process:

1. Prevention, screening and early diagnosis;
2. Care and cure;

¹³ http://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2013/state_of_the_innovation_union_report_2013.pdf

http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/achievements_2013.pdf

¹⁴ Active and Healthy Ageing refers to the process of optimising opportunities for health, participation and security in order to enhance quality of life as people age beyond being physically active or able to participate in the workforce and is applicable to both individuals and population group

3. Active ageing and independent living.

In addition, there are a number of horizontal issues that also need addressing to help achieve the goals set out. These include regulation and standardisation conditions; effective funding; evidence base, reference examples, repository for age-friendly innovation and a sufficient marketplace to facilitate cooperation among various stakeholders.

From the three pillars, key areas of importance have been identified and six thematic action groups have been set up. Within these groups, partners are able to implement, share and scale up innovative solutions that meet the needs of our ageing population.

Figure 14 Thematic action groups of the EIP on Active and Healthy Ageing

Action group	Aims	Types of organisations participating
Prescription and adherence action at regional level	To improve the quality of life and health outcomes of older people living with chronic conditions in at least 30 EU regions, through a holistic approach, including enhanced self-care, personalised care, better adequacy of treatment and increased adherence to safe and effective care plans	58 in total Large business, SMEs, advocacy groups, research institutions, national, regional and local authorities
Fall Prevention	To reduced falls by ensuring that new technologies to monitor falls enter markets faster, connecting research and strengthening procurement processes. Support the set-up of regional programmes for early diagnosis and fall prevention	100 in total Large business, SMEs, advocacy groups, research organisations, health/care providers
Prevention of functional decline and frailty	Understanding the underlying factors of frailty, exploring the association between frailty and adverse health outcomes in order people and better preventing and managing the frailty syndrome and its consequences	160 in total Large businesses, SMEs, advocacy groups, research institutions, EU or international organisations, health/care providers
Integrated Care	To reduce the avoidable/unnecessary hospitalisation of older people with chronic conditions, through the implementation of remote patient monitoring and management and redesigning care pathways	120 in total National, regional, local authorities, research institutions, academia, SMEs, large industry, advocacy organisations
Independent Living	To develop interoperable independent living solutions, including guidelines for business models.	59 in total Large business, SMEs, advocacy groups, research institutions, national, regional and local authorities
Age-Friendly Environments	Contributing to building international networks for innovation, evidence development and developing common guidelines to tackle the challenges of adapting environments to an ageing population	70 in total Regional and local authorities, European NGOs, technology providers, research institutions, SMEs

Source: <https://webgate.ec.europa.eu/eipaha/actiongroup>

2.3.4 Europe 2020 Strategy – Together for Health

Europe 2020 is the European Union’s 10-year economic-growth strategy and health policy forms an important component of its objectives for smart and inclusive growth. This is because keeping people healthy and active for longer has a positive impact on productivity and competitiveness, innovation can help make the healthcare sector more sustainable and advance medicine itself, the healthcare sector has an important role in improving skills and creating jobs as it employs 1 in 10 of the most qualified workers in the EU and with a projected increase of 45% in the number of people aged 65+ in the next 20 years, financing raising healthcare costs and access to a dignified and independent life for the ageing population will be central to political debate.

The European Commission White paper ‘Together for Health: A Strategic Approach for the EU 2008-2013’ (adopted 2007) supports the overall Europe 2020 Strategy, responding to challenges faced by member countries by strengthening cooperation

and coordination across the UK and complementing national health policies in line with Article 168 concerning public health of the ‘Treaty of the Functioning of the EU’.

The Europe 2020 Strategy has 7 flagship initiatives with 4 that are of particular relevance to public health.

6. Innovation Union – See Section 2.3.3 for more details (EIP AHA).
7. Digital Agenda for Europe – focuses on developing and using digital applications and specifically sets out plans for these technologies to improve the quality of care, reduce medical costs and foster independent living among people who are sick and disabled. There are four key actions within the agenda relating to health.
 - i) Action 75 – Give Europeans secure online access to their medical health data and achieve widespread telemedicine deployment.
 - ii) Action 76 – Propose a recommendation to define a minimum common set of data.
 - iii) Action 77 – Foster EU-wide standards, interoperability testing and certification of eHealth.
 - iv) Action 78 – Reinforce the Ambient Assisted Living Joint Programme.
8. Agenda for new skills and jobs – highlights the economic role of mental health and the health of the workforce. The aim is to improve working conditions and workplaces that prioritise the health and well-being of their employees, thus reducing health inequalities, workforce shortages and absenteeism.
9. European platform against poverty – aims to ensure economic and social cohesion with a target to lift at least 20 million Europeans out of poverty by 2020. One approach to this is boosting efforts on health promotion and prevention with a focus on reducing health inequality. The Platform seeks to develop innovative and sustainable financing of health-related services for older people and support community-based responses to needs such as social care for the elderly, children’s health and global health threats.

2.3.5 Horizon 2020 – Health for Growth

‘Health for Growth’ is the third EU health programme and covers the period 2014-2020. It is the main instrument of the European Commission used to implement the EU health strategy and is implemented through annual work plans, which set out the criteria for funding actions under the programme. The programme has a total budget of €449M and four overarching objectives with a number of thematic priorities:

10. Promote health, prevent diseases and foster supportive environments for healthy lifestyles taking into account the ‘health in all policies’ principle:
 - Risk factors such as use of tobacco and passive smoking, harmful use of alcohol, unhealthy dietary habits and physical activity
 - Drug-related health damage, including information and prevention
 - HIV/AIDS, tuberculosis and hepatitis
 - Chronic diseases including cancer, age-related diseases and neurodegenerative diseases
 - Tobacco legislation
 - Health information and knowledge system to contribute to evidence-based decision-making.
11. Protect Union citizens from serious cross-border health threats:
 - Additional capacities of scientific expertise for risk assessment
 - Capacity-building against health threats in Member States, including, where appropriate, cooperation with neighbouring countries

- Implementation of Union legislation on communicable diseases and other health threats, including those caused by biological and chemical incidents, environment and climate change
- Health information and knowledge system to contribute to evidence-based decision making.

12. Contribute to innovative, efficient and sustainable health systems:

- Health technology Assessment
- Innovation and e-health
- Health workforce forecasting and planning
- Setting up mechanism for pooling expertise at Union level
- Link with the European Innovation Partnership on Active and Healthy Ageing
- Implementation of Union legislation in the field of medical devices, medicinal products and cross-border healthcare
- Health information and knowledge system including support to the Scientific Committees set up in accordance with Commission Decision 2008/721/EC.

13. Facilitate access to better health and safer healthcare for Union citizens:

- European Reference Networks
- Rare diseases
- Patient safety and quality of healthcare
- Measures to prevent antimicrobial resistance and control healthcare-associated infection
- Implementation of Union legislation in the fields of tissue and cells, blood and organs
- Health information and knowledge system to contribute to evidence-based decision-making.

This Programme seeks to strengthen the links between economic growth and a healthy population to a greater extent than previous health programmes. The Programme is focused towards actions with clear EU added value, in line with Europe 2020 objectives and current policy priorities.

The Programme also seeks to support Member State's efforts to improve the sustainability of their health systems, this is particularly important in light of the financial crisis and pressure faced by Member States to provide the right balance between providing universal access to high-quality health services and respecting budgetary constraints. In light of this, Member State's efforts to improve the sustainability of their healthcare systems is very important to ensure the ability to provide high quality healthcare to all citizens, not only now but also in the future. The Health for Growth programme helps contribute towards this by finding and applying innovative solutions for improving the quality, efficiency and sustainability of health systems, putting emphasis on human capital and the exchange of good practices.

The Europe 2020 Strategy sets out key goals for smart, sustainable and inclusive growth. These goals are very much dependant on increasing innovation in healthcare, reflected in flagship initiatives such as the Innovation Union and the Digital Agenda. In addition to new technology and products it is important to remember that innovation in the way healthcare is organised and structured is also important as well as how resources are used and systems financed.

2.3.6 More Years Better Lives - Joint Programme Initiative

Joint Programming Initiatives (JPIs) aim to pool national research efforts in order to make better use of Europe's precious public R&D resources and to tackle common European Challenges more effectively in a few key areas¹⁵.

Joint Programming is a new process that combines a strategic framework, a bottom-up approach and high-level commitment from Member States to build on the experience gained from existing schemes coordinating national programmes. A high level group identifies areas for Joint Programming following consultation with stakeholders. The Council, upon a proposal from the Commission then recommends a limited number of areas in which to implement Joint Programming as a priority.

From here, the participation of Member States is based on voluntary commitments leading to partnerships composed of variable groups of countries. For each initiative that Member States participate in they will start with developing a shared vision for the area, defining a Strategic Research Agenda (SRA) and SMART objectives and preparing for the implementation of the SRA by analysing the options, assessing expected impacts and defining the best mix of instruments to be used.

There are currently 10 JPIs. The JPI Healthy Diet for a Healthy Life (HDHL) investigates the relationship between diet, exercise and health in a trans-disciplinary and collaborative approach; the JPI Agriculture, Food Security & Climate Change (FACCE) is concerned with research to support sustainable agriculture, food security and impacts of climate change to create a European bio-based economy. Another JPI, directly relevant to Smart Ageing, '*More Years, Better Lives - The Potential and Challenges of Demographic Change*', seeks to enhance coordination and collaboration between European and national research programmes related to demographic change. There are currently 14 EU countries and Canada participating in this JPI. Within this JPI, four research domains have been developed via expert working groups drawn from all participating countries. These research domains are:

- Quality of life, health and wellbeing – key questions in this domain include – how can we properly understand and measure quality of life and well-being? What is the role of health on quality of life across the lifecourse? How do we understand the social dimensions of quality of life, including social inclusion? How does paid and unpaid work affect the quality of life? How can the physical and social environment be designed to secure quality of life?
- Economic and social production – key questions in this domain include – how do we understand and measure the changing social and economic value of paid and unpaid work? What models of labour market organisation, regulation and legislation support the effective use of individuals' skills and experience across the lengthening lifecourse? How should age management practices and policies be better developed to suit a more age-diverse workforce? How does health affect employability in later life? How can lifelong learning best contribute to maintaining productivity across the life course? What are the implications of greater population diversity for the workforce and its management?
- Governance and institutions (with focus on e-governance) – key questions in this domain include – how can we achieve better integration between policies and services, including those providing health care and social care, what factors support social, civic and economic participation across the lifecourse? How can we ensure that people have access to relevant opportunities for learning at all stages of the life course? What are the implications for older people of the spread of – and routine use of – information technologies?

¹⁵ http://ec.europa.eu/research/era/how-does-it-work_en.html
MYBL Strategy Research Agenda (2014)

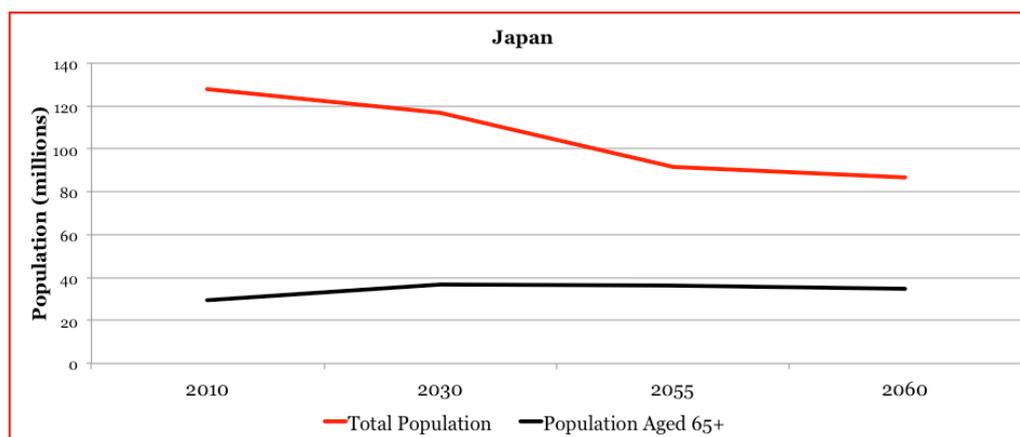
- Sustainable welfare – key questions in this domain include – what can we learn from comparative studies about the relative adequacy and sustainability of different welfare models? How can we develop fair and sustainable ways of distributing resources, rights and responsibilities between generations? How can we ensure that patterns of migration enhance, rather than damage quality of life, social cohesion and social inclusion? What models of care are most appropriate and effective for people who are nearing the end of their lives?

2.4 Japan

2.4.1 National Context and Policy on Ageing

Japan is one of the largest economies in terms of GDP and supports a population of around 127 million (the 10th largest population in 2014)¹⁶. Japan is currently faced with a proportionately large population of 50+ and is also experiencing an overall population decline. Over the next 50 years, the overall population decline is expected to reduce the total population by a third, to 87 million, which will result in an estimated 41% of the citizens to be aged 65+. The effects of the shifts in the ageing population will be felt in a number of areas, particularly in the labour force which measured 66 million in 2013, may under a worst-case scenario, drop by 42% by 2060 to 38 million resulting in a very high dependency ratio.

Figure 15 Population projection for Japan to 2060



Source: National Institute of Population and Social Security (NIPSS) Research, Japan¹⁷

Like many countries with ageing populations, Japan faces the fiscal challenge of ensuring its healthcare system meets an increasing demand because an ageing population generates pressure on the supply of lengthy and / or expensive treatments. According to the NIPSS, total social security expenditure for the ageing population accounted for ~23% of GDP in 2010 which has been predicted to rise to ~32% by 2060 (see Figure 16).

At present, Japan has a statutory health insurance system with over 3,500 insurers to provide healthcare to the entire population. Health insurers are regulated by the federal government to ensure all Japanese citizens have access to health care as well as to ensure that Japan's broader health policy goals are met by the many independent insurers and providers.

It is important to note that while there are a large number of insurers and providers, typically, citizens do not have the ability to choose between providers. Citizens must

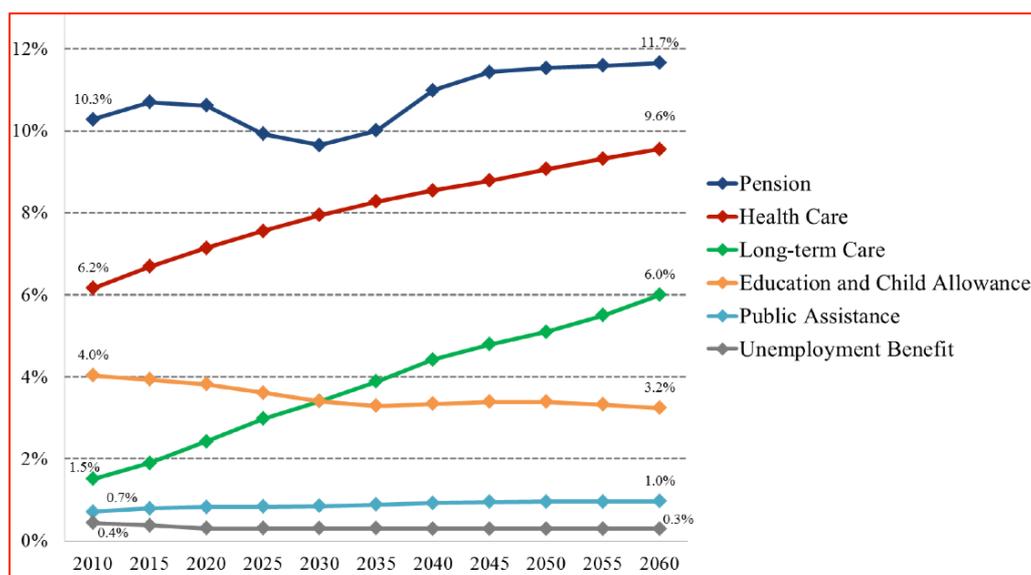
¹⁶ <http://www.worldometers.info/world-population/population-by-country/>

¹⁷ http://www.ipss.go.jp/site-ad/index_english/esuikai/ppfj2012.pdf

register with certain insurers based on their occupation, place of residence and age. There are four types of providers:

1. Society Managed Health Insurance (SMHI) funds set up by large employers.
2. Government Managed Health Insurance (GMHI) funds set up for employees and their dependants working in SMEs.
3. Mutual Aid Society Funds / Associations for national and local government employees and their dependants.
4. National Health Insurance (NHI) funds for farmers, self-employed, retired, unemployed and those not covered elsewhere.

Figure 16 The future trajectories of age-related expenditures (relative to GDP)



Source: Policy Research Institute, Japan

In 2008, the government funded around one third of the health insurance system while insurance premiums made up nearly half of funding. Cost sharing provided the remainder of funding.¹⁸ The reliance on cost sharing of a significant proportion of healthcare funding is designed to encourage informed decision-making by those seeking health care services. All health services are subject to a uniform 30% co-insurance rate (70% reimbursement), a rate which is reduced to 20% for children and 10-20% for those aged 75+. Those members of the population on low incomes and other specific population groups receive subsidies or are exempt from cost sharing. There is also a monthly limit to co-insurance payments based on age and income, beyond which a 1% co-payment is applied subject to a higher payment limit.

Since 2012, the Japanese Prime Minister Shinzo Abe has been working to try and help Japan recover from 20 years of recession. The ‘abonomic approach’ is a three-pronged approach (each prong often referred to as an arrow); fiscal stimulus, monetary easing and structural reforms. This approach has been characterised as a programme of ‘mix of reflation, government spending and a growth strategy designed to jolt the economy out of suspended animation that has gripped it for two decades’. The third arrow, structural reform was unveiled earlier this year.

¹⁸ <http://www.fraserinstitute.org/uploadedFiles/fraser-ca/Content/research-news/research/publications/health-care-lessons-from-japan.pdf>

In June 2014 the Japanese Prime Minister unveiled a programme which seeks to tackle Japan's crucial issue of an ageing population with the overall aim of restoring Japan's global competitiveness with strategic reforms to support children, child bearing and employment of young people; reform medical and long term care services, reform pensions and introduce a multi-layered safety net 'against poverty and income inequalities'. There are seven programmes of structural reform¹⁹:

1. Privatisation/Regulatory Reform – maximising the use of the private sector by reviewing the merits of special public corporations and semi-public institutions to reduce their subsidies in the promotion of privatisation with aims to expand the arenas and earning opportunities of the private sector. The intention is to introduce the free market process into fields such as health, nursing care, social welfare and education.
2. The 'Support Challengers' Programme – a social system that encourages individual ability – systems such as the tax system will be shifted to have an emphasis on equity investments as opposed to traditional savings as well as on business start-ups and business creation. There is the intention to strengthen the function of the fair trade Commission to promote competition policy. Broadcasting and telecommunications will be combined and a free market process introduced in these industries. In this way the aim is to promote a revolution in information technology measures such as the creation of IT model areas and support for IT education.
3. Strengthening Welfare and Insurance – making people feel safe and secure – a social insurance system will be created that is both safe and reliable and easy to understand. People will have their own social security numbers and 'individual social security accounts' to allow individuals to track their own social security payments and benefits. A sustainable pension system will be created that provides security and allows for changes in working styles. Pension taxation will be reviewed to smooth the burden of an ageing population among generations as fairly as possible. A 'medical services efficiency-boosting programme will be established to achieve efficient, high-quality medical care through reviewing the standardisation of medical services and compensation systems and through diversifying management systems that include joint-stock corporations. The growth of national medical expenses will be control, particularly for the older proportion of the populations and will be in balance with the national economy.
4. Doubling our Knowledge Stock-Human Capital Development through Individual Choice – priority to assisting individuals eager to study will be given, scholarships increased and measures developed to support self-help efforts for individuals who receive education as well as those educating themselves whilst in employment. The flow of education will be promoted and research funds from the private sector.
5. Lifestyle Revolution – creating an infrastructure that allows people to live and work as they like – a work friendly environment for women by providing tax and social security systems for promoting individual participation and by eliminating the waiting times for children to enter day-care facilities. An environment is to be created that is friendly to the elderly and the handicapped.
6. Local Independence and Revitalising-Empowering Local Governments to the Maximum – by encouraging the independent development of regions by capitalising on their unique character and the reorganisation of cities, towns and village and rebuilding regional fiscal strength in proportion to the cost and benefit of residents. This reform programme also seeks to reduce national involvement in local government and to revitalise rural regions by introducing private-sector style management locally.

¹⁹ <http://www.mofa.go.jp/policy/economy/japan/reform-m.html>

7. Fiscal Reform – creation of a simple efficient government for the 21st century – by changing the rigidity of resource allocation patterns of national and local governments. This programme seeks to reform the practice of earmarked revenue scores and the practice of budget allocations bound by the distinction between public works and non-public works. It aims to budget allocations around regions more flexibly and review the long-term plans related to public works.

2.4.2 Smart Ageing in Japan

Japan does not have a national Smart Ageing policy. However, it does have Smart Ageing International Research Centre (SAIRC) based at Tohoku University. The centre was founded in 2009 and opened in 2011 and has been designed to develop an approach for maintaining and improving the brain and mental health in a diverse and complex society from the standpoint of brain science, aiming to maintain and improve brain functions; cognitive neuroscience and psychology, aiming to maintain a healthy and tranquil state of mind at each ageing stage; and philosophy, from which phenomenology and ethics provide a radical reconsideration of the concept of the ‘mind’²⁰.

The concept of Smart Ageing proposed by SAIRC advocates a positive acceptance of the later stages in life from a perspective that sees ageing as a series of ‘developmental stages towards intellectual maturity’. SAIRC suggests that Smart Ageing is a revolutionary paradigm shift away from negative concepts such as anti-ageing that imply unwillingness to accept or face the later stages of life. It is hoped that as SAIRC grows, its achievements will help to enable an ‘intellectually connected society’ in which the increasing enrichment of life that accompanies ageing will be clear and that people of all age groups will be connected and able to support one another.

SAIRC has two divisions, the Division of Research and Development and the Division of Strategic Planning. The former division seeks to develop technology to support the development of sound brain functions and to mitigate ageing with subsequent dissemination to be achieved through collaboration with industry and international interdisciplinary cooperative research. In the latter division, collaboration with overseas advanced research institutions and companies studying geriatrics is promoted through liaison activities and the development of social work programs such as smart ageing education is expected to provide opportunities for senior citizens with an enthusiasm for learning to serve as educational support for young scientists²¹.

2.5 Finland

2.5.1 National Context and Policy on Ageing

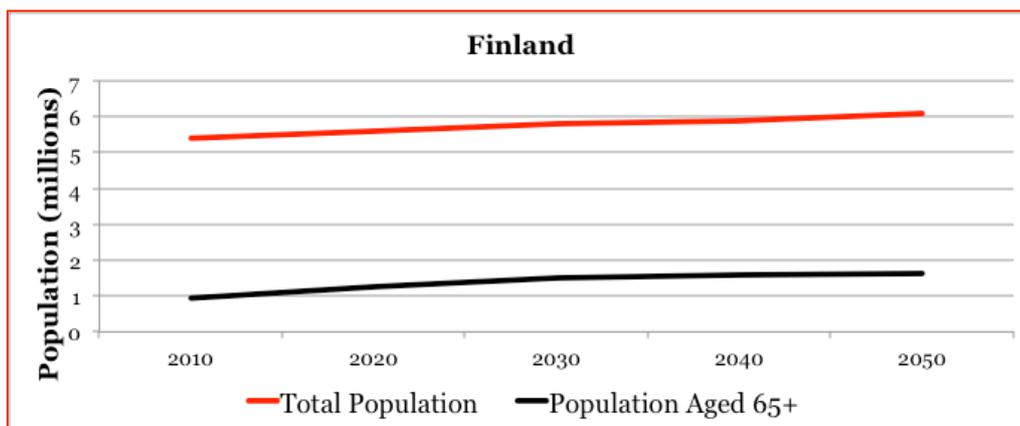
Finland is one of the world’s most competitive economies; innovation and structural reforms in the decade preceding the global and financial crisis helping it reach this position. The population of Finland is just over 5 million and supports a rapidly ageing population with the old-age dependency ratio steadily increasing over the past 40 years. In comparison, with other Nordic countries, Finland will experience an earlier and faster increase in ageing population, increasing pressure on public finances, specifically in relation to the provision of healthcare and pensions and labour resources²².

²⁰ <http://www.med.tohoku.ac.jp/english/org/cooperate/156/index.html>

²¹ <http://www2.idac.tohoku.ac.jp/dep/sairc/sairc.html>

²² OECD Economic Surveys (2014), Finland

Figure 17 Comparison of Finland's total population and population aged 65+, population prediction



Source: Statistics Finland

Finland experienced a deep recession in the early 1990's arising from the collapse of the Soviet Union, which resulted in high levels of unemployment (particularly among the older people), high levels of bankruptcy and a significant reduction in the number of taxpayers and their contributions to the welfare state. A dramatic turnaround in the economy in the late 1990's with record levels of growth meant that new skills and competences were in high demand but at the same time the number of young people entering the workforce was declining and so it became necessary to encourage older workers to remain in the workforce for longer. Finland subsequently devised a national policy on ageing to address the challenges it faces with an ageing population.

The strategy behind Finland's national ageing policy is a tripartite²³ endeavour between the government, employer and employee with organisations working together to share in the responsibility of managing an ageing workforce. The government is responsible for social caring, health services and general protective services while employers must ensure age-adapted workplaces and they must avoid age discrimination. Employees have the responsibility of maintaining their individual health and lifestyle and both employers and employees are jointly responsible for the promotion and training of competence and work ability. Finland's national strategy is supported by 20 years of research, which have shown that ageing has both positive (i.e. high level of wisdom, broad experience, good long term memory, well-developed skills) and negative effects (weakening short-term memory, increased likelihood of illness, out-dated skills, general slowing and decline) on workers. The results of this research – which also demonstrated that older people are highly dedicated to the work ethic and show low levels of absenteeism - essentially concluded that there is an enormous potential for older workers to continue to contribute towards the economic processes of Finnish society. This work led to the generation of a new paradigm for promoting and maintaining work ability (PMWA) based on three indicators to sustain work ability:

- Environmental – a hygienic and safe workplace with little physical effort needed;
- Organisational – flexibility, clearly defined roles, support from supervisors and communication with colleagues;
- Individual – high competence, good physical health, job satisfaction and high self-esteem.

²³ European Monitoring Centre on Change (2004), Managing the Challenge of an ageing workforce – Case example of the Finnish national strategy on ageing

These indicators became the basis for 2 specific ageing-related programmes in Finland involving key organisations such as the Ministry of Social Affairs and Health, Ministry of Labour, Ministry of Education, Finnish Institute of Occupational Health, Trade Unions and Employer Associations.

1. Respect for Ageing (1990-1995) – run by the Finnish Institute for Occupational Health and was aimed at changing the general opinion of ageing workers from one which considered them to have reduced mental and physical abilities to one which as studies revealed older workers to be better able to maintain productivity and learn new competences provided adaptations are made in the work environment to fit their specific needs.
2. The Finnish National Programme for Ageing Workers (1997 – 2002) – implemented jointly between several ministries²⁴ with the cooperation of several other institutions and organisations with the objective of supporting the labour market position of people aged over 45 years of age, concentrating on both the employed and the unemployed. The programme aimed at getting people to work until the stipulated retirement age of 65 years and reducing the number of people taking early retirement. The programme measures included adapting working condition to fit the needs of older workers, greater flexibility in working hours, competence and skills trainings tailor made for different age groups, special employment services, pension schemes and unemployment security cover for the benefit of the older employee.

As a result of these two programme a further 40 projects were launched to continue to promote and maintain the ability to work which covered aspects such as:

- Implementation of the PWMA paradigm;
- Age management training for all levels of management;
- Training of trainers and network building;
- Follow up barometer survey to keep track of progress made;
- Campaigns utilising main media channels.

The challenges of an ageing population, is not, of course, all about keeping older people in the workforce and Finland's national ageing policy more generally seeks to promote older people's functional capacity, independent living and active participation in society.

This has been built on further with the publication of the 'Socially Sustainable Finland 2020: Strategy for social and health policy' by the Ministry of Social Affairs and Health²⁵ in 2011. This strategy seeks to build a socially sustainable society in which people are treated equally, everyone has the opportunity to participate and everyone's functional capacity is supported by 2020. This strategy pursues social as well as economic goals with economic development providing the operating potential for the welfare state while social protection strengthens the balance of society and the economy²⁶.

2.5.2 Smart Ageing in Finland

Finland does not yet have a national policy on Smart Ageing, however, the leverage of technology to expand the potential of the social welfare and the health care sector is highlighted in its strategy for social and health policy to 2020.

²⁴ Ministry of Social Affairs and Health, Ministry of Labour, Ministry of Education

²⁵ responsible for the running of services for older people

²⁶ Ministry of Social Affairs and Health (2011), Socially Sustainable Finland 2020: Strategy for social and health policy

Finland's national funding agency for innovation, Tekes has a Smart Ageing Network Finland (SANF) of companies focusing on personal safety and active life solutions especially for older people. The network was founded in 2011 with the goal of bringing together and promoting Finnish companies with solutions for older people at home and in care homes. SANF targets markets both in Europe and in China. A particularly notable project from this network is the Active Life Home project led by Active Life Village Ltd with the involvement of most of the companies in the network and offers wellbeing solutions focused on care at home using Smart Ageing technology.²⁷ The project highlights the fact that technology is not replacing the need for human care services, it does however allow the smarter time allocation of carers and makes routines easier and helps the elderly person to actively remain in control of their own well-being. The technology solutions provided can help with dementia, sleeping disorders, poor mobility and other ageing-related health issues²⁸.

Tekes also ran a safety and security programme (2007-2013) which explored technology adaptation in an older persons home environment to help older people live safely and independently as long as possible, a benefit not only to the individual but also economically. Solutions developed under this programme include remote healthcare systems for patients discharged from hospitals and easy to use communication devices, which help older persons to keep up their social network.

Finland has also been involved in 19 project part funded by the Ambient Assistant Living joint Programme (see section 2.3.1), making use of its strong ICT base and has been the leading partner in 5 of these projects:

- AIB – ICT based falls prevention solution for older people;
- AMSCOP – communication interface developed for older people to reduce social isolation and reduce fear of independent living;
- HearMeFeelMe – ICT solution for visually impaired older people to facilitate access to digital services;
- Lily – ICT based well-being services;
- SoMedAll – social media solutions for senior users.

2.6 Netherlands

2.6.1 National Context and Policy on Ageing

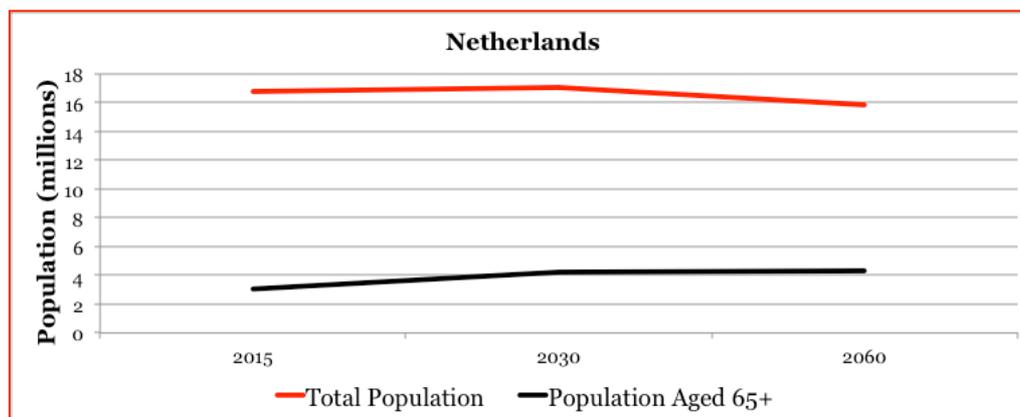
The Netherlands has a rapidly ageing population and the population aged 65 and over as a proportion of the population aged 20-64 is expected to double from 27% in 2012 to 52% in 2050. Compared to other OECD countries, this places the Netherlands mid-range among OECD countries in terms of the old age dependency ratio²⁹.

²⁷ Active Life Village, <http://www.activelifevillage.fi/en>

²⁸ Smart Ageing Network Finland Brochure, 2013

²⁹ OECD (2014), Ageing and Employment Policies: Netherlands 2014

Figure 18 Comparison of the Netherlands' total population and population aged 65+, population projection



Source: http://www.ifs.du.edu/ifs/frm_CountryProfile.aspx?Country=NL

In the past, older workers have commonly left the workforce early through early retirement and disability schemes, however over the past 10 years the Dutch government has increased the incentives for older persons to stay in the workforce and closed pathways to early retirement to tackle the over utilisation of disability pensions as well as raising the state pension age. The Netherlands has made good progress in this and between 2002 and 2012 the employment rate for the 55-64 age group has increased 17 percentage points to 58.6% (OECD average 54%) and the employment rate for the 65-69 age group has increased from 6.5% in 2002 to 12.7% in 2012 (OECD average 19.3%).

Healthcare provision is also a concern in relation to the Dutch ageing population; the Netherlands in 2009 was the second largest health spender in the OECD and in 2010 public expenditure on health and long-term care accounted for around 10% of Dutch GDP, which is expected to continue to rise in the near term.

The Netherlands has a private health insurance system with regulated competition. In the mid-2000s there have been wide-ranging reforms to the insurance system with the objective of reinforcing the role of market mechanisms and tackling market failures, which undermined the competitive-pricing of health care provision. These reforms include³⁰:

- Introduction of the Health Insurance Act of 2006 which made private health insurance mandatory for everyone replacing the dual system where public insurance was mandatory for about two thirds of the population and the remaining third relied on voluntary private insurance. Under the new system all citizens have to pay a flat rate premium (set by the insurer) and an income-related contribution to a risk-equalisation fund, which covers 50% of total health expenditure. The idea behind the reform was to give health insurers sufficient incentives to act as prudent buyers of health services on behalf of their customers. Thus the act allows health insurers to selectively contract with health care providers.
- Reform of the remuneration system for GPs in 2006 which as previously based on a capitation basis for two thirds of the population and fee-for-service basis for the remaining third of the population. The new system, a hybrid system with part-capitation – an annual ‘registration fee’ per patient and part fee-for-service with regulated maximums has led to more integrated care being offered to patients

³⁰ OECD (2013), Health care reform and long-term care in the Netherlands, Economics Department Working Paper No.1010

through negotiated bundled payments for providing coordinated care for patients, particularly those with chronic conditions. The overall aim of this reform is to increase the cost-effectiveness of the healthcare system.

Although the reforms set out above had not delivered the desired results by the second half of the 2000s, they had an effect on lowering generic drug prices due to stronger price competition which resulted in the list prices of the ten-biggest selling generics falling by between 76-93% leading to estimated annual savings of €348M (69%).

The healthcare system in the Netherlands is set to undergo further reform to further strengthen the role of market forces in the provision of health services and to secure cost containment and keep public healthcare expenditure within an annual growth rate of 3%. Further reforms are pursued with focus on the hospital sector and the introductions of legal instruments to enforce overall spending ceilings.

2.6.2 Smart Ageing in the Netherlands

The Netherlands does not have a national policy on Smart Ageing, however, the Dutch Ministry of Health, Care and Welfare does provide subsidies for the mainstreaming of independent living technology in the serviced housing sector called the ‘Dutch Domotics Programme’.

This programme was introduced following a general shift in policy in the Netherlands in the 1990’s towards allowing older people in the Netherlands to live for as long as possible in their own home rather than more traditional forms of residential elderly care. Against this background, the Ministry of Housing, Spatial Planning and the Environment and the Ministry of Health, Welfare and Sport jointly stimulated the implementation of ‘domotics’ technology in the home to enable people to live independently for longer by providing dedicated funds between 2003 and 2006.

The Dutch Domotics programme subsequently stimulated a large amount of experimental activities concerning the introduction of smart home solutions and ICT enabled service delivery to the home of older people across the Netherlands. Through the funding provided a lot of experience was gained from those actors involved and this was followed by a dedicated policy instrument set up to give €2,000-3,000 extra per apartment on smart home technology if the apartment is to be occupied by a person in need of care. Only care organisations and / or housing associations developing serviced housing stock for older persons are allowed to request the allowance³¹.

Expert assessment suggest that in 2006/7 ~350 projects and in 2008 ~250 projects were granted financial support for smart home and related telecare technology and on average each project involves around 90 individual homes.

Following the Dutch Domotics Programme a number of projects have sought additional funding for further development through channels such as the Ambient Assisted Living Programme. One such example is that of the AAL project ROSETTA, led by Dutch partners. ROSETTA was a long-term research project that focused on the safety of people with dementia in the Netherlands, Germany and Belgium. This project helped to develop technology that would help people live with dementia or Parkinson’s disease to live independently for longer. This project has led to the formation of a company called Dutch Domotics, a joint venture between Applied Radar technology and TNO who are now in the process of commercialising this technology³².

³¹ European Commission (2009), ICT and Ageing: Users, Markets and Technologies

³² <http://dutchdomotics.nl/about-us/?lang=en>

SPRINT, a Centre of Research Excellence, was founded in 2011 as part of the Innovative Medical Devices Initiative.³³ SPRINT seeks to ensure independent living of the elderly by realising Smart Personalized Rehabilitation and Intervention Technologies.

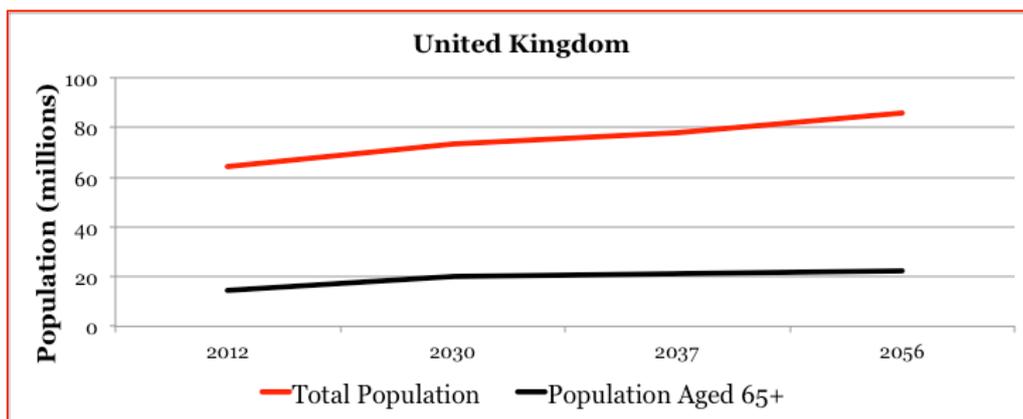
In addition to these national level initiatives the Netherlands also participates in internationally funded projects and participates in 42 projects funded by the Ambient Assisted Living Joint Programme, taking a lead role in a significant number of projects.

2.7 United Kingdom

2.7.1 National Context and Policy on Ageing

The UK like many advanced economies has an ageing population. The Office of National Statistics estimates that in the UK the population of people of retirement age will rise from just over 12 million in 2020 to more than 16 million by the late 2030's, with the number of people over 85 doubling to more than 3 million. The ageing population is a changing demographic for the UK resulting in more older citizens dependant on the working population than ever before.

Figure 19 Comparison of the UK's total population and population aged 65+, population prediction



Source: Office of National Statistics

In the UK, the approach being taken to the increasing ageing population has thus far very much been focused on health and social care, and pension and savings reform.

Health and social care costs in the UK are unsustainable and The Nuffield Trust estimate that under current healthcare system arrangements, the NHS in England will see a funding shortfall of £54bn by 2021/22, if NHS funding remains constant in real terms, if productivity gains are not made and if current hospital utilisations by people with chronic conditions (accounting for 70% of total health and social care spending 2010) trends continue.

Over the past 10-15 years, the UK has begun to try to respond to its ageing population by delivering a 'Healthy Ageing' programme as part of its National Service Framework (NSF), in addition to a number of initiatives to improve long-term care services for older people, in particular community-based services that are needed to overcome the

³³ <http://www.imdi-sprint.nl> and <http://www.imdi.nl/index.php?id=16313>

mismatch between the home based services that are usually desired and the residential care services that are in fact supplied³⁴.

In addition to its approach through the NSF, the NHS is currently undergoing a process of reform. The Health and Social Care Act 2012 was brought in to safeguard the future of the NHS following the recognition of the same set of factors that are driving the development of assisted living technologies: the NHS is facing rising demand and treatment costs as the population ages and long-term conditions has become more common. There is also need for improvement in some areas where the NHS falls behind other European countries and, despite the NHS budget being protected by government, the NHS is facing the tightest settlements ever, which is likely to be unaffordable in the future due to the exacerbated demand of an ageing population. The provisions of the HSC Act 2012 draw on the evidence and experience of 20 years of NHS reform and are designed to address these challenges by making the NHS more responsive, efficient and accountable, in part by the increased integration of health and social care services.

The integration of health and social care is important for many reasons but particularly for the development of assisted living technologies and important for the transition of the system to one where people are able to live independently for longer. In the past, significant issues have existed around the functional specialisation and distinctness of public services, such as health and social care where older people (and the taxpayer) may be served best by integrated services, where the historical separation between the services has created particular working approaches/technical systems that are not easily connected due to certain incompatibilities (DALLAS). ‘Caring for our Future’ seeks to address this problem with a number of key actions³⁵, including investment of £100m in 2013/14 and £200m in 2014/15 in joint funding between the NHS and social care to facilitate the move to better integrated care and support.

In addition to addressing challenges of unsustainable health and social care costs; the UK has also extended its policy measures to pension and savings reform and changes to the national retirement age.

The Pensions Commission has begun a period of reform which will lead to state pensions being linked to earning, pension auto-enrolment will extend private pension coverage to many who are currently not covered and the single-tier state pension will rationalise state provision and make it more generous for those with intermittent employment histories. This has been followed by the Department for Work and Pensions publishing ‘Fuller Working Lives – A Framework for Action’ which makes the case for older people to have fuller working lives. The framework outlines how an early exit from the labour market can have serious implications for the health, wellbeing and incomes of individuals and comes at a significant cost to the economy, business and society as a whole. This framework is taking a number of measures forward which includes:

- Bringing forward the planned increase in State Pension age to 67, in reflection of increased life expectancy;
- Rolling out a new Universal Credit System, a welfare benefit launched to replace six mean-tested benefits and tax credits, which seeks to ensure that work, and more work always pays better by providing more generous work allowances;
- Raising the age at which people can access Pension Credit (means-tested top up of the State Pension) and changing the rules around access to benefits for mixed aged couples to increase incentives for the younger partner to remain in employment;

³⁴ Assisted Living Innovation Platform: Medelec Cambridge.
www.medelec.co.uk/Presentations/11.00_GrahamWorsley_TechnologyStrategyBoard.pdf

³⁵ Department of Health. (2012). Caring for our future: reforming care and support.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/136422/White-Paper-Caring-for-our-future-reforming-care-and-support-PDF-1580K.pdf

- Introducing the new State Pension in April 2016, which is a flat rate pension, set above the basic level of the means tests. The aim is to provide a clearer foundation for private income from savings and earnings;
- Continuing the rollout of automatic enrolment of 6-9m people into workplace pension schemes;
- Increasing the flexibility in the way individuals can access their pension pots.

2.7.2 Smart Ageing in the UK

The UK does not have a national policy on Smart Ageing. However, the UK’s national innovation agency, Innovate UK has set up the Assisted Living Innovation Platform (ALIP) which delivers wide ranging-programmes, funding a variety of projects which seek to enable the ageing population and those with long-term health conditions to live with greater independence. Investment in this programme looks to address the challenge of assisted living in an attempt to contribute towards addressing the problem of unsustainable healthcare costs with the medium term goal of demonstrating the feasibility of new technology and new business and social models working together to deliver aspirational services at scale. ALIP programmes delivered include:

- Home-based Systems and User Centred Design;
- Smart Care Distributed Environment;
- Economic and Business Modules and Social Behavioural Studies;
- Independence Matters.

In addition to ALIP, Innovate UK also launched a large-scale programme called Delivering Assisted Living Lifestyles at Scale (DALLAS). DALLAS is a £37.3m programme launched in 2011, which has invested in four communities to improve the lives of 169,000 people by 2015. It comprises an investment of £19.6m by Innovate UK and the National Institute for Health Research, with a further contribution of £5.4m from the Scottish Government, Highlands and Islands Enterprise and Scottish Enterprise and additional investment from DALLAS communities themselves.

The overall aim of DALLAS is to demonstrate how independent living technologies, services and systems can be used to promote well-being and provide integrated top quality health and care, enabling people to live independently for longer. The four communities and the activities taking place in these communities set up under the DALLAS programme are presented in Figure 20.

Figure 20 Overview of DALLAS initiatives

Community	Overview of Activities
Year Zero	Individuals linked through products and services aimed at supporting them in managing their own health. Products and services developed with other businesses to be launched through the community.
Mi Liverpool	Support increased access to independent living technologies on the open retail market to increase levels of independence and self-care in Liverpool.
Living it Up	Using the community as a platform, living it up seeks to establish a trusted marketplace for independent living products that will match individuals with products and services that may be of benefit to them. Community activists will assess potential needs and the provision of advice is through centres, net TV, telephone line and installation support
i-Focus	Activity focuses on ‘interoperability’ both within the UK independent market and DALLAS itself.

Source: Adapted from Innovate UK³⁶

DALLAS is on-going and as a result, there are limited results available regarding its progress and success. The anticipated outcomes of DALLAS are:

- Benefits for the individual, their family and carers;
- Benefits to the systems (including the public and private healthcare systems);
- Economic and business benefits for the UK.

To date a baseline evaluation of the programme has been conducted and an interim and final stage evaluation of the DALLAS are due at a later stage. The baseline evaluation completed evaluates the economic and business benefits at the programmes initial stage to form a baseline against which change can be monitored following the implementation of DALLAS activities. The baseline evaluation identified existing market failures by the communities involved in DALLAS and the significant barriers to growth of the independent living sector that this programme seeks to overcome such as lack of awareness of products, systems and services, interoperability, statutory and regulatory barriers and the existing financial investment.

In addition to ALIP the UK also participates in internationally funded projects and has participated in 37 projects funded by the AAL-JP and taking the lead role in a significant number of these projects.

2.8 Summary

The EU and the individual countries studied have implemented and / or are in the process of refining strategies that have a focus on the ageing population and on promoting the wellbeing of older people. We find that the approach taken differs substantially across countries. Most countries have not developed a specific ‘Smart Ageing’ strategy although several strategies and policies are closely related to Smart Ageing and help reduce stress of the ageing population on the respective social security systems. The main findings are presented succinctly in the table below.

The priorities that are highlighted in most countries and EU are: health and healthcare, health insurance, independent living, increasing labour market participation and improving labour market conditions.

Japan, in particular, embraces a long-term societal perspective to tackling problems associated with the ageing population, such as encouraging active labour participation of mothers and maintaining fair / equitable pension contributions. Finland stresses the social responsibility of employers and employees in its national strategy. The focus of the ageing population strategy in the Netherlands focuses on labour market participation and decreasing cost of health care by means of increased competition.

The EU programmes provide several opportunities to scope development in Smart Ageing for the Irish private sector because:

- The programmes are closely aligned with the EU regulatory landscape;
- They provide an indication of the direction of market trends;
- They provide a good indication of the EU market in Smart Ageing;
- They provide opportunities for identifying collaboration across value chains;

³⁶ Final Report: Dallas baseline economic evaluation (2013)
<https://connect.innovateuk.org/documents/3301954/3710069/REVISED%20FINAL%20report%20for%20publication%20-%20TSB%20dallas%20evaluation.pdf>

- They operate at the EU technology frontier to the extent that they provide immense learning opportunities for the Irish private sector.

These opportunities are particularly relevant for Ireland because Ireland has a relatively small domestic market. The Irish private sector is currently lagging behind some major industrial players in Smart Ageing (e.g. Germany, UK, or France) but has the innovative/technical capacity to excel in the field and effectively compete in the international arena.

Figure 21 Summary of the global context study

Country / Region	Smart Ageing Strategy or related strategy	Prominent programmes in Smart Ageing
European Union	eHealth Action Plan Europe 2020 Strategy – Together for Health Horizon 2020 – Health for Growth	ICT solutions for ageing well; ICT in health products; Improving healthy ageing; Fall Prevention; Prevention of functional decline and frailty; Integrated Care; Independent Living; Age-Friendly Environments; eHealth; Wellbeing;
Japan	Privatisation/Regulatory Reform The ‘Support Challengers’ Programme Strengthening Welfare and Insurance Doubling our Knowledge Stock- Human Capital Development Lifestyle Revolution Local Independence and Revitalising Fiscal Reform	Health care; Health insurance; Improving labour market conditions
Finland	Respect for Ageing (1990-1995) The Finnish National Programme for Ageing Workers (1997 – 2002) Implementation of the PWMA paradigm Age management training for all levels of management Training of trainers and network building Follow up barometer survey to keep track of progress made Campaigns utilising main media channels ‘Socially Sustainable Finland 2020: Strategy for social and health policy’ by the Ministry of Social Affairs and Health	Labour market participation; Improving labour market conditions; Active Life Home project led by Active Life Village Ltd; Safety and security programme (2007-2013) (independent living)
Netherlands	Increasing retirement age Reform of health insurance system	Assisted living: Domotics Programme
UK	‘Healthy Ageing’ programme as part of its National Service Framework Health and Social Care Act 2012 ‘Caring for our Future’ Fuller Working Lives – A Framework for Action’	Assisted Living Innovation Platform (ALIP) Delivering Assisted Living Lifestyles at Scale (DALLAS)

3. Mapping: Activities linked to Ageing in Ireland

3.1 Overview

The analysis of the Irish Smart Ageing landscape builds on the information on the various projects, programmes, initiatives and policies collected by DJEI for this specific purpose from government departments, research funding agencies, enterprise agencies, academia and NGOs. We complemented the information collected via the survey with desk research and a database on FP7 funded projects compiled by Enterprise Ireland to document international funding for Irish initiatives in Smart Ageing. The total number of initiatives submitted amounts to 1,138.

The mapping exercise provides a snapshot overview of the types of recent or active strategies and programmes that involved the informant, either directly or indirectly, at the time of submission.³⁷ As mentioned above, the submissions are complemented with additional initiatives that are documented in the public domain. While the mapping exercise provided an extensive body of data, it is by no means fully exhaustive of all activities and initiatives or indicates future commitments in the field of Smart Ageing in Ireland.

As an indication of the breadth of data collection, Government departments and public agencies provided 365 initiatives, Higher Education Institutes 211, and we collected data on 94 internationally funded projects, and 214 NGO or philanthropically-funded projects. Enterprise initiatives where possible were also included so that public and private sector relationships can be identified, however, no direct submissions were received from the private sector.

For a detailed count and analysis of submissions, see Appendix B. In the following we provide an analysis of the mapping for each of the application areas.

3.2 Healthcare and self-care

3.2.1 Introduction

Healthy ageing, health and personal social services are priority areas in policymaking, adopted by Healthy Ireland as part of the National Positive Ageing Strategy. As documented in this strategy document, a number of specific strategies and policies have been set out with the objective to shape the health and self-care industry. Overall, strategies are set out to both reduce costs of the health care system and to improve the health and wellbeing of individuals. The following strategies have application to older people:

- Quality and Fairness (2001).³⁸
- National Health Promotion Strategy (2005).
- A Strategy for Cancer Control in Ireland (2006).
- A Vision for Change - Report of the Expert Group on Mental Health Policy (2006).
- Report of the Interdepartmental Working Group on Long Term Care (2008).
- Tackling Chronic Disease - A Policy Framework for the Management of Chronic Diseases (2008).
- National Men's Health Policy (2008 - 2013).

³⁷ Data collection took place in July-September 2014.

³⁸ Earlier policy strategies include The Years Ahead (1988) and Adding Years to Life and Life to Years (1998).

- HSE Population Health Strategy (2008).
- Action Plan for Health Research (2009 - 2013).
- National Guidelines on Physical Activity for Health (2009).
- Changing Cardiovascular Health: National Cardiovascular Health Policy (2010-2019).
- Review of the Recommendations of Protecting Our Future: Report of the Working Group on Elder Abuse (2010).
- Future Health – A Strategic Framework for Reform of the Health Service 2012-2015.
- Irish National Dementia Strategy (launched in December 2014).
- eHealth Strategy for Ireland (Department of Health, 2013)

3.2.2 Key Irish Actors and Activities

- The Department of Health has established eHealth Ireland to promote and implement the eHealth Strategy via an internationally-linked collaborative innovation ‘ecosystem’. Priority areas include ePrescribing, online referrals and scheduling, telehealth and the development of summary patient records.
- Enterprise Ireland (EI) invests in industry-led research to support development in the sector and contribute to the creation and growth of companies that can succeed in international markets. EI supports the Healthcare Innovation Hub and the ARCH Technology Centre, amongst others.
- The Health Innovation Hub, a joint initiative of the Department of Health and DJEI, aims to facilitate and accelerate commercialisation of a broad range of innovations into the health system that can deliver savings, efficiencies and better patient outcomes. There are a range of pilot projects at UCC targeting various innovative solutions for the health system, e.g., medical devices and its manufacturing, hygiene, and ICT solutions such as e-prescriptions, remote monitoring, GP referral and staff rostering systems.
- Applied Research for Connected Health (ARCH), a technology centre that conducts innovative and applied research to support the deployment, adoption and reimbursement of Connected Health solutions.
- Technology Research for Independent Living (TRIL) Centre, initially was a joint venture between INTEL and IDA. Today, TRIL is located in UCD. TRIL seeks to provide technology solutions which support independent ageing, enhance health and independence for older people while focusing on understanding and delivering on their support needs and preferences at home or in the care environments.
- SFI is currently responsible for the funding of several large research centres. Some of these strategic initiatives build on previous Strategic Research Clusters (SRCs) and CSETs:
 - SFI Alimentary Pharmabiotic Centre (APC), receives €6M per year government funding. The focus is on the human gut microbiome;
 - SFI Biomedical Diagnostics Institute (BDI) Strategic Research Cluster, receives €4M government funding per year with the objective of advancing science and technology to advance clinical use;
 - SFI Insight Research Centre. This is the largest of the seven funded SFI centres; total investment was €75M – including 30% industry funding. Government funding amounts to €10M per year. The Science Foundation

Ireland Insight Research Centre is responsible for several large centres/cluster in connected health and health diagnostics;

- SFI-funded Regenerative Medicine Institute (REMEDI), Engineering and Technology, received €3M per year to research regenerative medicine therapies for diseases such as osteoarthritis. The vision of REMEDI is to develop a new and realizable paradigm for medicine in the future utilizing minimally invasive therapeutic approaches to promote organ and tissue repair and regeneration thus avoiding the need for replacement. REMEDI has recently been incorporated into the SFI-supported CURAM Research Centre, which will be funded over 5 years to the level of €41m;
- SFI Investigators Programme (IVP) 2014 support themes in the field of Connected Health and Independent Living and Personalized Medicine (other themes of the IVP are Diagnostics and Biomarkers in the area of Food for Health Sustainable Food Production and Processing, Software Defined Networking, and Cyber Security and Digital Forensics).
- The Health Research Board (HRB) has been involved in financing projects and programmes related to Smart Ageing. The HRB also provides support for Horizon 2020 and the EU Public Health Programme (more than €1M for 2014-2020) that may have relevance to Smart Ageing. The total sum of HRB awards to HEIs - that are related to Smart Ageing - allocated during 2009-2014 - amounts to more than €66M. The biggest part of the budget (€30M) is allocated to support research capacity and leadership, followed by support for projects and programmes (€22M). Specifically, the majority of HRB grants are allocated towards research for policy & practice and overall science & technology research. Also, a substantial amount of funding (€11M) is allocated to support research infrastructure and networks³⁹ and, finally, a smaller part of the HRB awards (€2.6M) are allocated to international and collaborative initiatives.
- NGOs play an important role in health and services. Prominent players are Age Friendly Ireland, Atlantic Philanthropies, the Alzheimer Society, Third Age Ireland, and the Carers Association. For example Atlantic Philanthropies provides the Marymount Hospice with financial aid, €10M, to improve the standard of palliative care services in the Republic of Ireland Health Service Executive (HSE) southern region by supporting the construction of a new prototype hospice building.
- Large indigenous and multinational firms are active in the health sector, including in the area of Personal Health Records and Health Informatics (e.g. Cerner and G-PACE); Mobile health (e.g. Doctot and e-media); Medical Device, Sensor Technology and Contract Service Providers (e.g. Biancamed Ltd and HeartPhone, Bosch GmbH). Valentia Technologies is an example of a successful indigenous healthcare software company that is active in the field of Smart Ageing.
- Several enterprises are active under the flagship programmes ARCH and the Health Innovation Hub (HIH). HIH is working with national industry partners representing industry sectors including Ibec, the Irish Small and Medium Enterprise Association (ISME), the Irish Medical Device Association (IMDA) and Engineers Ireland⁴⁰. Companies partner directly with the Hub and participate in test bed activities. For example Abtran Full health on the development of an electronic GP referral pilot, Complete GP on the development of electronic

³⁹ One example of an award funded on the Research Infrastructure and Networks scheme is the award to the University College Dublin Supporting the operation of the Irish Clinical Research Infrastructure Network (ICRIN).

⁴⁰ <http://www.hih.ie>

prescription, and Slainte Healthcare on the development of automation of workflow and care pathways.

- Other relevant companies active at the Hub include Critical Healthcare, Full Health, Kjaya Medical, Netcare Wellness, OpenApp, SilverCloud Health, Gabriel Scientific, SureWash, Takumi Precision Engineering, Helix Health, Tickerfit, Nsilico Lifesciences Ltd, Lincor, Health Beacon, VascoCare Medical, Arann Healthcare, Radisens diagnostics Ltd, i360 Hygiene, FastForm, Handle Hygiene, and Vidscript.
- Higher Education Institutes (HEIs) are actively involved in research related to health and ageing.
 - University College Cork (UCC) initiatives have a primary focus on health and a majority of the initiatives are fully targeted at the 50+. Some of these projects are funded using public funding including international / EU funding such as the TRUST- 'Thyroid Hormone Replacement for Subclinical Hypothyroidism Trail' programme (€1.1M of €6M total grant) which involves 5 universities in Europe and is targeted at the 65+ population. UCC has received funding for over 30 research projects from the HRB over the years 2009-2014, that are related to Smart Ageing overall.⁴¹ The total sum of HRB funding received is just over €18M. UCC is involved in several collaborative and non-collaborative initiatives such as the BioExplore Research Centre, however with no programme specifically targeting the older people. UCC is part of the K-CORD consortium, which seeks to optimize the supports, services and facilities available to people with dementia and their carers through early diagnosis and intervention, innovative respite and education and assistive technology.
 - NUI Galway has received many HRB awards with grants ranging from €6.8M to €54k totalling 15M over 2009-2014. Research topics range from health care, nerve repair, Parkinson's disease, and evaluation of treatments to interventions of the urinary system. Moreover, NUI Galway has several initiatives in connected health. One project aims at the utilization of connecting technologies and medical devices for healthcare applications. NUI Galway is also involved in the REMEDI collaborative programme (see above).
 - The Royal College of Surgeons has also received HRB awards. One award is used to assess the impact of multimorbidity in older people in hospital admissions, healthcare utilisation and cost. The college also has many other research projects, one of these is study on the quality of prescription for older adults and another is an investigation into whether older people are being denied life-saving operations due to age discrimination in NHS.
 - Dublin City University submitted more than ten initiatives and several of these specifically target older people. For example, the research project ACTIFCare aims to develop strategies to care for people with dementia. DCU has set up a strategy for Developing Research and Innovation and one of the areas of expertise will be health technologies, and the healthy and ageing society. As part of this strategy, there will also be a virtual research centre.
 - Trinity College Dublin submitted a large number of initiatives in the field of health that have some relation to Smart Ageing. Close to 50 of these projects are HRB research awards. Notable data collection initiative on the 50+ population by TCD is the TILDA project: the Irish Longitudinal Study on Ageing (TILDA) with applications in research and policy development. Another notable initiative involving TCD is the Mercer Institute for Successful

⁴¹ Note that no data were received regarding funding from SFI and EI

Ageing (MISA), which coordinates clinical services, research, training and education at the St. James' hospital, the largest teaching hospital in Ireland.

- University College Dublin has a leading role in the Applied Research for Connected Health (ARCH) Technology Centre. ARCH conducts innovative and applied research to support the deployment, adoption and reimbursement of Connected Health solutions. Researchers from the University of Limerick (and RTI International) are also involved in ARCH.
- Other HEI organisations with interest in healthcare include St Angela's College, Athlone Institute of Technology, Galway Mayo Institute of Technology, Dundalk Institute of Technology, ITT Dublin, and NUIM.

3.2.2.1 Other actors

Several hospitals, such as the St James's Hospital, St Vincent's University Hospital, Beaumont Hospital, and the Connolly Hospital, are collaborating with HEIs and research centres in research programmes in topics such as cancer research, kidney disease, musculoskeletal physiology, and Alzheimer's disease and Parkinson's disease.

Under the Department of Environment, Local Community Development Programmes are coordinated by Local Government, in relation with other partners. Some of these programmes have application to health and Smart Ageing: i.e. the LCDP - Support for Older People, organized by the Westmeath Community Development Limited.

3.2.3 International Actors

Ireland is involved in several large scale EU programmes in health, with relation to Smart Ageing. In general, the programmes involve national HEIs as well as industry partners. This has included: FP7 programmes, Active and Healthy Ageing EIP, AAL and the JPI More Years Better Lives. The Active and Healthy Ageing EIP includes the programme ELDERMET that involves researchers from UCC, and Body Area Networks that involves researchers from the Tyndall National Institute (e.g. within ASSERT and COLLAGE). The AAL programme iCarer involves an Irish SME called 3S Group and BREATHE includes, among others, collaboration with Enterprise Ireland.

3.2.4 Key Initiatives

The health care and self-care sector can be sub-divided into five broad categories: connected health, neurodegenerative diseases, basic research, health and services, and medical devices.

Based on a tentative categorization of a majority of initiatives it is estimated that about 47% of the initiatives can be categorized under basic research, about 25% of the initiatives are part of the health and services industry, 10% of the initiatives are part of the connected health industry, another 10% are part of the medical devices industry, and around 11% can be classified under research on or support for older people with neurodegenerative diseases. Below we outline some of the major projects under each of these categories.

- Connected Health involves projects in tele-health, and e-health. Major projects are conducted at the HIH, ARCH and the SFI-funded Insight Research Centre (incorporating the Technology Research for Independent Living (TRIL) Centre).
- SFI operates a series of funding programmes supporting research activity by researchers at different stages of the careers across the full range of national research priority areas. Although the SFI programmes do not exclusively focus on Smart Ageing, in having broad scope from ICT to health to energy, the funding programmes have the potential to fund researchers with a particular Smart Ageing focus.
- Research into neurodegenerative diseases is a particular growing field. Initiatives under Neurodegenerative diseases include, for example, research on Alzheimer

disease. The work of the K-CORD consortium and the Genio dementia programme is one interesting example.

- Under basic research in health and self-care we include projects that have a focus on epidemiology, observatory studies, and biomedical research. The TILDA data collection programme and ELDERMET are major programmes in the area. Under Science Foundation Ireland the Curam Research Centre (incorporating Regenerative Medicine Institute (REMEDI)), the Alimentary Pharmabiotic Centre (APC) and the Biomedical Diagnostics Institute (BDI) are likewise major investments related to Smart Ageing.
- Activities under Health and Services are innovative (and less innovative) work in the field of telecare and services. A particular example is the development of social alarms. There are several palliative care services and the Older & Bolder programme.

Several enterprise and other organisations working in health care may not target specific age cohorts such as the 50+ population. It is clear however, that medical technology can have disproportionate benefits to older people because they are more at risk for the onset of certain disease as well as treatment thereof. For example, medical technology can help older people rehabilitate faster or delay the progression of certain disease such as arthritis. These advances in medical technology can keep older people an active part of the workforce for longer periods of time. There are several companies under the ARCH Technology Centre that may be of relevance.

The health and self-care sector is a very large industry with numerous opportunities to develop new solutions with application to Smart Ageing. Several actors are actively involved in these initiatives. The Irish government plays a key role in providing (financial) stimulus that supports development in a range of priority areas. In particular, research at HEIs benefits from government funding and the test bed activities documented benefit from national coordination.

With an ageing population, the importance of independent living – via the connected health industry and health services, telecare and telehealth – has become widely recognized in industry and the public sector. The need to promote the independent living of older people reduces the burden on the health care system. Additionally, independent living can improve the quality of life of older citizen.

Interest in independent living of older people encompasses a broad range of applications within health and social care from medical devices to home automation, which will have a positive influence on the wellbeing and quality of life of Ireland's older people. Opportunities exist in the field of medical devices in general; but also many new applications such as monitoring the onset of e.g. Alzheimer's using mobile applications are likely to deliver important breakthroughs in monitoring, diagnostics and prevention.

3.3 Education and training

3.3.1 Introduction

Education and lifelong learning is a priority policy area and an integral to National Goal 1 in Ireland's National Positive Ageing Strategy. This goal aims to *'remove barriers to participation and provide more opportunities for the continued involvement of people as they age in all aspects of cultural, economic and social life in their communities according to their needs, preferences and capacities'*. One of the objectives that underpins this goal, relevant to education and lifelong learning, is:

- To promote access (in terms of affordability, transport availability, accessibility of venue) to a wide range of opportunities for continued learning and education for older people.

3.3.2 Key Irish Actors

3.3.2.1 Government departments and agencies

The Department of Education and Science (DES) has several initiatives that aim to provide education and training for individuals, including the older person, under the programmes Skillnets, Springboard, and MOMENTUM.

One initiative supported by DES that targets older people more directly is the Dublin City University (DCU) 'age-friendly' university initiative which is an interdisciplinary working group developing generic principles for age-friendly universities throughout Ireland and internationally.

Department of Environment, Community, Local Government (DECLG) supports several local community actions in education and Smart Ageing. For example, the Limerick lifelong learning project and the Limerick Community Education Network (LCEN) are small-scale projects that promote adult learning. Despite their size, there is opportunity to roll out similar projects across different communities in Ireland.

The Department of Justice and Equality (D/Justice and Equality) provides a grant to the Third Age Foundation for their Failte Isteach measure that mobilises older volunteers to teach conversational English to immigrants. As such, this programme uses the skills and capacity of older people to help Ireland cope more effectively with a very European issue of open borders and immigration.

3.3.2.2 Third sector

NGOs are also rather active in this space, albeit they are predominantly active in supporting informal education for older people. Several example of NGOs and activities are listed below:

- Age Friendly Ireland, e.g. via the Age Friendly University scheme and the programme 'Digitize the Nation'
- Age Action
- Aontas, amongst others, with the Promotion of Adult Education programme
- Atlantic Philanthropies, with the Older Persons Community Education Pilot Initiative and the European Ageing Study Tour
- The Carers Association, which organises an information and resource centre
- Age and Opportunity via the Education and Engagement programme
- The National Council for the Blind via the Independent Living/Orientation and Mobility training
- The Irish Deaf Society via their Deaf Adult Literacy Services.

3.3.2.3 Business

Enterprises are active in the education sector and sometimes liaise with the public sector by seeking grants to undertake particular training programmes. Under the Local Community Development Programmes (LCDPs), several companies are actively involved in promoting the uptake of informal education amongst older people, focusing on training ICT skills, Skype, mobile phones, etc.

3.3.2.4 HEI

Overall, most universities do not target their curricula at the 50+ age group. However, there exists a relatively modest number of initiatives at Irish universities that promote adult education or specifically open education programmes to older people. Dublin City University, Cork Institute of Technology (CIT), University College Cork UCC), NUI Galway (NUIG), Trinity College Dublin (TCD) and the University of Limerick organize most of the initiatives documented. Activities cover both research and services and both target older people directly, or as part of a larger target group.

For example, a research project organized by DCU aims to explore the concept of global positive ageing through the engagement of older people in teaching, learning and research opportunities in higher education. Alternatively, UCC in cooperation with the Bishopstown Senior Social Centre is setting up the 'Computers for the Petrified Programme' that will run from 2015-2017. This programme offers tuition in the use of computers for older people. TCD provides life-long learning opportunities through free online courses. Moreover, it offers a research programme in subjects on ageing such as a postgraduate programme in dementia.

3.3.3 International Actors

The Department of Education and Science via the five-year Education and Training strategy is involved with international actors in the field education. This is a joint initiative with the OECD (and ESRI). Further analysis is required to understand how the strategy will support the population of 50+. Additionally, there have been a small number of projects in education via the Active and Healthy Ageing EIP; one of these involves UCC.

3.3.4 Key Initiatives

Key activities in the field of education and smart ageing are organized around the following themes:

- Dedicated training programmes on basic IT skills and computer literacy
- Free online courses or part-time education (in specialized areas) for individuals, including older people
- Strategy programmes to increase retention of older people in education or engage older people in teaching, learning and research opportunities in higher education.
- Awareness or support programmes for (older people) living with specific challenges such as dementia.

3.3.5 Conclusion

Education is a priority area of the Irish National Positive Ageing Strategy. Several policy initiatives aim to encourage lifelong learning. Some HEIs have introduced a lifelong learning strategy and policy, which may support the participation of older citizens in higher education and training programmes. Moreover, HEI strategies may also support the role of older people in providing higher education.

In practice, education and training and Smart Ageing in Ireland largely focuses on providing basic IT skills and computer literacy for its older citizens. Several enterprises are involved in this sector through the delivery of LCDPs. These training courses are provided on a small scale but there may be space to expand the provision of the training courses across Ireland, especially in rural areas. Aside from the for profit sector, the third sector makes a strong contribution to education and training for older people. A substantial number of NGOs and volunteers are involved in informal education delivery for independent living.

3.4 Financial services

3.4.1 Introduction

Financial security and preventing the abuse of older people are two specific objectives adopted by the National Positive Ageing Strategy. An additional point of reference is the National Pensions Framework (2010).

There are a number of existing government initiatives that can be classified under the financial services in the field of Smart Ageing. Overall, these policies function as safety nets and aim to protect the financial wellbeing of older people in Ireland.

3.4.2 Key Irish Actors

3.4.2.1 Government departments and agencies

According to the submissions, the financial services sector has a small number of important projects funded and delivered under the umbrella of Smart Ageing in Ireland⁴². Each of these projects is fully targeted at the 50+ age category. These include a number of features of the taxation system that reflect the particular circumstances of older people:

- **Age tax credit:** In addition to the personal tax credit, the age tax credit can be claimed by individuals of 65 years of age or above. The tax credit is €245 for single people and €490 for married couples or civil partners. It is estimated that in 2011, the Age tax Credit had an estimated cost of €47.6M.
- **Aged 70 Years and Over Universal Social Charge Threshold:** There is no threshold to the Universal Social Charge for older people aged 70 and above. From payments in excess of €16,016 the same rate of Universal Social Charge applies as for payments in excess of €10,036 p.a: 4% instead of 7%.
- **Deposit Interest Retention Tax (DIRT):** The DIRT will have a rate of 41% from the 1st January 2014, which is deducted from interest paid or credited on deposits of Irish residents. When exempt from income tax, individuals aged over 65 may be exempt from DIRT.
- **Tax relief on pension contributions increases over different age thresholds.** For individuals aged between 50-54 30% of net relevant earnings are eligible for tax relief. For individuals aged between 55-59 35% of net relevant earnings is eligible for tax relief, And, for individuals aged 60 and over 40% of net relevant earnings is eligible for tax relief.

Additionally, the Department of Finance participates in the work of the Working Group on Ageing Populations and Sustainability (AWG), which operates under the aegis of the EU Economic Policy Committee. The AWG undertakes quantitative analysis of the sustainability of public finances and of the economic consequences of an ageing population.

The Department of Social Protection (DSP) funds the remaining initiative. This initiative is a publication on the entitlements for the over 60s. The publication provides information on entitlements, services and supports for older people, encompassing social welfare, pensions, health, tax, legal matters and residential care. The project had an estimated cost of €15K.

The Revenue Commissioners have developed tailored tax return forms suitable for older persons, which can be downloaded online. Moreover, on an on-going basis, close working relations with groups representing older persons are developed to seek their views on communications initiatives as well as forms and leaflet design.

3.4.2.2 Third sector

No initiatives in financial services documented

3.4.2.3 Business

No initiatives in financial services are documented. However, health care and insurance companies (multinational and indigenous) have recently introduced initiatives to segment the market by cohort (e.g. targeting individuals below 55) and this market segmentation may drive future competition and opportunity.

⁴² For the purposes of this report, aspects of the taxation system are included under the heading of financial services.

3.4.2.4 HEI

The UCD runs a professional certificate programme in the management of elder abuse. The aim of the programme is to enhance practice related to the prevention, identification and management of elder abuse⁴³. UCD also runs an interdisciplinary research centre (involving the UCD School of Nursing, Midwifery and Health Systems, the UCD School of Applied Social Science, the UCD School of Public Health and Population Science and the UCD School of Medicine and Medical Science) referred to as the National Centre for the Protection of Older People (NCPOP). The centre is funded by the Health Service Executive.

3.4.3 International Actors

No initiatives in financial services documented

3.4.4 Key Initiatives

The financial services sector five initiatives that specifically target older people (50+) under the Department of Finance. These initiatives are tax and credit relief programmes.

3.4.5 Conclusion

Safeguarding the financial protection of older people is a key priority. The public sector is active in supporting the disposable income and savings of older people from a tax and credit perspective. There are other aspects of financial safety for older people that are not revealed in the mapping exercise. There may be a gap with respect to protecting older people against financial abuse and fraud. For example, research at UCD has a specific programme on the management of older people abuse.

3.5 Food and nutrition

3.5.1 Introduction

Nutrition is an area for action under National Goal 2 of the National Positive Ageing Strategy, which sets out to ‘*support people as they age to maintain, improve or manage their physical and mental health and well-being*’. The Department of Health and the Health Service Executive have the lead responsibility for this action.

The food industry accounts for more than 6% of GDP in Ireland and employs about 45,800 people.⁴⁴ The food industry is a growing market; it is expected that by 2050 there will be a 70% increase in food demand⁴⁵ (Forfás 2011, p. 14). The increase in food demand is explained by:

- Growing global market seeing an increase in overall population, and specifically the increase in the older population in Ireland.
- Change in diets in emerging economies, which generates possibilities to expand the export market.

The Food Strategy 2020 – “Food Harvest 2020”, set out in cooperation with industry, aims to stimulate the increase in exports of indigenous food products. As part of this strategy, there is emphasis on increasing synergy and cooperation between actors and

⁴³ For more information see:

<http://www.ucd.ie/nmhs/taughtgraduateprogrammes/professionalcertificates/professionalcertificateinthemanagementofelderabuse/>

⁴⁴ Opportunity Areas in Health, Wellbeing and Ageing (Forfás thematic working group)

⁴⁵ Forfás 2011, Detailed Assessment of Opportunity Areas for the Natural Resources & Sustainable Environment Thematic Working Group

doubling private sector R&D in the industry. National priorities in the food industry that are relevant to Smart Ageing include:

- Improving functional foods and other food developments. There is a growing demand for super foods and other foods with functional properties. Specific research initiatives exist in understanding and optimizing food properties for increased health. Research on functional foods involves establishing health benefits via microbiology and clinical medicine and trials. The Irish private sector has particular strength in the dairy industry⁴⁶.
- Establishing common (EU) standards and labels for food products, via engagement with industry.
- Establishing national wide healthy practices and personalized nutrition. Because the recommended nutritional intake changes along the individuals' life cycle, there is opportunity to tailor the food market to support the health of older people. This involves re-evaluating the diet provided to older people in institutions such as care homes, retirement homes and hospitals. Some studies indicate that the intake of fruit and vegetable consumption of the very old in residential care is currently below recommended guidelines. The lack of adequate intake of minerals and vitamins can be detrimental to the health and cognitive ability of older people. Personalized nutrition involves introducing segmented and individually tailored diets based on individuals' genetic predisposition and health history.
- Improving resource efficiency and developing efficient solutions to reduce food and waste in the food chain. The increasing market of food and nutrition, in part segmented to older people, increases pressure to protect the environment and to reduce the carbon food print across and within the industry.

3.5.2 Key Irish Actors

3.5.2.1 Government departments and agencies

Major funding in the Irish food industry for R&D stems from the Department of Agriculture, Food and Marine (DAFM), SFI, HRB, EI, the Marine Institute and Industry.⁴⁷ In the area of Smart Ageing, two government departments have implemented strategies and/or activities particularly relevant for older people: DAFM and DJEI.

DAFM has a number of initiatives with Teagasc, the agriculture and food development authority in Ireland. The responsibility of Teagasc is to support science-based innovation in the agri-food sector and the broader bioeconomy. The Teagasc Statement of Strategy (2012-2015) sets out the food programme directed towards developing the base of expertise and information in generic technologies. A key element of the strategy is to contribute to the development of a functional foods sector. The current projects of Teagasc relevant for Smart Ageing include the ELDERMET research project, a collaboration involving HEIs. Moreover, Teagasc supports a range of research projects in the field of nutrition and nutritional properties for older people:

- Fermented Healthy Beverages (funding via Teagasc);
- Healthy-to-Bake: ready to bake mixes containing healthy flours generated from food processing by-products” (funding via DAFM);
- Exploitation of the nutritive properties of safe Irish-grown milled oat and barley varieties as functional ingredients in new healthy food formulations (funding via DAFM);

⁴⁶ One of the upcoming reforms in the dairy industry that impact the Irish industry are the CAP reforms and the changes in milk quota.

⁴⁷ Opportunity Areas in Health, Wellbeing and Ageing (Forfás thematic working group)

- Healthy cereal-based snacks for older people (funding via DAFM);
- Healthy cereal based snacks from by-products of the milling, malting, brewing and cider industries (funding via DAFM);
- Based on healthy foods (funding via DAFM and HRB);
- Novel food ingredients for older consumers (funding via DAFM).

For example, the research on ‘Novel food ingredients for elderly consumer’ looks at the health of intestinal microbiota of older people and estimates the effect of milk in shaping microbiota.

Other activities under the DAFM are the following:

- DAFM’s Food Institutional Research Measure (FIRM); a national funding scheme for research at colleges and research institutes. The scheme has funded research targeted to older people, including the ELDERMET project and other studies conducted by the Irish Universities Nutrition Alliance (IUNA). FIRM has also recently approved a project in partnership with Teagasc on novel nutritional solutions to combat chronic malnutrition in the elderly.
- Consumer Research into Healthy Ageing 2012 carried out by Bord Bia, which is a global consumer study assessing nutrition trends in older people to support health through nutrition and commercial opportunities.
- GLAS a €1.4B scheme on green, low carbon agri-environment targeted at farmers. The scheme is not specifically for older people although roughly half of the beneficiaries are over 55 (this, in part, reflects that the average age of the population of Irish farmers is increasing).
- Organic Farming is a similar scheme targeting a smaller pool of farmers of different ages. The value of this scheme is €30M.
- On Farm Investment Schemes, likewise is a scheme targeting farmers with a focus on farm modernization. The value of this scheme is €395M although only part of the funding goes to older farmers.
- Food Dudes is a programme that targets primary school children and encourages healthy eating from early on. The programme, worth €2.5M does not target older people although, from a long-run perspective, the programme can have positive implication for healthy ageing.

DJEI through the National Research Prioritisation Exercise and its associated Action Plans identified Food for Health as one of the 14 priority areas for targeted funding. DJEI, through Enterprise Ireland, supports (along with Teagasc) a Technology Centre⁴⁸, Food for Health Ireland (FHI), a key technology research centre established in 2008 developing innovative nutrition-related projects. In its phase 2, FHI aims to commercialise bioactive food components for different projects from appetite modulation and glycaemic management to healthy ageing and performance nutrition. Overall, FHI receives exchequer funding of around €6M per year.

Additionally, SFI is a funding partner of a €42M initiative, Alimentary Pharmabiotic Centre (APC) that has some application to Smart Ageing. Partners in this project include Teagasc, UCC, NUI Galway, and the University of Limerick as well as industry partners. APC works in the field of inflammatory, infectious and other disorders within and beyond the gut.

⁴⁸ Technology Centres are collaborative entities established and led by industry and include both indigenous and multinational enterprise.

3.5.2.2 Third sector

Further research is needed to understand how NGOs are working in the food and nutrition sector. However, it is clear that the third sector plays a role in ensuring the care of older people and their nutritional intake.

3.5.2.3 Business

SFI provides grants and match funding of industrial partners for research programmes through the establishment of a small number of larger research centres of scale.

In particular, in the area of food and nutrition, APC aims to partner with industry. Currently, it has a number of technology opportunities available for commercialisation, including CF Phage: Therapeutic to treat cystic fibrosis lung infections; Live 5: 5 microbe animal feed additive for promoting growth & good health; Super 'Nisin' Bacteriocins: derivatives with enhanced antimicrobial activity; and SAFEFORMULA: infant formula safe from *E.sakazakii*.

The Food for Health Ireland Technology Centre (established jointly by EI and IDA Ireland) includes the following industrial partners: Irish Dairy Board, Carbery Group, Dairygold Food Ingredients Ltd, Glanbia plc, and Kerry Group plc. Aside from large corporations and multinational, smaller enterprise and cooperatives are also active in the market.

3.5.2.4 HEI

UCC is a prominent player in the food and nutrition industry, and provides home to APC. UCC is involved in a small number of important initiatives that are fully related to food and nutrition and smart ageing. First, UCC is involved in the ELDERFOOD programme, which focuses on examining the effect of particular dairy components on gut microbiota to provide the scientific validation required to promote consumption of dairy products and ingredients in the older population to improve health. Second, UCC is involved in the NuAge initiative, which similarly is a study on dietary strategies addressing the needs of older populations for healthy ageing in Europe. Third, UCC is involved in a project about the market development of health promoting foods for the ageing population. In addition, UCC is involved in a study on the potential efficacy of Omega DHA (a type of fatty acid) in slowing cognitive decline in older people.

3.5.3 International Actors

Ireland is involved in the European Union Joint Programming Initiatives (JPI) under two programmes. The first is the Healthy Diet for a Healthy Life (HDHL) that investigates the relationship between diet, exercise and health in a trans-disciplinary and collaborative approach. Ireland has a strong role in this JPI with DAFM, SFI, and HRB being active funders of the initiative, and DAFM and SFI having members on the Management Board. The other JPI is the Agriculture, Food Security & Climate Change (FACCE) that has Governing Board Members from DAFM and Teagasc.

There are initiatives under the Active and Healthy Ageing (AHA) EIP relevant for food. For example, the action group 'Age Related Undernutrition in Europe' (ARUE) is, with Irish participation, implementing a screening program for nutrition in EU Healthy Ageing programs with the objective to increase the awareness level of nutrition and minimise the impact of poor nutrition on the ageing process⁴⁹.

⁴⁹ <https://webgate.ec.europa.eu/eipaha/initiative/index/show/page/1/id/170> and <http://www.mna-elderly.com>

3.5.4 Key Initiatives

Key activities under food and nutrition relevant to smart ageing include the following:

- Research into the functional foods and the ELDERMET programme. This is a strategic research initiative with application to the older population. There exist specific research capacity and industrial players in the dairy sector.
- SFI-funded APC drives research in health and nutrients at UCC and other HEIs.
- The Technology Centre Food for Health Ireland.

3.5.5 Conclusion

Development of the food and nutrition, targeted at older people is a growing economic sector and Ireland has specific (research) capacity in several of the functional foods sub-industries. A key strength of the food industry is that, relative to other industries, there is substantial cooperation between (academic) research partners, industry and several governmental bodies. The public sector is involved with supporting R&D at HEIs. Moreover, the private sector is stimulated to increase investment in R&D. In particular within research, Ireland is involved in several EU projects on food and nutrition that have an application on older people.

3.6 Connectivity and social participation

3.6.1 Introduction

Connectivity and social participation is a priority policy area for ageing in Ireland and forms an important component of National Goal 1 in the National Positive Ageing Strategy. It identifies the need to promote the engagement and participation of older citizens in their local communities with engagement through activity helping to maintain quality of life, promote social contact, combat loneliness and isolation and maintain people as active members of society.

National Goal 1 is *'remove barriers to participation and provide more opportunities for the continued involvement of people as they age in all aspects of cultural, economic and social life in their communities according to their needs, preferences and capacities'*.

There are several objectives within this goal concerning connectivity and social participation specifically. These include:

- Promote the concept of active citizenship and the value of volunteering, and encourage people of all ages to become more involved in and to contribute towards their own communities.
- Promote the development of opportunities for engagement and participation of people of all ages in a range of arts, cultural, spiritual, leisure, learning and physical activities in their local communities.

3.6.2 Key Irish Actors

The National Positive Ageing Strategy of Ireland 2013, published by the Department of Health recognises the importance of the connectivity and social participation of older citizens and this is reflected in one of its objectives; the need to promote the development of opportunities for engagement and participation of all ages in a range of arts, cultural, spiritual, leisure, learning and physical activities in their local communities.

The specific interest by the Department of Health in the connectivity and social participation of older citizens is in part, due to the influence of social networks on health. Fewer social networks are associated with a number of adverse health outcomes including obesity, cardiovascular disease, mental health problems and increased rate of mortality. Research has found that the health risks associated with

lower levels of social integration are comparable to those of smoking, high blood pressure and obesity. Research has further found that loneliness results in adverse mental and physical health conditions, increasing the risks of depression and cognitive decline.

3.6.2.1 Government departments and agencies

Other government departments in addition to the Department of Health that have a policy interest and contribute towards the National Positive Ageing Strategy with respect to connectivity and social participation of older citizens include:

- Department of Environment, Community and Local Government
 - Tasked with fulfilling the objectives outlined above which form part of National Goal 1.
 - There are a number of projects delivered as part of the Local Development Community Plan by various local organisations on behalf of the Department for the Environment, Community and Local Government. These projects are predominately service projects focusing on supporting actions around digital inclusion of older people, supporting independent living, improving information services and providing volunteer visits to reduce social isolation. There is one system-based project that looks at the development of a strategy to plan, organise and deliver events targeting older people.
- Department of Arts, Heritage and the Gaeltacht
 - Delivered a small number of projects via Chester Beatty Library, Age and Opportunity and Crawford Art Gallery. These projects are not exclusively targeted at those aged 50+ but are highly applicable. One of these projects delivered by Age and Opportunity, the 'Bealtaine Festival' celebrates creativity as we age.

3.6.2.2 Third sector

The third sector contributes heavily to the funding / delivery of connectivity and social participation projects. These projects encompass service provision, social activities and inclusion, volunteer schemes, strengthening civic engagement, independent living and support the Senior Citizens Parliament.

There are several main NGOs active and delivering projects in this space, these include:

- Atlantic Philanthropies - in conjunction with other organisations in Ireland are responsible for the funding / delivery of more than 50% of projects in this sector.
- The Alzheimer Society, Age Friendly, Friends of the Elderly, Age Action, Alone and The Irish Senior Citizens Parliament.

3.6.2.3 Business

No initiatives were documented as part of this study.

3.6.2.4 HEI

There are few research projects in this sector conducted in HEIs. The majority of projects focus on service and support provision and engage older people in various activities. One project delivered by Athlone Institute of Technology is a Master's degree project examining the social capital of the older people in Ireland. Two other projects are delivered by the Atlantic Philanthropies in conjunction with University College Galway in the first instance and the Society of Saint Vincent de Paul in the second. These projects established a Rural Ageing Observatory to investigate the role of location in social inclusion / exclusion among older people in Ireland and to develop a strategic plan and business plan for the partner organisation respectively.

3.6.3 International Actors

Ireland has several internationally funded projects

- A small number of projects are funded by the Ambient Assisted Living Joint Programme.
 - One project, which began in 2009 with a budget of €241K has the primary goal of encouraging older people to create, participate and engage in social networks in order to prevent loneliness and isolation.
 - A second project, which began in 2012 with a budget of €349K involves setting up a social platform to create an environment that enables older people to communicate; socialise; play communicative multiplayer computer games; and exercise either by exergames or by moderated exercises.

There also are several projects funded by the Active and Healthy Ageing European Innovation Platform (EIP). These projects focus on digital inclusion skills for carers, creating an age friendly EU by 2020; a European Later Life Active Network (ELLAN) and network innovation for age-friendly environments. Under age friendly EU by 2020, the Equality Authority in Ireland operates an annual 'Say No to Ageism Week', which seeks to challenge ageist attitudes with the use of outdoor advertising, a poster campaign or workplaces and promotional materials. The ELLAN project consortium includes 28 partners from 26 countries, the Irish partner being UCC.

3.6.4 Key Initiatives

Key activities under connectivity and social participation relevant to smart ageing include the following:

- Research links between increased social integration and improved health outcomes and links between social isolation and adverse mental and physical health conditions.
- Projects delivered through the Local Communities Development Plan focusing on independent living and social integration.
- The Rural Ageing Observatory established by the Atlantic Philanthropies and University College Galway to explore social inclusion and location in Ireland.

3.6.5 Conclusion

Connectivity and social participation is a priority policy area for Ireland as highlighted in the National Positive Ageing Strategy. There are strong links between inadequate social support and an increase in mortality, morbidity and psychological distress and a decrease in overall general health and well-being.

Decision-makers, non-governmental organisations, private industry and health and social service professionals can help foster social networks for ageing people by supporting traditional societies and community groups run by older people, voluntarism, neighbourhood helping, peer mentoring and visiting, family caregivers, intergenerational programmes and outreach services.

The third sector plays an important role in this sector, delivering a relatively large number of projects, which are mainly service based. Generally these projects provide support services to older citizens and provide the funds to run such services such as volunteer / befriending networks / services. It appears that there is little enterprise in this sector, due to few marketable opportunities.

3.7 Lifestyle products and services

3.7.1 Introduction

The ageing population in Ireland contributes as both consumers and producers in the economy and society and will continue to do so as this demographic grows. Lifestyle products and services, tailored to the 50+ age category, including tourism, is a large sector presenting many economic opportunities. There are at present, several products and services that have traditionally been tailored to the older population cohort with further opportunities to increase tailored services, such as 'age friendly hotels' with advances in integrating innovative technology into the hotel, e.g. sensor technology and adapted gyms for physiotherapy.

In this sector, it is important to note that bespoke service offering is relatively more difficult to distinguish between services that are targeted at older people and services that are targeted towards the disabled.

Although there may be commercial opportunities in the sector, because of the links with e.g. health concerns, several of the initiatives documented involve concessionary rates for older people and special offers (which, when attracting new customers, generate additional income to enterprise). With this in mind, here we focus on research on the use of older people using IT lifestyle products.

3.7.2 Key Irish Actors

3.7.2.1 Government departments and agencies

There are a number of government departments and agencies involved with funding / delivering projects in this sector.

- The Department of Agriculture, Food and the Marine is involved in several projects that include the promotion of social activities for the 50+ age category, market research to improve visitor experience, provision of facilities for the 50+ age category and reducing admission process to the 50+ age category for certain activities.
- The Department of Jobs, Enterprise and Innovation is involved in a project that looks at Irish Standards for universal design for energy suppliers
- The Department of Justice and Equality is involved in several project which are delivered by the National Disability Authority. Only a small number of these projects exclusively target the 50+ age category. In particular, there is a piece of research into the experience of older people using technology, including pendant alarms.
- The Sports Capital Programme is involved in a small number of initiatives, one of these is aimed at the refurbishment of swimming pools for local authorities and another project is aimed at developing sports and physical recreation for the 50+ age category.
- The Sports Policy and Irish Council is involved in a national programme for sport and physical activity for older people.

3.7.2.2 Third sector

There are several initiatives under Smart Ageing and lifestyle services organised by NGOs.

- A number of projects are funded by Age Friendly Ireland : the Bosch Telehealth Trial and Tourism for Older People: the Age Friendly County Programme and TOURage. One initiative involves several NGOs and enterprises with application in the health sector too.

- Atlantic Philanthropies has been involved in grant giving (€60,000) to enable Age and Opportunity, an Irish organisation that promotes healthy ageing and life-long learning, to carry out a planning process by contracting a consultant.
- Age and Opportunity has initiated the project Physical Activity & Sport, which is fully targeted towards older people. Age and Opportunity works with partner organisations to provide opportunities in arts and cultural activities, and encourage older people to live their longer lives to the full and be active citizens.
- The Irish Wheelchair Association is involved in a sports project, which may have application to older people.

3.7.2.3 Business

In collaboration with IDA Ireland, Google launched an Age Action programme titled the Silver Surfers Initiative. The initiative aims to increase the number of older citizens on line with a Google Survey in Ireland in 2013 showing that only 53% of those aged 50+ are online compared with 93% of those under the age of 50.

3.7.2.4 HEI

Several HEIs are conducting research or are involved in projects with application to Smart Ageing, under the lifestyle theme:

- Athlone Institute of Technology has a small number of projects in the field of media, including a €1.2m project called COMMAND ("Connected Media Applications- Development and Delivery").
- Cork Institute of Technology, the initiative that is relatively closer linked to Smart Ageing is the course that deals with making tourism available to all age groups.
- Dublin City University has an innovative project that aims to provide an opportunity for its participants to try out various other activities in the gym setting. The initiative does not specifically target older people.
- Institute of Technology Sligo is involved in a project on an integrated system using television, mobile applications and IT to enable people to remain at home for longer. The enterprise RUOK is driving the project.
- University College Cork has eight initiatives under lifestyle project and services targeted or involving towards older people. These initiatives range from membership discounts, to art exhibitions and art clubs and initiatives that look at enhancing the health and well-being of older Irish adults through promoting physical activity.

3.7.3 International Actors

There are a small number of projects with Irish partners that are funded by the Active and Healthy Ageing EIP, which aim to connect parties from different countries and have a focus on the theme social inclusion and patient empowerment. These projects include looking at the social and practical acceptability of health technology among citizens over the age of 60, monitoring the cost effectiveness of technology based assistive solutions in interventions aiming at maintaining independence and a good quality of life of older people and ensuring independent living of older people by realising Smart Personalized Rehabilitation and Intervention technologies.

In the Ambient and Assisted Living Joint Programme the project INSPIRATION aims to help older adults living a healthier life to stay mentally and physically fit. Via the programme, a digital coach is used to motivate them to be active on a daily basis. Ireland is involved in the EU project via the Waterford Institute of Technology – Telecommunications Software & Systems Group.

Another project seeks to address the grand challenges associated with increased urbanization. These challenges include social cohesion, migration, transport congestion, sustainability of resources and security and the project intends to provide

research solutions to create and shape attractive, sustainable and economically viable urban areas in which European citizens, communities and their surroundings can thrive.

There are also several projects funded by Framework Project 7, which look at personalized ICT supported services for independent living and active ageing, enhancing the results generated from other eHealth, Active Ageing and Independent Living projects with a view to supporting community building with the results and finally, to launch initiatives coordinated and disseminated by a series of workshops in the US, EU and Japan where members of regional and national ageing centres can come together to help establish public policy and international standards.

3.7.4 Key Initiatives

Ireland has no specific policy on the provision of products or services to the ageing population, however the National Positive Ageing Strategy highlights the Irish government's commitment to innovation and the belief that there is an opportunity for Ireland to become a global centre for the commercialisation of technologies, services and products that improve well-being. In this regard, the current Programme for Government has committed to progressively implementing the recommendations in Trading and Investing in the Smart Economy (2010), which specifically highlighted Silver Tech as an area for action.

3.7.5 Conclusion

Lifestyle products and services is a large sector with a lot of potential for further growth. In part, the sector is expected to grow as a result of the increase in the population above 50+. Moreover, the importance of this sector is reinforced significantly with a number of European funded projects such as the Active and Healthy Ageing EIP and the INSPIRATION project. Government initiatives in the area tend to focus on providing access to lifestyle choices via concessionary rates for older people.

In the next years, the private sector is expected to expand its market segment targeting the older population. Large commercial opportunities exist in the cosmetics industry and in the sport and recreation and tourism industry. At this stage, there is no indication that the private sector would benefit from (public) support to seize such opportunities.

3.8 Employment

3.8.1 Introduction

It is widely accepted, in Ireland and elsewhere, that citizens will need to participate in the workforce for longer and they need to contribute more towards their pensions if they are to achieve the income they expect or would like to have in retirement.

First, while Ireland has a relatively young population, the proportion of older workers as a share of all workers will increase steadily over the next 20 years.

Second, there is substantial pressure on public and private pensions in relation to the current inflow of pension contributions.

Third, there are substantial skills shortages in certain areas, relating to the numbers of people available to work and the nature of the experience and skills required.

Fourth, there are concerns for social wellbeing – with people living longer – many years beyond the typical retirement age in a growing proportion of cases – because older people will need more opportunities to stay connected to their communities and society and participating in work whether paid or voluntary is a good way to address this.

3.8.2 Key Irish Actors

3.8.2.1 Government departments and agencies

There are several government departments with policy interest in employment and older citizens

- Department for Social Protection
 - Employment and equality legislation (see also the Employment Equality Act, 1998)
 - Pensions legislation
 - Return to work policies
- Department for Jobs and Enterprise was involved in ‘Senior Enterprise’,⁵⁰ a EU INTERREG IVB NWE initiative specifically designed to encourage greater involvement of the 50+ age group with enterprise (2010-2013). In 2013, the Entrepreneurship Forum was established and one of its recommendations was that the Exchequer continue funding the ‘Senior Enterprise’ project. The project was led by the Mid-East Regional Authority in 2014.
- Department of Health
 - Has the lead nationally for the National Positive Ageing Strategy, which includes four over-arching goals, one of which is ‘participation’.
- Under the DES there are several (education and training) programmes - Springboard and Skillsnet - that aim to provide education or skills training to those unemployed. A private company is in charge of Skillsnet; evaluations show that some 3% of those who took a course in 2012 were over 60 years old.

3.8.2.2 Third sector

Age Friendly Ireland is looking to implement a pilot scheme to recognise age-friendly businesses and other employers. The initiative aims to identify appropriate age friendly workplace strategies and practices and evidence to develop a set of guidelines.

Third Age Ireland is involved in a Microworking programme which aim to further develop volunteering and the community sectors.

Several NGO and voluntary projects that aim to improve the connectivity of older people indirectly also contribute to maintain older people active participants in society.

3.8.2.3 Business

Further research is needed to understand what the business community in Ireland is doing to respond to these anticipated demographic changes.

Some enterprises are identifying internal opportunities to maintain some of the older workforce engaged under more flexible working conditions. For example, Dublin Bus, has increased its mandatory retirement age, from 65 to 66. Ireland has no legally binding / mandatory retirement age; this is a matter for individual employers.

In addition, some enterprises are specifically seeking opportunity to contract older workers (e.g. McDonalds).

3.8.2.4 HEI

There are substantial opportunities to re-train older people for re-integration into the job market. Life long learning programmes are still not emphasizing the opportunity for older people to develop along their career trajectory.

⁵⁰ <http://www.seniorenterprise.ie>

There are a small number of initiatives at HEIs that are related to employment and smart ageing. These include:

- The Rubicon Incubation Centre at Cork Institute of Technology is home to sixty start-up companies, some of which are developing smart ageing products
- University of Limerick is a partner in the Irish Smart Ageing Change (ISAX), which aims to strengthen social and corporate sectors via a range of locally-designed and locally-tested innovations that are ready to be scaled-up

3.8.3 International Actors

The Active and Healthy Ageing Platform has an employment angle.

3.8.4 Key Initiatives

Ireland has no specific national policy or strategy on ‘employment and the over 50s, although the issue is touched on in the National Positive Ageing Strategy, which includes a ‘participation’ as one of its four overarching objectives and the five participation objectives include a commitment to develop a wide range of employment options.

The repository contains several employment-related initiatives judged to be of relevance to older people

- A small number of NGO initiatives (Third Age / micro-working; Age Friendly Ireland / pilot business recognition scheme to accredit AF employers).
- A national government initiative which has a limited scope to encourage the over 62 to become active part the workforce (Dept. of Social Protection / Pathways to Work advisory service promoted to over 62s).⁵¹
- A regional government initiative (Mid East Regional Authority / Senior Enterprise).
- A state enterprise initiative (Dublin Bus / increased working lifetime).
- A university initiative (University of Limerick / testing social innovations to improve engagement of older people in private and NGO sectors).

3.8.5 Conclusion

Employment of older people is a question about social equity on the one hand and financial prudence (for government) on the other; and possibly skills shortages too, as older workers will tend to have skills and knowledge that are not easily replicated with younger workers.

Several market opportunities may be explored further:

- Recruitment and employment agencies that specialise in providing employers with access to the particular talents of older and more experienced staff.
- Online services / software aps to improve the connection between older workers and employers with vacancies where longstanding experience and advanced ‘soft skills’ may be particularly important attributes.
- Consultancy and training to support employers – public or private sector – to make adjustments to their HR policies / practices to reflect a multigenerational workforce on the one hand and a growing number of very much older works on the

⁵¹ The Pathways to Work government initiative is mandatory for those aged under 62 and on unemployment benefits and the programme is merely optional for over 62s and on unemployment benefits.

other (e.g. job descriptions that give appropriate weight to experience and define roles – possibly part time – suitable for the deployment of such experience).

- Career advice for older workers.
- Retraining / upskilling to support career changers.
- Development and refurbishment of workplaces to better accommodate older workers, for example tackling obvious and classic concerns about reduced mobility etc.
- Development of equipment better suited to the needs of older workers.

3.9 Housing and transport

3.9.1 Introduction

Housing and transport are priority policy areas for ageing and form integral components of National Goals 3 and 1 respectively, for ageing in the National Positive Ageing Strategy.

Housing forms part of National Goal 3 which aims ‘*to enable people to age with confidence, security and dignity in their own homes and communities for as long as possible*’. There are several objectives within this goal concerning housing specifically. These include:

- Facilitate older people to live in well-maintained, affordable, safe and secure homes, which are suitable to their physical and social needs.
- Support the design and development of age friendly public spaces, transport and buildings.
- Continue to implement an An Garda Síochána Older People Strategy and empower people as they age to live free from fear in their own homes, to feel safe and confident outside in their own communities, and support an environment where this sense of security is enhanced.

Transport forms part of National Goal 1, which aims to ‘*remove barriers to participation and provide more opportunities for the continued involvement of people as they age in all aspects of cultural, economic and social life in their communities according to their needs, preferences and capacities*’. There are two objectives within this goal concerning transport specifically. These include:

- Promote access (in terms of affordability, transport availability, accessibility of venue) to a wide range of opportunities for continued learning and education of older people.
- Enable people as they age ‘to get out and about’ through the provision of accessible, affordable, and flexible transport systems in both rural and urban areas.

3.9.2 Key Irish Actors

3.9.2.1 Government departments and agencies

The National Positive Ageing Strategy is led by the Department of Health, however, in the case of housing and transport there are other government departments which have a policy interest in ageing, lead on these issues and are responsible for delivering a number of related projects. It is important to note that many of the projects delivered in this sector are not exclusively applicable to those aged 50+ and that improved transport arrangements, for example, may benefit the wider population.

In relation to housing the Department for the Environment, Communities and Local Government has responsibilities, and for transport it is primarily the Department of Transport, Tourism and Sport.

- Department of the Environment, Community and Local Government
 - Several projects are funded / delivered, some via Local Community Development Plans in conjunction with Roscommon County Council and Ballymun / Whitehall Area. The projects focus on volunteers providing door-to-door transport and collaboration to increase safety and security awareness and to promote independent living in these communities. Another set of projects relate to assistive living technologies available under the Housing Aid for Older People (HAOP) scheme and the Mobility Aids Grant (MAG) scheme and grants available to support the purchase of an alarm system for independent living.
- Department of Transport, Tourism and Sport
 - A notable project is the Rural Transport Programme that is set up with the objective of providing bus services for people in rural areas who do not have adequate access to public transport. In 2013, the value of this programme was €9.13M.
- Department of Energy Communications and Natural Resource
 - A small number of projects are funded / delivered which relate to energy efficiency and renewable energy, the latter including a demonstration project for independent living.
- Department of Social Protection
 - A small number of projects are funded / delivered, one project which provides information on daily living aids, mobility aids and assistive technology (Assist Ireland) and the second project which provides a smart card for public transport (Public Services Card).
- Department of Justice and Equality
 - Several projects funded / delivered all in association with the National Disability Authority. Many of these projects focus on universal design and the development of standards. There are also awards supported by this Department including the Access City Award, the Universal Design IDID Award 2013 and the RIAI Universal Design Award.
- Department of Jobs, Enterprise and Innovation
 - A small number of projects are funded / delivered, both focusing on standards and developing standards on universal design through the National Standards Authority of Ireland (NSAI).
- Department of Defence
 - This department funds the awareness campaign ‘be winter ready’ which offers practical advice and support for winter preparations. This programme does not exclusively target older people although there is specific concern for the preparation of older people.

3.9.2.2 Third sector

The third sector makes a considerable contribution in this sector. There is a range of projects in our database for the third sector for housing and transport. Of these projects, several are concerned with housing and include providing affordable accommodation for older people, providing specially designed apartments and bungalows to older people and providing assistive technologies to enable independent living. The remaining projects are transport related and include changing bus routes to run past hospitals more frequently, providing community transport in the form of a Flexibus service and a motoring project.

3.9.2.3 Business

No initiatives were documented as part of this study

3.9.2.4 HEI

There are some research projects in this sector. As we have seen much of the focus is around providing assistive technologies to enable independent living for longer and providing / designing appropriate housing for older citizens.

There are 4 projects funded in our database in this sector. These include 2 projects by Trinity College Dublin, the first of which provides innovative solutions for buildings, neighbourhood and cities and the second is residential home hosting innovative programming approaches that are person-centred and supportive of patient strengths rather than simply responding to needs. The remaining two projects, the first delivered by University College Cork studies the impact of transport on social participation in Bandon and the surrounding area. The second project, delivered by University of Limerick provides accommodation and support services to start-up companies based at the Nexus Innovation Centre, many of which are active in technologies for assisted living.

3.9.3 International Actors

There are several internationally funded projects in this sector in our database.

- Some projects are funded by FP7 in association with various HEIs in Ireland. One project aims at the development and validation of a new service model that addresses frailty in community dwellings for older adults, the remaining projects are coordination and support actions aimed engaging, coordinating and disseminating information about independent living projects.

Another set of projects are funded by the Active and Healthy Ageing European Innovation Platform. This includes a study on the social and practical acceptability of health technology among citizens over 60 years of age. Another project monitors the cost-effectiveness of technology based assistive solutions in interventions aimed at maintaining independence and a good quality of life for older people. Another example is a project (Smart Prevention, Rehabilitation & Intervention Technologies: Improved mobility & participation - SPRINTS) that aims to ensure independent living of older people by realising Smart Personalised Rehabilitation and Intervention Technologies. Ireland is involved in this project via Trinity College Dublin.

- There is a project funded by the Ambient Assisted Living Joint Programme that aims to address the grand challenges associated with increased urbanisation.

3.9.4 Key Activities

Housing and transport are priority policy areas for Ireland as highlighted in the National Positive Ageing Strategy. The main ambition is to encourage independent living of older people. Rather than placing older people in residential care and homes, it is thought that allowing older people to stay in own homes for longer periods of time is preferable for the individual and also for the wider society.

In addition to the Strategy it is also important to note the Irish National Development Plan 2007-2013, a scheme of organised large-scale expenditure on national infrastructure which actions '*new schemes to meet the needs of older people*' and the Housing Strategy for People with a Disability (2011-16) which includes the continued need to prioritise funding for the operation of the Housing Adaptation Grant Scheme for people with a disability and older people, to facilitate applicants to live in their own homes and communities for as long as possible.

The housing and transport sector is relatively large. Based on our database there are a significant number of projects funded and delivered by at least 6 government

departments. Housing projects tend to focus on design and standards and assistive technologies to support independent living. Transport projects tend to focus on increasing mobility within the community to improve social inclusion. The importance of this sector is reinforced by the presence of a number of internationally funded projects, which explore different aspects of smart ageing in this sector from examining the social and practical acceptability of health and technology to co-ordinating projects across countries to help with the dissemination of information about independent living projects.

3.10 Other sectors

3.10.1 Key Actors and Initiatives

There are several activities/policies/programmes that have not been categorized under any particular sector. These initiatives fall under a specific sector other than those mentioned in the sections above. For example, some of the programmes documented are related to national monuments and historic properties, information services such as the provision of information on entitlements and legal matters, and support for e.g. web-design for older people.

There also is a range of initiatives - and in particular conducted by enterprises - that fall under ICT and silver technologies. Further research is however needed to detail the relation between the enterprises and the target sectors such as health or lifestyle products and the older people. The companies include: Open Sky, Baxter International, Bosch, General Electric, and Philips.

3.11 Multidisciplinary sectors

3.11.1 Key Actors and Initiatives

There is a range of initiatives that target Smart Ageing that have a strong multidimensional nature.

- ‘Age Friendly Ireland’, ‘The Ageing Well Network’⁵², and the ‘Older & Bolder’ programmes: include a range of activities such as
 - Raise public awareness and advocate for age equality;
 - Develop a wider understanding of dementia;
 - The development of national position papers outlining strategy;
 - The development of local age friendly strategies (Galway, Limerick);
 - Develop new community orientated models for ageing;
 - Integrate innovations in care, technology and environment;
 - Development of a network and a community in the field of Smart Ageing to exchange information and knowhow.
- National Positive Ageing Strategy developed by the Department of Health.
- The Irish Centre of Gerontology at NUI Galway seeks to develop and promote social and economic aspects of ageing in Ireland to support a holistic and positive view of ageing and act as a source for all involved in ageing in Ireland.
- The EU Ambient Assisted Living (AAL) programme aims to foster the emergence of innovative ICT-based products, services and systems for ageing well at home, in

⁵² The Ageing Well Network is no longer in existence, its funding ceased in December 2014.

the community and at work (see Section 2.3.1) - having applications for development in housing, health, employment and more.

3.12 Network analysis

In this section we present an example of the network analysis we conducted across the different application areas and across types of actors. For more detailed results, see Appendix C. The types of actors and their abbreviation are indicated in Figure 22. For example, a government department ('G') working in the application area 'Healthcare' can have a relation with an international funding agent ('I') that likewise is working in healthcare and with enterprise ('E') active in the application area 'Food'. The types of relations or collaborations across actors and industries can consist of e.g. partners in a consortium, a funding allocation and work on a joint-project/initiative.

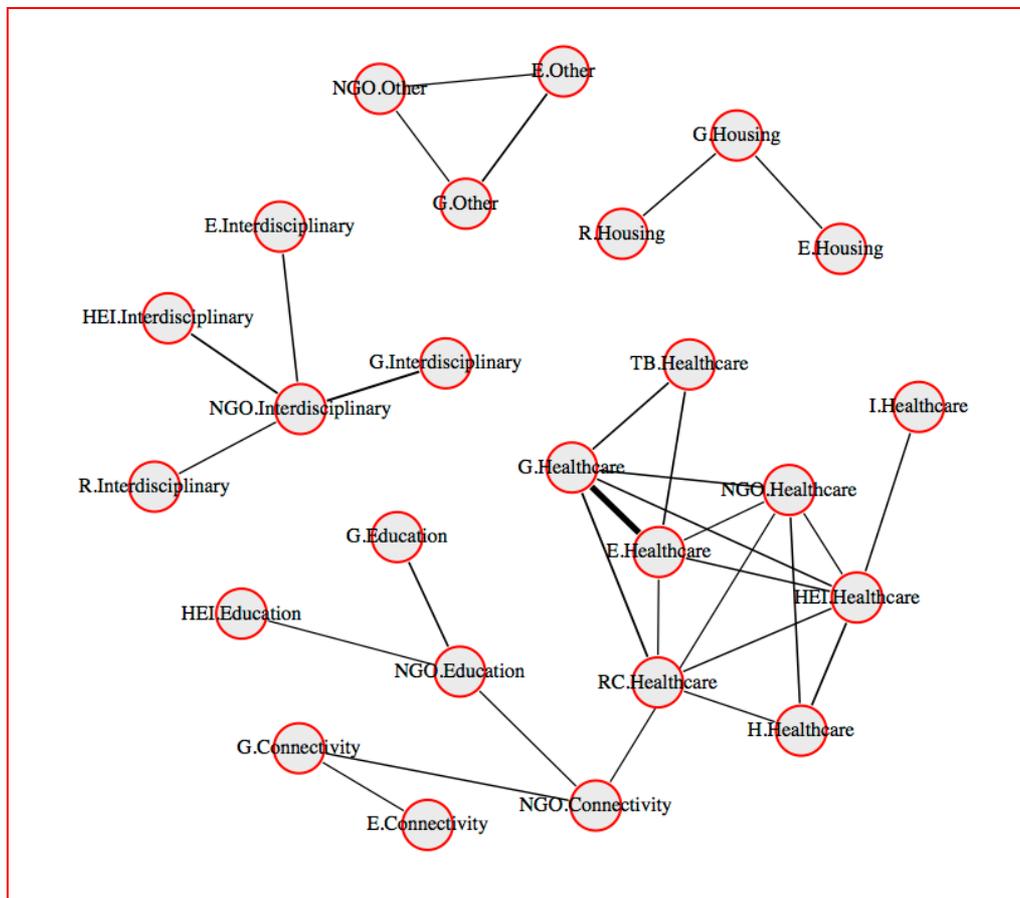
Figure 22 Notations used in the network analysis

Application area, abbreviation	Application area	Actor, abbreviation	Actor
Healthcare	Healthcare and self-care, including biomedical solutions	G	Government
Education	Educational and training services for older people	HEI	Higher Education Institutes
Finance	Financial services for older people	E	Enterprise
Food	Food and nutrition for older people	NGO	NGOs and volunteers
Connectivity	Connectivity and social participation	I	International funding agents
Lifestyle	Lifestyle products and services including tourism	TB	Test bed activity
Employment	Employment	R	Regional partnerships / regional councils
Housing	Housing and transport	H	Hospital
Other	Other application area(s)	RC	Research centre / publically funded research agent
Interdisciplinary	Multiple application areas		

The network analysis captures relations/collaboration between different types of actors and application areas. This means that, we establish a link between actors of a given type (e.g. HEI and Hospitals) that are engaged in a given sector and different actors of a given type that are engaged in a given sector. We present below initiatives across application areas and type of actor where five or more initiatives exist for a specific linkage.

The network depicted in Figure 23, identifies four main clusters in the Irish Smart Ageing landscape: a small cluster which comprises of actors in the housing industry, a small cluster which comprises of actors in 'other' industries, a group of actors in interdisciplinary industries, and a large cluster which includes collaboration across the application areas education, connectivity, and healthcare. In the large cluster, NGO activity in 'connectivity' is connected to NGO activity in 'education', activity of RC in 'healthcare' and to government activity in 'connectivity'. Aside from the centrality of NGOs, governmental bodies are also well connected to various actors: enterprise, test-bed activity, NGOs and research centres. The actors in the healthcare cluster are particularly well connected. And, as depicted by the relative degree of *thickness of the connecting line*, there is a substantial concentration of activity between the government and enterprise in healthcare.

Figure 23 Initiatives across application areas and type of actor (where five or more initiatives exist for a specific linkage)



3.13 Summary

We summarize the key findings resulting from the three parts of the mapping exercise: the overview of the Irish Smart Ageing landscape, an initial scoping of the different Smart Ageing application areas and the network analysis, briefly introduced in the previous section. An overview of the key findings is presented in Figure 24. The mapping exercise was intended to identify priority areas and hence the findings are presented separately for each of the Smart Ageing application areas. The last column of Figure 24 denotes the extent to which evidence of preconditions for commercial opportunities in Smart Ageing was found for a given application area: Substantial evidence (**); Good evidence (**); Some evidence (*); and No evidence (-).

The mapping exercise yields substantial evidence that preconditions of commercial opportunities exist in health and self-care for Smart Ageing. There are a large number of important initiatives, a growing sector (and fast growing sub-sectors), there is a substantial enterprise base and major research capacity. Also, we find strong network relations within the sector.

We find good evidence that preconditions of commercial opportunities exist in the food & nutrition and housing & transport areas. Both sectors have a strong enterprise base and there may be good opportunities to expand the market. Moreover, there is extensive collaboration within these industries.

The assessment of commercial opportunities does not account for the role of actors that are actively working across the Smart Ageing sector and may -indirectly- have

important input into the expansion of industries in the field of Smart Ageing. The application areas connectivity & social participation and the initiatives under ‘multiple application areas’ appear to be particularly relevant from this perspective. For instance, the commercial opportunities in the healthcare sector are likely to be more successful when products and services are tailored to the needs of older people from a broader perspective, incorporating lifestyle choices and individual preferences. The EU AAL programme is a good example of a programme that incorporates such broad perspective.

Figure 24 Summary of the main results from the mapping exercise (items in bold indicate optimal preconditions for commercial opportunities)

Application area	Overview of Smart Ageing landscape	Sector analysis	Network analysis	Optimal pre-conditions
Healthcare and self-care, including biomedical solutions	<ul style="list-style-type: none"> • Large number of initiatives related to smart ageing • Main actors: HEI, enterprise, government, public research bodies • Substantial enterprise base • Substantial number of research initiatives • Range of small-scale (research) initiatives • Substantial amount of initiatives that do not exclusively focus on older people 	<ul style="list-style-type: none"> • National priority area • Substantial research capacity • Substantial support from the Higher Education Authority / Health research Board to research projects in healthcare • Growing sub-sectors: connected-health (ARCH, TRIL programmes), neurodegenerative diseases (K-CORD and Genio dementia programme), important observatory studies such as TILDA • Initiatives including the Health Innovation Hub project, REMEDI • UCC capacity and involvement in BioExplore Research Centre, NUI Galway and Trinity College Dublin capacity in neurodegenerative disease 	<ul style="list-style-type: none"> • Strong connections within sector across types of actors, including collaboration on initiatives that target older people, substantial within industry collaboration on research projects • Strong connection between government and enterprise • Collaboration between HEI and hospitals, international funding bodies and research centres • Connection with ‘connectivity’ as an application area, including collaboration on initiatives that target older people 	***

Application area	Overview of Smart Ageing landscape	Sector analysis	Network analysis	Optimal pre-conditions
Educational and training services for older people	<ul style="list-style-type: none"> Substantial amount of initiatives that do not exclusively focus on older people 	<ul style="list-style-type: none"> National priority area Some engagement of Universities in positive ageing strategy Strategic role for NGOs (and possibly enterprise) in providing IT up-skilling training programme to older people 	<ul style="list-style-type: none"> Connection with 'connectivity' as an application area, including via projects that target older people and particularly in the services 	*
Financial services for older people	<ul style="list-style-type: none"> Tailored initiatives by the Department of Finance to the 50+ and other relevant age cohorts Small number of initiatives that require substantial amount of public spending 	<ul style="list-style-type: none"> Main support from the Department of Finance policy/regulations on pension and tax credits for older people 	-	-
Food and nutrition for older people	<ul style="list-style-type: none"> Recognition of Smart Ageing opportunities by the DAFM Substantial research initiatives 	<ul style="list-style-type: none"> Growing sector, potential in functional food industry (dairy) Establishing nationwide healthy practices, including in residential care Well-connected sector across the entire food chain from improving resource efficiency, nutritional value to reducing food waste Key initiatives under e.g. the ELDERMET programme, the SFI Alimentary Pharmabiotic Centre (APC), Food for Health Ireland Substantial number of SMES and large corporations, especially in the dairy sector 	<ul style="list-style-type: none"> Some collaboration between government bodies and enterprise in developing 'system' initiatives Substantial funding from government to private sector development on initiatives with some relation to Smart Ageing 	**

Application area	Overview of Smart Ageing landscape	Sector analysis	Network analysis	Optimal pre-conditions
Connectivity and social participation	<ul style="list-style-type: none"> Substantial number of (service) initiatives fully targeted to older people Range of small-scale initiatives 	<ul style="list-style-type: none"> National priority area and goal in NPAS Recognition of the importance of connectivity to wellbeing Primary role of NGOs (Local Community Development Plans and Rural Ageing Observatory) in providing services International programmes AAL, AHA EIP (in part) are related to connectivity 	<ul style="list-style-type: none"> NGOs in connectivity play an important role in collaborating with NGOs in education and research activities in healthcare. In particular, NGOs play an important role in connecting actors on projects that do not specifically target older people in the service industry 	*
Lifestyle products and services including tourism	<ul style="list-style-type: none"> Substantial amount of products applications 	<ul style="list-style-type: none"> Products and services tailored to older people cohort (and other frail groups), including tourism economic opportunities Opportunity in relation to IT/silver technology developments (via AAL programme). Government initiatives focus on providing concessionary rates to older people to activities (in health to health) 	-	*
Employment	<ul style="list-style-type: none"> Several initiatives that involve considerable funding 	<ul style="list-style-type: none"> Third sector involvement dedicated to maintain older people active via voluntary projects and microworking Some government initiatives that aim to support older people participation in the workforce 	-	-

Application area	Overview of Smart Ageing landscape	Sector analysis	Network analysis	Optimal pre-conditions
Housing and transport	<ul style="list-style-type: none"> • Relative large number of initiatives related to smart ageing • Recognition of the needs of older people across national transport services • Substantial enterprise base • Substantial number of initiatives fully targeted to older people 	<ul style="list-style-type: none"> • National priority area • Projects on maintaining the mobility and independent living of older people • Considerable support from Government, and NGOs 	<ul style="list-style-type: none"> • Relative amount of collaboration within sector on projects that fully target older people • Substantial funding from governmental bodies to regional bodies on projects that fully target older people • Collaborative opportunities in developing product applications housing and transport (AAL) 	**
Multiple application areas / interdisciplinary	<ul style="list-style-type: none"> • Relative large number of initiatives that apply to multiple application areas • Substantial number of initiatives fully targeted to older people 	<ul style="list-style-type: none"> • Several key activities in Smart Ageing have cross-sectoral applications: initiatives that aim to raise awareness, inform, development of strategies, development of wider networks. 	<ul style="list-style-type: none"> • Collaborations across multiple application areas and actors, in particular on projects that aim to develop networks and other 'systems' initiatives 	*

4. Opportunity areas

In the following sections we describe the different opportunity areas identified based on desk research, the mapping exercise, targeted interviews and the multi-stakeholder workshops organised to validate and substantiate the selection of priority areas of commercial opportunities in Ireland related to Smart Ageing. These include

- Functional food.
- Connected health.
- Assisted living.
- Adaptable housing.
- Leisure tourism.
- Finance.
- Education & Employment.

4.1 Functional food

The opportunity: Develop globally competitive products for ‘improved nutrition’ for healthy ageing thereby contributing to economic growth, increasing public awareness, and supporting health.

4.1.1 Introduction

According to the International Food Information Council, “functional food” category represents foods or food components that may provide benefits beyond basic nutrition. Food science analysts now say that the next-generation foods will be custom-designed to meet the needs and the desires of an individual consumer to deliver ‘personalised nutrition’. According to Bord Bia⁵³ advances in genetics-based nutrition research will help drive the move towards functional food and drink aimed at different groups of the population.

The demand for foods that offer health benefits and even promote disease prevention will become ever more important in order to avoid the long-term health and care costs (Business Insights, The Future of Targeted Functional and Wellbeing Food and Drinks report, 2010). Recent European data show that milk formula, energy drinks, probiotic yogurt, juice drinks, sports drinks, cereal, and biscuits were among the top-performing functional global health and wellness food categories in 2013 (Euromonitor, 2014). Almost three quarter of consumers globally say that they are strongly motivated to live a healthier lifestyle because they want to stay active as they age (The Futures Company Global MONITOR, 2010). This should come as no surprise as older people want to stay active, look good, be fit and healthy more than ever before. For example, age-related products remained the most popular purchases within multivitamins in Ireland in 2013, accounting for 36% of total multivitamins retail value sales. Indeed, older Irish consumers are generally those who are most conscious of maximising their health, with products that aim to maintain and/or improve mobility and joint health the most popular (Euromonitor International 2014). The trend for demand for functional food and drink is also on the up in Asia, especially in Japan and China, where consumers are culturally focused on maximising performance. Note that in Asia, functional food for the older people use explicit ‘senior’ claim on product labels, in contrast to products in the Western countries where a more ‘ageless’ positioning is preferred.

⁵³ Exploring the role of food and drink in the future of health and wellness, Bord Bia, The Futures Company, 2011

Product types preferentially consumed by older people include:

- Bone and joint health.
- Heart health, e.g., cholesterol lowering ingredients.
- Cognitive health, e.g., omega 3, choline.
- Mood food, e.g., against stress, sleeping patterns.
- Digestive health, fibre intake.
- Against muscle loss / Sarcopenia.
- Loss of appetite, ‘nutritionally dense’, protein-rich products.
- Nutricosmetics.
- ‘Super functional’ food: combination of multiple health benefits in favourite food, ice cream, coffee, etc.

4.1.2 Market overview

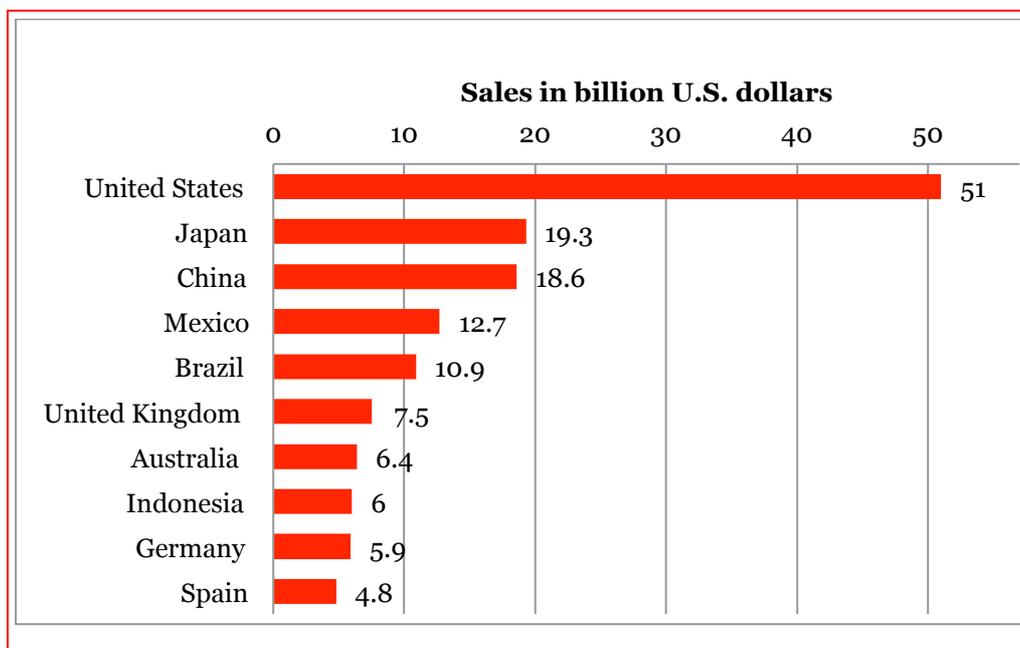
The functional food and drink market is a very large global market with growth opportunities in North America and Asia (Figure 25, Figure 26). The global market of functional food is estimated to have a CAGR of 6% between 2011-2015 (Euromonitor, 2012). Specific sectors within functional food, such as nutricosmetics will be worth over \$4bn globally by 2017 with annual growth of 11% between 2008 and 2012 (Global Industry Analysts Inc, Kline 2010).

Figure 25 Market size of functional food

Product type	Market size
Global sales of functional foods	\$190bn
Global sales of functional beverages	\$63bn
North American sales of functional foods	\$55bn
Global sales of probiotic products	\$30bn
Global sales of multivitamins	\$16bn

Source: Statista, 2010

Figure 26 Sales of functional foods worldwide in 2011, by country



Source: Euromonitor; Agriculture and Agri-Food Canada; Statista

Ireland has a strong agri-food and drink sector accounting for 7.2% of Ireland's economy-wide GVA, 12.3% of Ireland's exports and 8.8% of total employment (DAFM 2014). In 2013, the Irish agri-food and drink exports increased by an estimated 9% to approximately €9.9bn. In 2013, total dairy and ingredients exports increased by an estimated 15% to €3bn. (Bord Bia 2013). The UK was the main destination for Irish agri-food and drink exports in 2013 accounting for 42% of all exports. 32% of exports went to continental EU markets while the remaining 26% went to international markets. Distribution of agri-food and drink exports from Ireland in 2013 show a dominance of dairy products and ingredients (31%), followed by prepared consumer foods (17%), beverages (13%), meat (beef 21%, pigmeat 5%, poultry 2%, sheepmeat 2%), seafood (5%) and edible horticulture and cereals (2%).

4.1.3 Policies and activities

According to our analysis of current research activities in the food industry across Ireland, Government, HEI, and Industry already work together and hence it represents a well-connected sector.

Furthermore, Ireland has a significant research base with a small but growing interest in older people. The flagship ELDERMET/ELDERFOOD project examines the effect of particular dairy components on gut microbiota and provide the scientific validation required to promote consumption of dairy products and ingredients in the elderly population to improve health. The SFI-supported Alimentary Pharmabiotic Centre (APC) conducts research at the interface of Food and Medicine.

The Technology Centre Food for Health Ireland combines scientific research & industry expertise to improve health through innovation in food. Products commercialised include milk-derived functional ingredients for healthy ageing. Recent investment (2013) of €16m by DJEI through Enterprise Ireland, and €5m by private companies Carbery, Dairygold, Glanbia, the Kerry Group, and the Irish Dairy Board highlight the significance of the activities of the research centre in Ireland and beyond. Several research projects in Teagasc Food Programme are related to functional food and involve older people.

In order to coordinate food research activities in the academic sector, the Irish Universities Nutrition Alliance (IUNA) was established including Trinity College Dublin, University College Cork, University College Dublin, and University of Ulster.

TILDA also provides a rich source of information, including nutrition, health, social participation, and education, waiting to be explored and exploited by industry, government and research sectors.

Ireland's national policy and research funding support for functional food is extensive, including

- National Positive Ageing Strategy Goal 2 recognises 'nutrition' as a lifestyle factor;
- Research Prioritisation Exercise "Food for Health" Priority Area H includes development of functional foods and ingredients;
- The Food Harvest 2020 report;
- DAFM 2011: National Food Research and Innovation Plan 'Food and Health' as part of the Strategic Research and Innovation Agenda;
- Major R&D funders include DAFM, SFI, HRB, EI, Marine Institute and industry.

The European Union also has a strong policy and research funding support related to food and health:

- Horizon2020 targets individualised diets and links between food, nutrients and health (e.g., "Tackling malnutrition in the elderly");
- Joint Programming Initiative: Healthy Diet for a Healthy Life (HDHL) investigates the relationship between diet, exercise and health in a trans-

disciplinary and collaborative approach. Ireland has a strong role in this JPI with DAFM, SFI, and HRB being active funders of the initiative, and DAFM and SFI having members on the Management Board;

- European Technology Platform on Food for Life: research targeting healthy ageing;
- Removal of EU milk production quota in 2015 provides opportunity for Ireland to export to global markets.

4.1.4 Ireland's Strengths, Weaknesses, Opportunities, and Threats

Innovations and product development in the functional food sector specifically targeting the older people as consumer group may result in significant economic returns as well as strong social benefits through disease prevention and reduced healthcare costs. Mainstream nutraceuticals and fortified foods for older people are and will be a significant global market. Functional food represents added value, premium pricing with higher margins with respect to commodity food products. Below we provide an overview of the key strengths, weaknesses, opportunities and threats for Ireland entering the functional food sector in the wider scope of Smart Ageing.

Strength

- Strong research capacity related to functional food exists in Ireland with access to patient cohorts providing evidence-base about benefits of functional food for the older people.
- Internationally competitive food industry already generates products for exports. Irish companies IDB, Glanbia, Carbery and Kerry Foods; some SMEs such as Nuritas, Bioatlantis; and multinationals such as Abbot, Wyeth, Nutricia, Danone, Unilever, General Mills, Nestle.
- Well-connected sector across the entire food chain from improving resource efficiency, nutritional value to reducing food waste.
- Strong connection of 'healthy food' products in Ireland with nature / sea⁵⁴ with potential impact on tourism.

Weakness

- Largely ingredient supplier (commodity) to multinationals without real added value products on the market for consumers.
- Irish agri-food exports concentrated in Europe with less presence globally.
- Research is not translating to products in a timely fashion.
- Patent protection of nutritional food components is lagging.
- Innovative SMEs lack resources to drive product development and test functional food products via conducting clinical trials.
- No awareness or focused marketing campaign.

Opportunity

- Leverage existing Irish R&D capacity and research centres in functional food.
- Repurpose existing and successful baby-food/instant milk products and strategies.
- Identify the specific age-related needs in the current global functional food market.

⁵⁴ NutraMara programme for marine functional food development. <http://www.nutramara.ie>

- Develop products related to prevention / treatment / management of particular diseases or conditions. In particular, dehydration, osteoporosis, and Alzheimer's could lead to innovative medicinal food products.
- Integrate all aspects of functional food: fortification, nutrition, natural quality of ingredients, pleasing sensorial aspects (taste and smell), portion size, packaging for easy opening – to make it attractive to the older people (and other challenged groups).
- Market functional food using a holistic approach integrated with the lifestyle of older people, IT design, sports and recreational activities, health and wellbeing and weight management.
- Explore nutritional data from TILDA to develop a better market segmentation of the older population, i.e., personalised nutrition.
- International cooperation and potential partnerships for Irish companies via major EU platforms⁵⁵.
- Combine know-how about nutrition with 'smart appliances', e.g., mNutrition.

Threat

- Regulation may pose potential barrier for health claims for functional food (Food Safety Authority of Ireland / EFSA).
- Strong global competition from multinationals (some already present in Ireland) may create barriers to entry for indigenous companies⁵⁶.
- Many newly launched functional food products are withdrawn from the market within two years of launch⁵⁷.

4.1.5 Rationale for government intervention

The Irish agri-food industry is already well established and strong. Ireland has a reputation for healthy and high quality food and a world-class agri-food research base. However it needs to focus on new consumer needs to enhance its potential and continue to expand its activities and reach new customer segments. Ireland's research outputs could usefully be leveraged further so they translate into innovative products in a more timely fashion; and having a corresponding supporting infrastructure (including IP management) for functional food should then pay additional dividends from investments in terms of future exports and employment. In a highly competitive international environment there is a strong role for government to reconnect key players and help reposition their offering in the field; it could also work with industry interest groups to communicate the new Irish vision for functional food to the outside world and achieve a similar success as it did with formula milk.

The policy objective for the government should be to support Ireland's agri-food sector in expanding its international sales within the functional foods markets of special relevance to older people worldwide and facilitate the translation of new research ideas into developing new products for the older people.

⁵⁵ See for example, NU-AGE. <http://www.nu-age.eu>

⁵⁶ Global Functional Food and Nutraceuticals Market (2014 – 2020)
<http://industryarc.com/Report/99/functional-food-market.html>

⁵⁷ Functional food in the European Union. <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1719>

4.1.6 Recommended actions

The government could consider the following public interventions:

- Create a group around an apposite champion to define / shape a *national strategy, vision and target* for functional food for the older people with corresponding action plan.
- Support a *coordination mechanism* that brings together the food industry with research (including university and health / clinical practice), and other partners along the value chain (i.e., formulation and packaging). This open platform will help to share insights and lessons learned and facilitate collaboration and partnerships among businesses / supply chains and between businesses and universities / research institutes.
- Establish flagship projects around key needs, such as osteoporosis or malnutrition in older people.
- The Health Innovation Hub (HIH), together with DAFM, Teagasc and FHI, could encourage innovation in new food product development for older people. HIH could provide food / nutrition companies with greater insights into the specific nutritional requirements of older people in nursing home / hospital settings, and could facilitate applied consumer research such as new food product / taste trials.
- Promote functional food and *create awareness* in the public and businesses around the link between diet and health in maintaining health and preventing illness.
- Support *positive branding* (c.f., ‘Origin Green’) of functional food by empowering consumers and ‘ageless’ product positioning in Western countries. Development of prospectus / marketing materials for use by Bord Bia and businesses, through international trade missions, events and so on.
- Include nutrition as a *key module in education* of healthcare professionals, including the issue of malnutrition which is common among the older population.
- Help Irish SME’s grow by *commissioning global studies* and position their products in functional food.
- Enable access to substantial additional (competitive) resources through various EU platforms (e.g. European Technology Platform on Food For Life, NU-AGE, etc.).

4.2 Connected health

The opportunity: Develop and commercialise sensor, information and communication technologies that facilitate the remote delivery of care and effective intervention, thereby improving medical outcomes and quality of life for older people, while also improving the management of healthcare resources.

4.2.1 Introduction

The internet and ICT have become a diagnostic tool. The Pew Internet Project reports that 35% of U.S. adults have gone online to figure out a medical condition; of these, half followed up with a visit to a medical professional. 41% of online diagnosers say a medical professional confirmed their diagnosis.

Connected health is a model for healthcare delivery that uses technology to ultimately provide healthcare remotely. The mobile healthcare market comprises of connected medical devices, healthcare application, and related mobile technology. There are many international efforts to strengthen the health information infrastructure in order to improve the quality of health and care in an affordable way.

ICT solutions provide enhancement in health in one of the following ways: (i) more efficient healthcare delivery (e.g. electronic records); (ii) new care pathway (e.g. remote monitoring, self-care); clinically superior treatment (e.g. diagnostics).

The Irish TILDA project provides important lessons on health treatment and health diagnosis that can be used by future innovations in connected health. TILDA's research has already contributed to advancing smart technologies.

Products and services related to connected health:

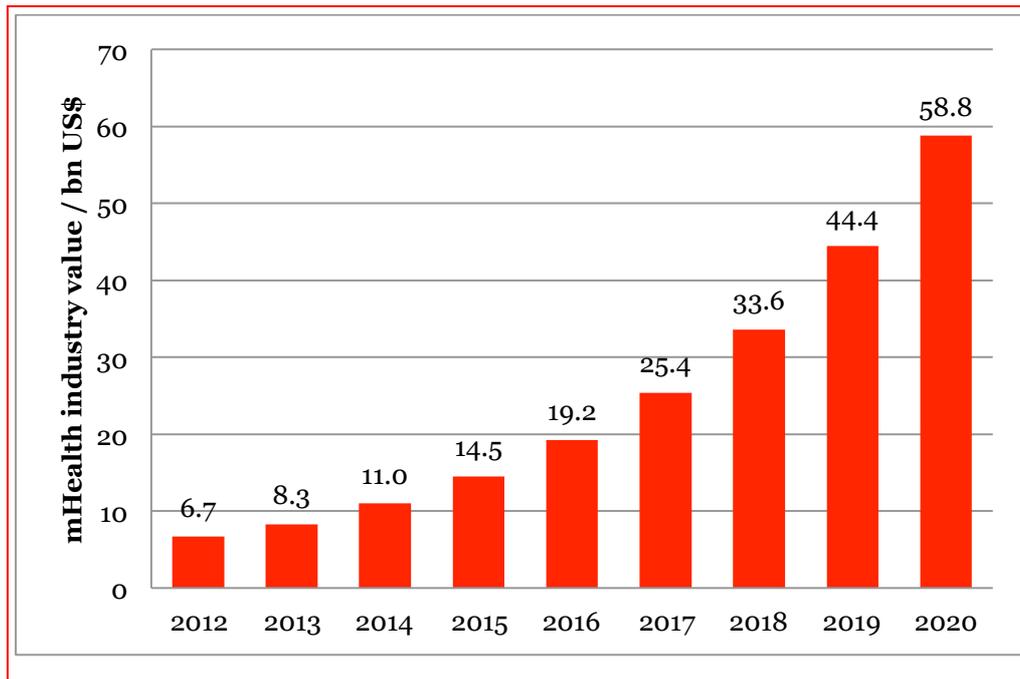
- Mobile apps / Application Programming Interface.
- Remote patient monitoring.
- Health data analytics (chronic).
- Sensor technology (ambient and wearable).
- Medical devices (Point of care diagnostics).
- Wireless technology.

4.2.2 Market overview

Connected health represents a very large global market albeit definition of products and services in this category vary in market reports: from mHealth through healthcare IT and telecare / telehealth are all used names to describe similar but not identical markets. It is not targeting specifically the older people but since older people often affected by chronic health conditions, the products and services developed in connected health will be predominantly used by this segment of the population. In the following we provide statements from market reports that illustrate the size and growth potential of this application area.

- The global healthcare IT market will grow from \$40bn in 2012 to \$57bn by 2017. Source: Markets and Markets.
- The global mHealth market will grow from \$1bn in 2012 to \$10bn by 2018 at a CAGR of 42%. Source: Transparency Market Research.
- The global mHealthcare market is estimated to grow from \$6bn in 2013 to \$21bn by 2018 at a CAGR of 27%. Source: Markets and Markets.
- The global mHealth market is projected to grow 61% by 2017, reaching \$26bn. Source: Research and Markets.
- The global telehealth/telecare market will grow to £14bn by 2015. Source: Deloitte.
- The global Hospital Information Systems (HIS) market was valued at \$7.8 billion in 2009 and is forecast to reach \$18 billion in 2016 (CAGR , 13%).

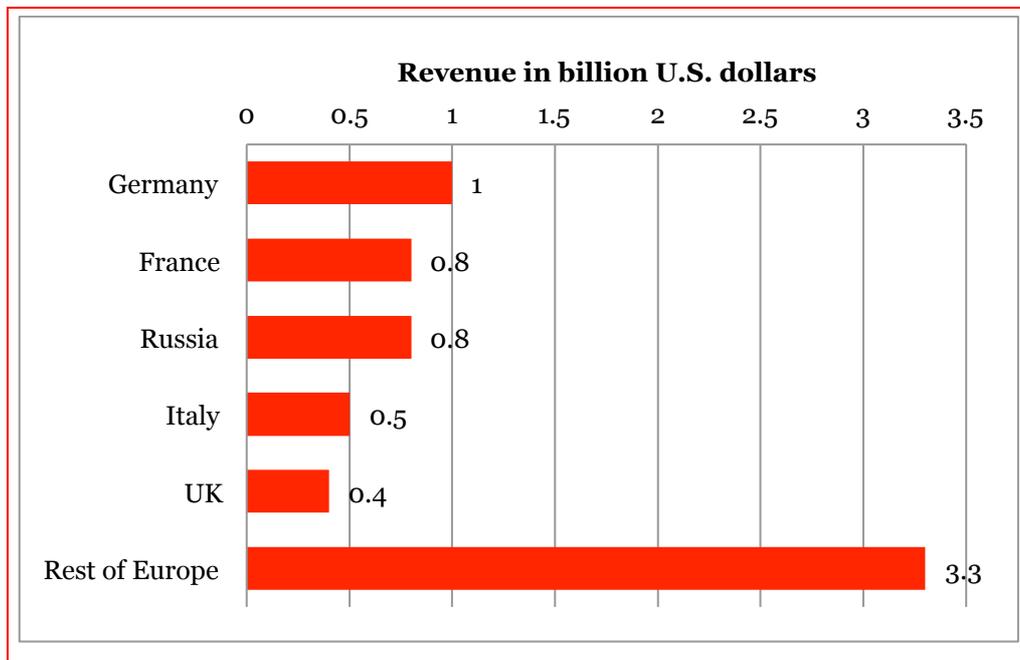
Figure 27 mHealth industry market size projection 2012 to 2020



Source: Allied Market Research 2013

According to PwC and the GSMA, Europe will be a bigger market for mHealth than North America, and the biggest in 2017. The region has a \$6.9bn mHealth market opportunity, while North America’s mHealth market opportunity is \$6.5bn. Market values for other regions and countries include: Latin America, \$1.6bn; Africa, \$1.2bn; United States, \$5.9bn; China, \$2.5bn; Japan, \$1.4bn. Revenues in Europe are predicted to be the largest in Germany, France, and Russia by 2017 (Figure 28).

Figure 28 mHealth revenue in Europe in 2017, by country

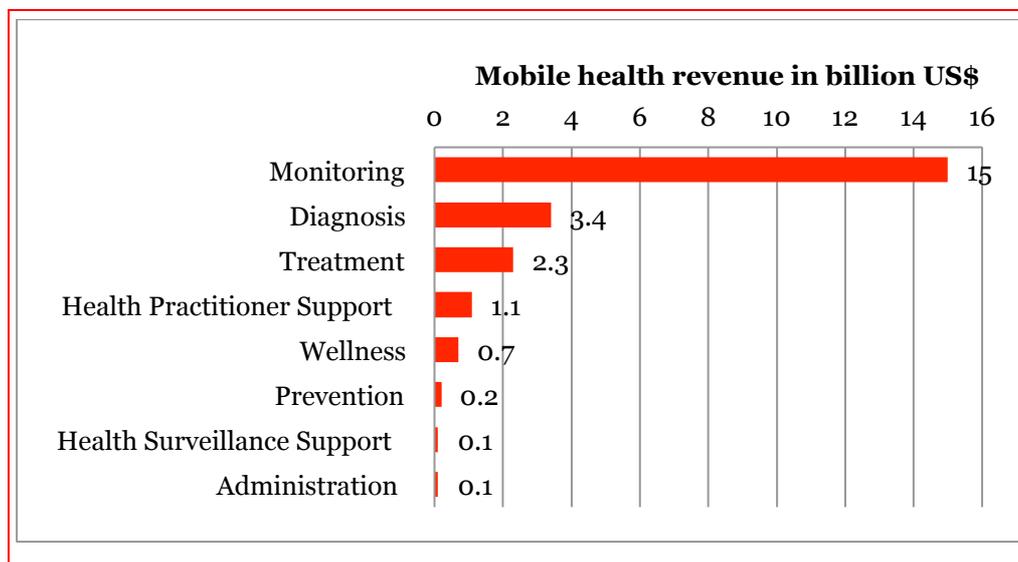


Source: PwC 2012

According to IMSHealth currently most connected health applications ‘inform’ or ‘instruct’. The future is in remote monitoring that could allow for increased data

collection and interpretation. Revenues from mobile health currently come from monitoring activities (65%), followed by diagnosis (15%) and treatment (10%).

Figure 29 mHealth revenue worldwide in 2017, by service category



Source: PwC 2012

4.2.3 Policies and activities

According to our mapping analysis of healthcare-related activities in Ireland, there is a very high degree of interaction among Government, Industry, HEIs, hospitals, and the third sector through test-bed activities, research centres, also linked to areas in Connectivity and Housing.

Ireland has a significant number of research centres related to connected health where academic and industrial researchers can interact and develop new products and services, potentially targeting older people. These include

- INSIGHT - Centre for Data Analytics, which incorporates:
 - CLARITY - Centre for Sensor Web Technologies
 - DERI - Digital Enterprise Research Institute
 - TRIL – Technology Research for Independent Living
- LERO - The Irish Software Engineering Research Centre
- ARCH - Applied Connected Health Research
- Health Innovation Hub (Cork)
- BDI - Biomedical Diagnostics Institute
- CURAM – Centre for Research in Medical Devices, which now incorporates:
 - REMEDI - Regenerative Medicine Institute.

Connected health has also been recognised in the Research Prioritisation Exercise under the categories “Connected Health & Independent Living” and “Medical Devices”. Other national policy initiatives include the ‘Healthy Ireland’ framework, the ‘National Development Plan 2007-2013 Transforming Ireland’, and ‘eHealth Strategy for Ireland’ 2013. The Ageing Well Network also prepared a report on ‘Silver Technologies for an Ageing Population’ in 2010, directly relevant to Connected Health and Smart Ageing.

On the EU-level there are a number of policies and research funding support that provide a useful framework for consistent action for Ireland and other European member states:

- EU H2020: Personalising health and care
- Innovative Medicines Initiative
- Digital Agenda for Europe: eHealth and Ageing
- eHealth action plan 2012-2020
- EU EIP AHA regional initiatives for delivering integrated care
- European Connected Health Alliance.

4.2.4 Ireland's Strengths, Weaknesses, Opportunities, and Threats

Connected health represents a diverse group of products and services where multi-disciplinary research and development involving all stakeholders, including the patients, is a prerequisite for success. Ireland already has strong enterprise presence in this application area and focussing on relative strengths and weaknesses will help turn the existing knowledge base into tangible economic returns. It is remarked that exploiting connected medical technologies and chronic disease management will ultimately mean cost savings in the public health expenditure in Ireland and beyond and hence a significant public sector presence in the potential consumer base is expected.

Strength

- Significant research expertise in the various research centres (e.g., ARCH).
- Strong industrial capacity with skilled embedded software engineers (ICT), and high-quality manufacturing of middleware medical devices. Multinational companies in Ireland in this connected health include IBM, Microsoft, Fujitsu, Philips, Novartis, Bosch Healthcare, Intel Health, GE Healthcare, BT Healthcare, HP, and SMEs: Valentia Technologies, BiancaMed, Centric Health, Heartphone Ltd, SensorMind Ltd, Eircom eHealth Solutions, Shimmer, Safe Care Technologies, Kinesis Health Technologies, CareZapp.
- Good examples of industry-friendly test-bed activities with connected actors including the older people and industry (e.g., CASALA/Nestling), helped by the Ireland's 'small country' effect.
- Effective governance, clinical champions, and industry aligned under eHealth Ireland to promote and implement the eHealth Strategy. Initial focus on ePrescribing, online referrals and scheduling, telehealth and the development of summary patient records.

Weakness

- Ireland's publicly funded health systems have limited capacity at present to adopt new ICT solutions hindering the effective contribution to medical innovation.
- Public health and care budgets are separate and do not provide incentives for frontline staff and end-users to adopt new health technologies in test-bed activities.
- Reimbursement practices in privately funded systems.
- Lack of interoperability and standards in product development prevents global scale (e.g. to use patient data from new ICT solutions)
- Challenges to integrate systems and technologies.

Opportunity

- Demand for managed and personalised care is growing rapidly worldwide providing a large and growing export market.

- Current relatively low market penetration, low consumer awareness, and low adoption rate in Europe are expected to change radically in the near future.
- Integration of technologies already existing in Ireland, e.g., accelerometers, gyroscope, carbon nanotubes, etc. will lead to innovative products.
- Integration of telecommunications and healthcare will spill over to other areas, e.g., reducing medication non-adherence costs or early detection of diseases.
- Interoperable, adaptable and scalable systems (e.g., application programming interfaces, healthcare analytics, ‘health avatars’) will be easy to export.
- TILDA research data can help better understand factors relevant to the socio-economic wellbeing of the older people and develop smart products and services.

Threat

- Solution developed without the end-users is not fit for purpose.
- Rapid changes in information technologies make products obsolete.
- General ICT infrastructure (i.e., fast broadband, mobile network coverage) and systemic weakness prevent Ireland to become a national test-bed.
- Security issues of data access and transmission delay introduction of products and services.
- Regulatory bottlenecks render product development expensive (Health Products Regulatory Authority, EU Data Protection Regulation).
- Increasing investment and international competition from Germany, UK, USA and Japan. Major vendors currently: Tynetec/LEGRAND, Tunstall, OBS Medical, CareTech, Aerotel, Tanita, A&D Medical, GE Healthcare, J&J.

4.2.5 Rationale for government intervention

Promotion and implementation of the eHealth and mHealth agenda are essential for governments worldwide, including Ireland, especially to tackle chronic conditions affecting older people. This can only be done if the value chain of product development is a truly integrated process. Technology solutions are currently fragmented, and SMEs will require help to overcome the barrier to entry and develop a connected health solution that is fit for purpose at the point of care. Barriers also include the lack of standards and interoperable platforms (fundamental for successful uptake on the global scale); unclear reimbursement models and rates for connected technologies; lack of national telecommunication infrastructure; and the regulatory environment.

Therefore it is important to support high-risk product development through demonstration programmes that provide the cost benefits of innovative technologies and move pilot programs to market in a timely fashion. Testing, demonstration of utility, and adoption of new technologies among the frontline staff should be encouraged and facilitated in the public health and care system.

Policy objectives for the government should be (i) to remove barriers and facilitate the convergence of technologies for both medical devices and software solutions; (ii) to create better incentives for developing and adopting connected health technologies in hospitals and care homes.

4.2.6 Recommended actions

- *Facilitate experimentation* with novel systems through connecting research, industry and clinical actors that could lead to new products / services and a step change in clinical practices. One way to achieve this is to link up primary care providers with centres of excellence in the US.
- Support translation of knowledge by supporting innovative SMEs via Small Business Innovation & Research (SBIR) programmes in connected health. Facilitate market entry for innovative solutions to intermediate markets, between

public healthcare and private individuals, such as care homes and sheltered housing.

- Expand and *scale up demonstrator projects* and ‘living labs’ to the national level to show the economic and social benefits of the project. Scaling up the Health Innovation Hub to the national level (based on the experience from the Cork Demonstrator Project) could be a practical way to increase health innovation in general and targeting the older people in particular.
- Build on existing primary healthcare IT infrastructure and support the development of a national electronic *scorecard and telehealth for chronic conditions*.
- Create awareness programmes and *training for frontline staff* and end-users about benefits of connected health solutions.
- Explore the feasibility of a health and welfare *technologies programme*, similar to that found in Denmark, a self-financing scheme with industrial stakeholders involving large hospitals, to promote / support innovation in Smart Ageing. The introduction of such a programme may be linked to the review of objectives of existing infrastructure, i.e. ARCH and the Health Innovation Hub.
- Promote wider access to EU funding and networks in connected health and assisted living.

4.3 Assisted living

The opportunity: Develop and commercialise physical and electronic devices connected to communication technologies that enable older people to monitor and manage their health, thereby living longer, healthier and happier in their homes.

4.3.1 Introduction

Traditional perceptions about old age are changing and it is increasingly accepted that older people want to live longer healthy life years independently in their homes. The concept of ‘assisted living’ includes the use of sensor and information and communication technologies to support people’s needs and wishes, and allow them to live ‘a good life in old age’ as independently as possible in the lowest intensity care setting. Living in smart homes and using smart applications will be the new norm for older people to stay independent and socially engaged. It is estimated that users of smart home applications will triple between 2005 and 2020 from 13 million to 37 million people. Studies show that older people are showing greater participation in gaming than ever before, thus contributing to their overall health and improved quality of life (American Journal of Psychiatry). Assisted living technologies may also provide the solution of the future for mitigating the social impact on the working population. It is shown that the average annual cost of assisted living care was at \$37,500 in 2010, compared with \$80,000 per year for a private room in a nursing home (MetLife Mature Market Institute 2010).

Examples of Products and services related to assisted living:

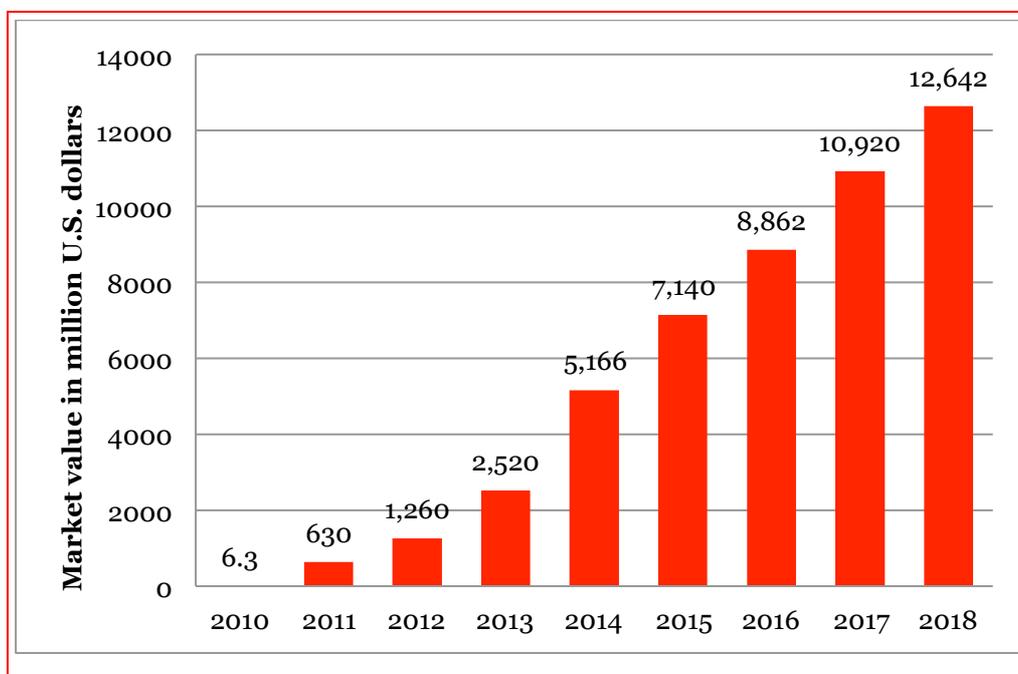
- ‘Ambient Assisted Living’ products
 - Support daily routine via entertainment, communication to alleviate loneliness
 - Supervise the daily routine, including remote monitoring
 - Support access to care, including emergency response, and communication with medical professionals
- Sensor technology (ambient and wearable)
- Mobility aids

- Actuators – devices that do physical operations: opening windows, self-feeding robotics, micro-pumps for insulin delivery, etc.
- Interface between human and machine – speech, gesture, tactile, video inputs / visual, acoustic, tactile, light outputs
- Physical and cognitive gaming technology.

4.3.2 Market overview

The assisted living market is very large globally; however definition of products and services in this category vary in market reports. In the USA, \$41bn was spent on assistive technology in 2011 (BCC Research). The global wearable device market (part of the assistive technologies) shows a steep rise, reaching \$12.6bn by 2018 (Figure 30). According to the 2nd Asia-Pacific Silver Economy Business Opportunities Report 2013, Asia-Pacific’s silver economy is expected to hit \$3 trillion by 2017. The assisted living market in Europe is predicted to grow from \$155m in 2009 to \$525m in 2015 with CAGR 22% with social care homes accounting for \$115m and residential, home-based services \$40m (Frost & Sullivan 2009). In 2009, Germany had 33%; UK 28%; Scandinavia 16% of the market share.

Figure 30 Wearable device market value from 2010 to 2018



Source: Business Insider

4.3.3 Policies and activities

Mapped research activities show a high degree of interaction among Government, Industry, HEIs, hospitals, and the third sector through test-bed activities, research centres; also linked to adaptable housing and connected health. Ireland has a significant research base in assisted living. These include

- INSIGHT
 - TRIL - Technology Research for Independent Living
 - CLARITY - Centre for Sensor Web Technologies
 - DERI - Digital Enterprise Research Institute
- LERO - The Irish Software Engineering Research Centre

- COLLAGE - Collaboration on Ageing, Ireland's 3 Star Reference Site for EIP AHA
- SAAL - Smart Ambient Assisted Living
- MISA - Mercer's Institute for Successful Ageing (St James's Hospital)
- Netwell Centre / CASALA
- CARDI - Centre for Ageing Research and Development
- TILDA data collection - The Irish Longitudinal Study on Ageing.

In terms of national policies, the National Positive Ageing Strategy Goal 3 recognises the need for older people to live independently in their homes and communities for as long as possible and the Research Prioritisation Exercise 'Connected Health & Independent Living' encapsulates the assisted living application area well.

On the EU-level, significant policy and research funding support is present including

- EU H2020 funding: Personalising health and care
- Digital Agenda for Europe: eHealth and Ageing
- EIP AHA regional initiatives for delivering integrated care
- Ambient Assisted Living JP.

4.3.4 Ireland's Strengths, Weaknesses, Opportunities, and Threats

Assisted living technologies range from sensor technologies that gather data linked to monitoring and reporting systems, through mobility aids to entertainment. Recognising the needs of older people and translating those via focussed research to products and services require a multi-disciplinary environment involving all stakeholders. The 'Assisted Living' market is potentially a large market with low consumer awareness or product adoption rate currently in Europe; it is expected to change radically in the near future. It is noted that many of the 'Assisted Living' capabilities of Ireland are related to those discussed in 'Connected Health'. We discuss below Ireland's relative strengths and weaknesses to help to focus on specific application areas that can turn the existing knowledge base into tangible economic returns.

Strength

- Significant research expertise in various research centres (e.g., CASALA, TRIL).
- Strong industrial capacity with embedded software engineers, and high-quality manufacturing of middleware medical devices.
- Good examples of industry-friendly test-bed activities with connected actors including end-users (CASALA/Kiduku).
- Ireland's international cooperation, part of the European networks⁵⁸.

Weakness

- Irish health and care budgets are separate and do not provide incentives for end-users (older people, carers, and frontline staff) to adopt new assistive technologies.
- Challenges to scale up existing initiatives to the national level (partly due to rural infrastructure challenges).
- Multi-disciplinary and multi-stakeholder activity currently not joined up to understand behaviour and needs, and translate those to commercial solutions.

⁵⁸ See, for example, <http://www.openlivinglabs.eu>

Opportunity

- Integration of technology with adaptable (smart) homes.
- Translate existing robotics expertise to healthcare and independent living.
- Focus on mobility as a key to independence, prevention of physical and cognitive decline.
- Develop games for the older people, linking physical and cognitive training with social connectivity.
- Develop human – machine interfaces to facilitate take-up of new technologies.
- Integration of technologies already existing in Ireland and services will lead to innovative solutions.

Threat

- General ICT infrastructure (i.e., fast broadband, mobile network coverage) and systemic weakness prevent Ireland to become a national test-bed at the scale of UK's DALLAS programme.
- Lack of interoperability and standards in product development prevents global scale.
- Solutions developed without the end-users not fit for purpose.
- Rapid changes in information technologies make products obsolete.
- Security issues of data access and transmission delay introduction of products and services.
- Regulatory bottlenecks render product development expensive.
- Increasing investment and international competition from Germany, UK, USA and Japan.

4.3.5 Rationale for government intervention

Assisted living technologies will provide crucial options for older people and it will ultimately mean cost savings in public health expenditure. Therefore a considerable demand is expected (initially from public bodies) for the products and services in this application area. Focusing on the multi-disciplinary strength will be translated into economic returns. As discussed in the case of connected health, technology solutions are currently fragmented, and there is a strong need to join up partners along the value chain, including SMEs. The cost-benefit and 'fitness for purpose' of new products need to be demonstrated before wider adoption can be expected. Adoption will increase with falling prices and allow large scale production. Barriers affecting the assisted living solutions include the lack of interoperable platforms, unclear health insurance incentives; value and meaning of the data collected; consistent national telecommunication infrastructure, and supporting regulatory environment. Large-scale demonstration programmes are needed to alleviate fears and uncertainty among private enterprises and involve the end-users in the product co-design.

Policy objectives for the government should be (i) to remove barriers and facilitate the convergence of technologies and industries (i.e., gaming, entertainment, and health); (ii) to create better incentives for developing and adopting assistive living technologies in older peoples' homes.

4.3.6 Recommended actions

- *Coordinate activities* across research, industry, clinicians and older people to effectively co-design innovative products and services and ensure maximum social and economic benefits of the project and accelerate pilot programmes to reach market.

- Expand and *scale up living-lab* projects to the national level ('large incubator') in order to demonstrate utility for the end user and profitability for private enterprises on a large-scale.
- Create an *innovation programme in the assisted living* space and attract international firms to Ireland to import specialised know-how and technology.
- *Challenge industry to develop games* for older people, linking physical (mobility) and brain training for improved cognition.
- Promote (along with insurers) and implement the concept of assisted living, including the 'social inclusion technologies'.
- Establish training and *awareness programmes* for designers, entrepreneurs, and end-users.
- Expand the coverage of national telecommunication and broadband infrastructure.

4.4 Adaptable housing

The opportunity: Develop the know-how and commercialise the knowledge of smart housing adaptation to support assisted living for older people in their homes. This represents an export opportunity of services for specialised consultancies and internationalisation of indigenous companies.

4.4.1 Introduction

There is a substantial need for the adaptation of existing housing stock to better meet the needs of an older population, especially in rural settings, in Ireland and in many other countries. This international 'adaptation' market is presumed to require design services and building systems, and such Irish know-how and services in this sector may be exported.

There are many kinds of products and services that are expected to figure in the 'adaptable housing space', including architecture and design services, Building Information Monitoring software, and Building systems and components:

- Modular building systems / extensions (to Passive House standards).
- Energy efficient building products to complement (e.g. smart windows).
- Intelligent building management systems and multifunction devices (e.g. smart alarms).
- Intelligent controls for lighting and heating (devices and smartphone apps).
- Access systems / stairlifts / ramps.

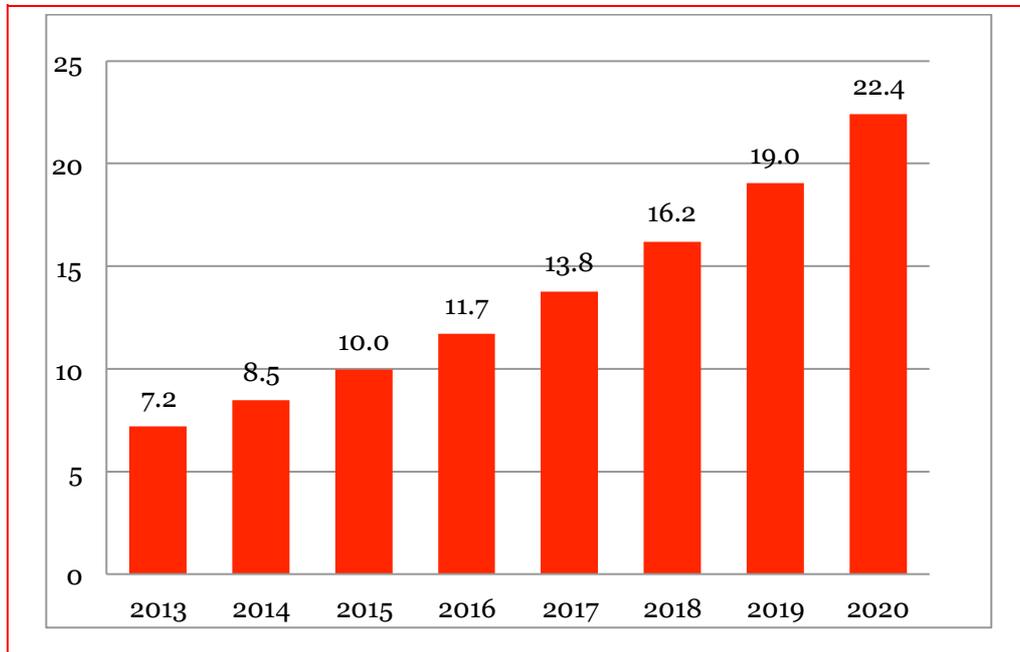
It is noted that major technology companies are entering this market already, see Google's \$3.2 billion purchase of NEST Labs, but this is driven by the Internet of Things rather than Smart Ageing per se.

4.4.2 Market overview

Although Ireland's repair and maintenance industry (RM&I) in the housing sector is worth around €4bn annually, it represents predominantly conventional design and construction services with no meaningful market for 'adaptation' in the private sector with some interest in the local authority sector. The local authority sector is more likely to be able to establish a sizeable and growing market by bringing together adaptable housing and assisted living application areas.

There is a large ‘smart homes’ market in North-America (Figure 31) and while Europe's smart home market is much smaller and highly concentrated (around Germany, France, Netherlands) it is quickly growing.⁵⁹

Figure 31 Americas smart homes market from 2013 to 2020 (in billion U.S. dollars)



Source: Markets and Markets

4.4.3 Policies and activities

While the research and industry picture is not especially promising, Ireland does have several policies and programmes that provide a platform for a big push in this area of adaptation for the internal market

- Ireland has just renewed its commitment to provide Housing Adaptation Grants for Older People (HAGs are a small part of the new €3.8bn programme announced in the Social Housing Strategy 2020, Department of the Environment, Community and Local Government).
- Approved Housing Bodies (AHBs) have been given greater authority / freedom over development of social housing (new or retrofit), which should create a smaller group of larger clients with a strong incentive to build new homes of better quality / environmental performance as well as upgrade the existing building stock to better suit the location / needs of its clients.
- The Construction 2020 strategy means government has targeted the industry as a strategic sector that warrants substantial government support to get people back to work. The strategy also acknowledges the need for an increase in accommodation suitable for older people and has earmarked €100M for new social housing (800 units) designed for older people and people with disabilities.
- There are also several adjacent policies that may be relevant, and in particular the support for improved energy efficiency or independent living.

⁵⁹ <http://www.marketsandmarkets.com/PressReleases/smart-homes.asp>;

<https://www.bsria.co.uk/news/article/connected-and-smart-home-market-will-reach-620-million-in-europe-by-2015/>

Ireland's 'retrofit / adaptation' research base is currently rather limited with industry expenditure on research and innovation for the whole utilities sector around €5M a year, and investment in 'adaptation' will be close to zero. There are however several public sector research institutes with relevant capabilities.

- TrinityHaus, at TCD, which includes research projects on low carbon adaptable homes and universal design amongst many others.
- Information & Communications Technology for Optimal Building Operations (ITOBO), funded by SFI, and concerned with building management at the level of individual dwellings through to neighbourhoods.
- Construction Industry Research & Knowledge Centre (CIRK), which has an interest in re-enveloping, retrofitting, energy efficiency and smart metering amongst other things.

4.4.4 Ireland's Strengths, Weaknesses, Opportunities, and Threats

Adaptable housing may represent an opportunity for economic growth for Irish enterprises as smart homes are considered to be the future growth direction in the developed world, with relevance to the older people. We listed the key features of this application area.

Strengths

- Ireland has a design / built environment research base with an interest in adaptation / universal design.
- Ireland has several civil and structural engineering companies with a strong international presence in specialist buildings, for example, in the Passive House sector, e.g., Kingspan Group.
- Ireland has tech start-ups and software companies that could develop smart building products or sell into global supply chains for 'smart housing'. See for example, Future Homes, Cheevers Smart Solutions, and others.

Weaknesses

- Ireland's construction industry has suffered substantial reversals of fortune in the recession, and limited business incentives are currently available.
- Ireland's architectural sector is small with limited international visibility and exports: it employs around 3,000 architects and had an output of around €180M / exports of around €40M in 2010 (RIAI).
- Ireland's design and construction sector lags behind other countries' industries in the use of ICT / Building Information Modelling (BIM), for example, with around half the penetration rates of the UK and 30% of the US (Irish Building Magazine).
- Ireland's modular building / extensions industries are small and focused on quite traditional / conservative products, with no meaningful export base.
- Routes to market are challenging / still a predominantly domestic marketplace in most countries.
- Other countries like Germany, Sweden, Canada have much larger / stronger systems building industries and a much stronger tradition / capacity in the energy efficient / zero carbon buildings.

Opportunities

- Link up adaptable housing with assisted living to develop unique solutions for older people living in homes not suitable to their needs and hence.
- Smart applications to energy efficiency (Home Energy Management Systems) and security considerations are also relevant for older people.

- Design expertise / consultancy may be exported to the growing European market.

Threats

- Smart homes currently target the high-end market due to significant installation costs.
- Competitive market with a number of European incumbents (RWE, Diehl Controls, and others).
- Privacy concerns prevent wide scale adoption.

4.4.5 Rationale for government intervention

Adaptable and smart homes will be the future in the developed world with advantages from saving energy to creating homes suitable for a lifetime. The government may consider as policy objective to support Ireland's design and building products sector in expanding its international sales within the smart homes and retrofit markets in general, and with a specific target concerning the older people, in particular. Ireland has launched new construction and social housing strategies in 2014, which target building (new and adapted) for older people.

4.4.6 Recommended actions

- Review the possibility of creating an *international competition for Adaptive design*, for housing and for retrofit, as part of Irish Design 2015. This will bring in solutions from around the world as well as energising Irish architects, and whoever wins it will help demonstrate the potential of novel design solutions, build relationships between Ireland's design and construction industries and global leaders.
- Consider supporting RIAI and the Construction Industries Federation in *developing working groups* / market research and international promotional campaigns.
- Encourage *collaborations between research groups, designers and technology firms*, to encourage development of smart buildings and smart building technologies for retrofit.
- Bring *housing and assisted living* together to create added value for both application areas.
- Identify links between 'solutions for adaptable housing' and adjacent government policies including social housing and *energy efficiency* for older people. Look to promote the case for 'adaptation' within those policies and initiatives.
- Consider launching a scheme like the SBRI to give greater focus / innovation to that procurement activity, allowing designers and developers to benefit from these lead markets in the social housing sector.
- Support efforts around *Universal Design*, which are seeking to develop solutions for lifetime homes / lifetime neighbourhoods.
- Expand the volume of underpinning research, in both the design space and in the technology space, perhaps by creating a virtual centre of excellence for 'adaptation in housing for the older person'. This would bridge existing centres and allow their individual research groups to attain critical mass and greater visibility.
- Replicate demonstration projects, which bring together the HSE with Local Authorities with designers, academic groups and industry to develop / showcase novel residential homes and community centres.
- Review planning rules with a view to increasing flexibility in terms of use / reuse of dwellings and mixed use in neighbourhoods. Look at ways to expand the Housing Adaptation Grants scheme, so it is available to a larger number of people.

4.5 Tourism

The opportunity: Develop globally competitive (smart) tourism market tailored specifically to older people thereby contributing to economic growth, utilising and enhancing existing capacities in Ireland.

4.5.1 Introduction

Tourism is an important service traded globally and, according to the World Tourism Organisation, over 1.1bn international tourists travelled the world in 2014. Tourism is an integral component of the enterprise sector in Ireland and plays a major contribution to the national economy through export earnings, employment, regional development and in the provision of facilities and amenities. The importance of tourism to overall economic recovery is also highlighted in the Action Plans for Jobs 2012 to 2014.

Tourism in Ireland is made up by smaller enterprises, both in urban and rural settings, supporting employment of 185,000 in Ireland (2012). Tourism thus has a strong role to play as a source of employment and provides opportunities across a range of skill levels. It also has a powerful influence on international perceptions and the image of the country abroad. It is apparent that tourism, and specifically global tourism, must be central to the government's economic recovery programme. Ireland can continue to tap into the growing trend of older people travelling abroad, and build on its strong market position in this space by adapting to the needs of the older people visiting Ireland. The needs of the 50+ cohort is however not homogeneous and product development and differentiation will be required to meet the needs of the sub-groups within this cohort. The success of tourism is also closely linked to the quality and inclusiveness of systems of transport, ICT, food, and housing. We looked at how Smart Ageing and tourism may be brought together to exploit commercial opportunities.

4.5.2 Market overview

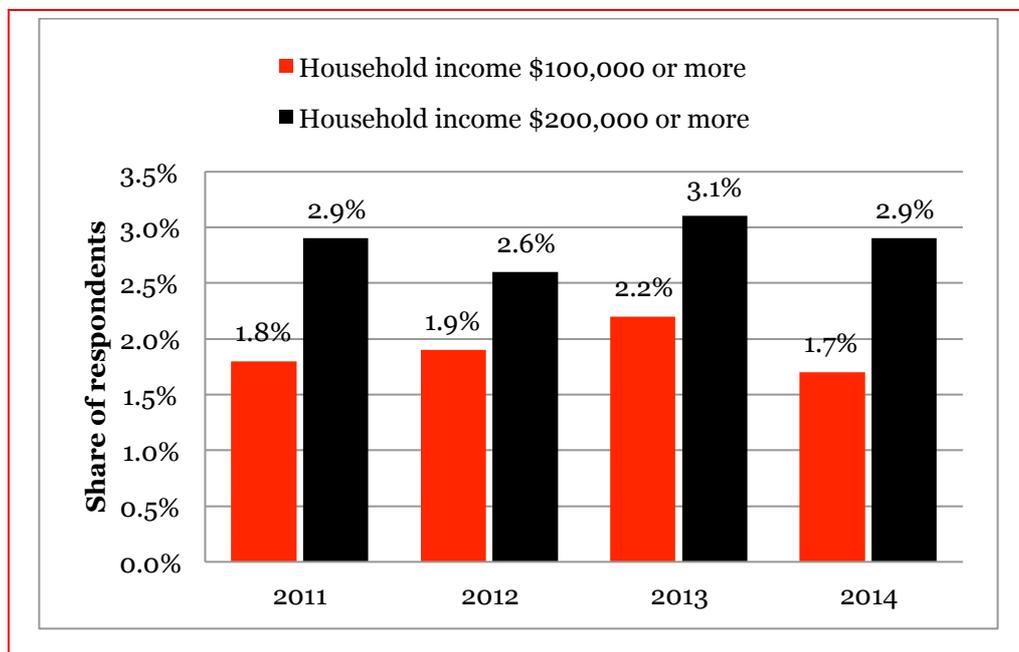
Tourism is a major source of revenue in Ireland, with 7.3 million visitors generating €3.7bn in 2014, about 10% increase over 2013. In 2013, 42% of overseas visitors were holiday /leisure, 36% visiting friends and relatives, 17% were on business and 5% were visitors to Ireland for other reasons. Most visitors come from UK (31%), followed by visitors from the USA (21%), and from Germany (8%) and France (5%). Money spent by overseas visitors was spent on accommodation (29%), food (23%), shopping (12%). The average length of stay was almost 8 nights and for holidaymakers 7 nights. 30% stayed with friends / relatives, 18% stayed in hotels, 26% stayed in rented accommodation, 6% stayed in B&B / Guesthouse and 20% stayed in other accommodation. The profile and source of tourists is also changing with demographic shifts. While overseas visitors to Ireland have traditionally come from the cohort of people aged 50+ in the US and the UK (almost a quarter of holidaymakers in Ireland were aged 55 and over and a further 17% fell into the 45-54 age category), changing demographics have also diversified Ireland's source markets, with Continental Europe increasingly important and growth from long-haul markets (both developed and developing) already noticeable albeit from a very low base.

The 50+ cohort is also an important target in terms of financial spend within a country. According to Bank of America, Merrill Lynch this group is one of the most active demographics in travel and leisure, and spend €120bn per year globally. About 3% of USA visitors to Ireland had an annual household income of \$200k or more (Figure 32). It is noted that a particularly large market for tourism is linked to the wellness industry; inbound and domestic wellness tourism in Europe was estimated to be worth \$158bn in 2012 (The Global Wellness Tourism Economy Report, 2013 SRI International). All in all, Ireland may well position itself to cater for the needs of older visitors from the USA and Continental Europe seeking wellness services.

It is recognised that consumer demand has been changing and emphasis is now on visitor 'experience' and niche markets; for example, the recent policy consultation document by the Department of Transport, Tourism and Sport (DTTAS) explicitly

identifies “retired travellers, health and wellness tourists, and cruise tours” among the growing trends in global tourism (Policy Consultation: Tourism Policy, 2013).

Figure 32 Share of affluent household members in the USA who visited Ireland in the past three years



Source: Ipsos

4.5.3 Policies and activities

Ireland’s Tourism Renewal Group stressed in the past the need for agencies to identify, appraise and pursue new areas where Ireland may have a particular competitive advantage, including niche markets, while maintaining a balance across those areas. Ireland has a number of corresponding national policies:

- Universal Design for customer engagement in tourism services, National Standards Authority of Ireland (2013).
- Universal Design Toolkit for Customer Engagement, Centre for Excellence in Universal Design, National Disability Authority.
- Trading and Investing in a Smart Economy, A Strategy and Action Plan for Irish Trade, Tourism and Investment to 2015, DJEI 2010; and Review of the Government Trade, Tourism and Investment Strategy, DFAT 2014.
- National Tourism Policy for Ireland, draft statement 2014.
- Statement of Strategy and Action Plan on Tourism 2015 – 2017, expected in 2015 to implement policy.

4.5.4 Ireland’s Strengths, Weaknesses, Opportunities, and Threats

Ireland is known for its natural beauty and social inclusiveness to overseas visitors. The economic downturn however also affected Ireland and the number of visitors declined between 2008-2011, followed by stabilisation and return to growth in 2013 and 2014. Ireland needs to take advantage from the growing number of international tourists, and identify the 50+ cohort as one of its target audiences. We shall review below the industry’s strength and weaknesses as a potential Smart Ageing opportunity for Ireland.

Strength

- Ireland is directly accessible from Europe and the US via air links.

- Attractive to English-speaking visitors and the Irish Diaspora.
- Irish Short Stay Visa Waiver Programme and the British Irish Visa Scheme eases restriction for overseas travellers.
- Ireland can offer nature-inspired leisure programmes.
- Ireland is a safe and clean destination often important priorities for the older people.

Weaknesses

- Ireland is not part of the Schengen area with a common visa policy that facilitates travel across 26 European countries.
- Limited air links are hampering growth prospects from emerging markets.
- Accessible travel to the Irish countryside is challenging.
- Perception of a fragmented Irish tourism industry between local authorities and Failte Ireland.⁶⁰

Opportunity

- Create a unique experience, blending technological innovation, cultural heritage, and natural beauty, e.g., smart application development for heritage trails.
- Develop augmented reality software and interactive technology in museums to make visits memorable for the older people.
- Enhance the hospitality dimension of visitors' experience with a blend of social interactions with the local communities and cultural heritage.

Threats

- Internationally competitive growing market.
- Global economic crisis limits the growth of the sector as a whole.

4.5.5 Rationale for government intervention

In some part of the country a significant number of the self-employed working in the tourism / hospitality sector are B&B and pub owners who are themselves 50+ and may need advice / training on how to build in technology in their offering. A thriving tourism industry for the older people not only offers an economic opportunity, but beyond that, provides social benefits in Ireland ('sense of place') and international reputation. It however requires an integrated set of actions that will potentially result in an increase of overseas visitors from the 50+ age group as part of the ongoing overall growth in the sector. It is remarked that the recent public consultations on tourism policy by DTTAS point to the need for a more balanced focus on resources, revenue and jobs, distinguishing between short-term wins and longer term stability.

4.5.6 Recommended actions

- Enhance tourism services in Ireland by continuing to improve infrastructure linked to the needs of the older visitors: accessible transport, age-friendly hotels and B&Bs, and communication technology.
- Support overseas marketing of tourism in Ireland and create a strong image / brand around 'experience', 'cultural heritage' 'environment' and 'wellness' in activities.

⁶⁰ Perceptions were discussed during a workshop involving stakeholders and experts, and further research, including benchmarking with other European member states are needed to clarify this point

- Continue to promote ‘inclusive’ and ‘culturally curious’ tourism in established markets (UK, US, Germany) as well as for tourists with high disposable income from emerging markets in Asia and South America.
- Create a new or extend an existing annual event (e.g., Bealtaine Festival), with the involvement of the entertainment industry, so that older people return to Ireland as tourists.
- Offer advice and training to staff on how to build technology into services to older people. Consider training the 50+ age group in Smart Tourism. Review regulation so that it facilitates the introduction of innovative approaches such as those attractive to older international visitors. For example, by developing standards and introduce ‘age friendly’ certification in hotels and other service facilities.
- Provide specific incentives from government for innovative entrepreneurs to invest in this space both in the short-term, e.g., to build age-friendly hotels, and longer term, e.g., to build a brand in untapped markets.
- Build networks with other EU regions so that Ireland is part of EU-wide offerings, e.g., via the Irish Regions Office and local authorities town twinning schemes.
- A clear reference to the importance of the 50+ cohort should be made within the forthcoming Strategy on Tourism.

5. Future opportunities

We identified two additional opportunity areas in which there may currently be no immediate business opportunities / jobs for Ireland, nevertheless these were recognised as hugely important enablers for a thriving Smart Ageing business sector and their emergence will be necessary in the future.

5.1 Finance

Financial services is an important sector in Ireland, covering areas such as funds management, payments, insurance, operational leasing and specialist finance, with Ireland's International Financial Services Centre exported €19bn in 2009 (CSO, Ireland). The sector employs approximately 21,000 people in agency-assisted companies in Ireland. We investigated during a dedicated workshop session potential opportunity areas that may be within the scope of Smart Ageing:

- Create an Irish/American Investment Fund into 'Smart Ageing' products and services.
- Stimulate the development of finance and health insurance products for independent living.⁶¹
- Enable cross-border / portable pensions and international pension fund management.
- Develop better equity-release schemes to empower the older people.
- Products / tools to protect older customers from risk of abuse / fraud.
- Promote the development of FinTech products more generally including privacy and security.

The government may consider the following actions in order to strengthen the products and services delivered to older people internationally:

- Increase funds / capacity available for incubators / accelerators to support emergence of more FinTech businesses focusing on new products or services of relevant to older clients.
- Support existing centres of excellence in their work with businesses (upstream and downstream) with a view to developing new concepts and new service models.
- Develop financial services test beds to explore novel financial products and delivery channels, from hybrid mortgages through to novel payment methods for generic bills (e.g. utilities, property tax, etc.) with older people; use to support showcasing.
- Support the FinTech and Financial Services industries develop and test the feasibility of novel (proprietary) ideas for products for older people in international markets.

5.2 Education & Employment

Education & Employment are also considered crucial enablers for business opportunities in the Smart Ageing sectors.

⁶¹ A recent survey of 17 leading insurance companies in the UK by BBC indicated that they have no plans to develop new insurance products to help people plan ahead for their care needs in old age, despite policy changes meant to stimulate such activities. Cost of Care project. <http://www.bbc.co.uk/news/health-31023340>

Capacity building in gerontology (e.g., environmental and industrial) through teaching and training courses are a prerequisite to create the next generation of entrepreneurs who can design products and services for the older people. Further, education and lifelong learning also contributes to the general wellbeing of the older people and it is part of the Positive Ageing Strategy in Ireland. Ireland has age friendly cities and age friendly universities. Dublin City University has developed a set of 10 generic principles for an 'Age Friendly University', and it is now adopted by universities in Ireland, the UK and the USA. It is important to deal with 'ageism' and link age awareness to economic opportunities.

- It will be important for the government to consider that the Expert Group on Future Skills Needs undertakes a skills needs analysis and define the training requirements for Smart Ageing.

It is envisaged that e-learning will become a big market in the future. Tata has recently made a deal to make Ireland a number one e-learning centre.⁶² The new online courses will be accredited by Irish universities and can be sold worldwide. For example, it is expected that training health professionals such as nurses and GPs will be an important need in developing countries, i.e. in China. Delivering education via online (and potentially via blended education) will be a future opportunity for Ireland. Equally, employing (older) nurses in a call centre and outsourcing their services worldwide can potentially make a large economic impact in Ireland. Irish companies, such as Rigney Dolphin, have already made progress in this space and could be further developed.

- Promote Ireland as a country with an age-diverse culture in workforce.
- Draw on experience of older people to improve care.

In terms of adapting the work place for older people, the concept of age friendly workplace needs to be developed in conjunction with a reformed pension system including HR models dedicated for older workers. It is recognized that older people are successful entrepreneurs and 'Silver Entrepreneurship' could be supported at a government level.

- Create a national award for the most 'age friendly' workplace. Provide opportunities to promote ergonomics for older people (e.g. in workplace) during the Year of Irish Design.
- Leverage local authorities in the silver economy and for support in online learning.
- Flag pensions on the policy agenda
 - Credit system for home workers
 - Reintegration of older people in workforce through reskilling / role redesign has pension consequences; realign pension with working life.

⁶² <http://www.independent.ie/business/irish/indian-giant-gives-lifeline-to-struggling-universities-30784484.html>

6. Conclusions and recommendations

Smart Ageing is a broad concept that combines innovation and technology to produce products, services, solutions and systems to improve the quality of life for people aged 50 and over. Eight thematic application areas were defined for this study: Healthcare and self-care; Education and training; Financial services; Food and nutrition; Connectivity and social participation; Lifestyle products and services; Employment; Housing and transport. In our mapping exercise we categorised activities across Ireland received during the data collection phase to the eight areas above and two additional categories: Other sectors and Multidisciplinary sectors. A network analysis of the structured information helped visualise the large body of data and showed connectedness and cross-sectoral linkages. For example, this showed that projects in Healthcare were often linked to Education and Connectivity.

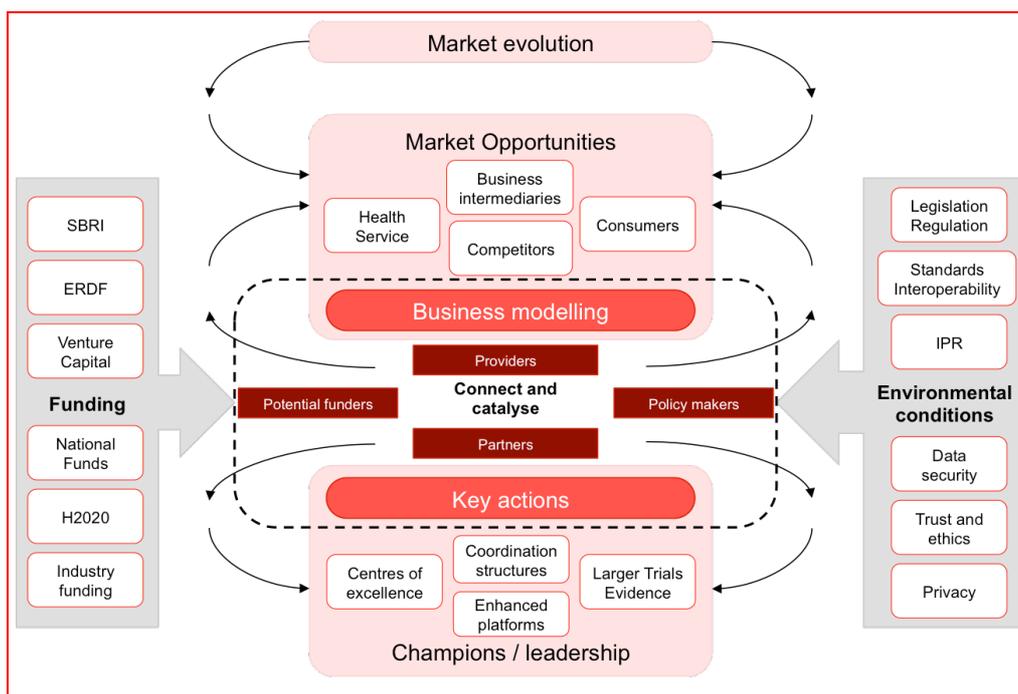
Based on a set of indicators we identified potential commercial opportunity areas in Functional food, Connected health, and Assisted living. Other important areas with less immediate opportunities discussed in this report include Adaptable housing, Tourism, Finance, and Education & Employment.

Although the scale of global markets and growth opportunities is enormous, substantial international activity is already noticeable in Smart Ageing, discussed in the Global context activities in Section 2 of this report. However, very few countries have set up the kind of political leadership necessary to maximise commercial opportunities Ireland is currently aiming at. Therefore, focussed political commitment may be the single most potent action Ireland can take to exploit international opportunities in a coordinated, multi-disciplinary approach.

6.1 Framework for exploiting Smart Ageing opportunities in Ireland

Smart Ageing is a concept that is based on the underlying assumption that a segment of the population above 50 years of age forms a potential consumer or interest group that can be treated similarly. The concept came under scrutiny over the validation workshops and interviews where experts in a particular application area did not always appreciate the age as the key, unifying factor for the group itself. In many cases, the activity-based grouping or condition-specific grouping seemed more adequate. Nevertheless, in order to exploit market opportunities from assets that exist in Ireland and can be used to develop products and services for the older people, it may be useful to use a logic framework–type map as seen in Figure 33. The ultimate objective of the Action Plan for Jobs is to connect and catalyse existing resources and thus help to develop innovative products and services that respond to the evolving market opportunities. In order to do so, policy makers must create optimal environmental conditions via legislation and regulation to provide businesses the confidence to operate (securing IPR, interoperability standards to help integration, etc.) and risk their capital and interact with other key stakeholder. These exchanges usually happen in technology centres or innovation hubs where partners congregate around key opinion leaders or champions and formulate a common vision to achieve their goals. The ensuing key actions require funding and this can come from venture capital, public and industrial funding, or a combination of those. Often these processes are iterative in nature and require periodic readjustments before products and services are developed that the consumers or the health services can adopt and integrate into their routine activities. We are confident, based on current activities in Ireland and the prevailing global context, that there is scope for exploiting in the short term existing R&D capabilities in Functional food, Connected health, and Assisted living space and target the older people in export markets and grow new indigenous businesses in Ireland.

Figure 33 Framework for exploiting Smart Ageing opportunities in Ireland



Source: Technopolis Group. The diagram was adapted from HAIVISIO project: Improve the Exploitation of Assets from EU Funded R&D in Active and Healthy Ageing

6.2 Recommended actions for Smart Ageing opportunity areas

There are a number of cross-cutting issues that are contingent on the domestic health system working with enterprise and given the system's complexity further efforts would need to be invested to facilitate this interaction. Based on an improved national physical and communications infrastructure, Ireland will be able to establish a Smart Ageing ecosystem (with local authorities, public research, businesses and end-users connected in a safe and collaborative environment) that can build country-wide demonstrator projects and living labs to validate the feasibility and socio-economic benefits of innovations in the Smart Ageing space. In the following we summarise the key recommendations for each opportunity area.

6.2.1 Functional Food

The opportunity: Develop globally competitive products for 'improved nutrition' for healthy ageing thereby contributing to economic growth, increasing public awareness, and supporting health.

- Create a group around an apposite champion to define / shape a *national strategy, vision and target* for functional food for the older people with corresponding action plan.
- Support a *coordination mechanism* that brings together the food industry with research (including university and health / clinical practice), and other partners along the value chain (i.e., formulation and packaging). This open platform will help to share insights and lessons learned and facilitate collaboration and partnerships among businesses / supply chains and between businesses and universities / research institutes.
- Establish flagship projects around key needs, such as osteoporosis or malnutrition in older people.
- The Health Innovation Hub (HIH), together with DAFM, Teagasc and FHI, could encourage innovation in new food product development for older people. HIH

could provide food / nutrition companies with greater insights into the specific nutritional requirements of older people in nursing home / hospital settings, and could facilitate applied consumer research such as new food product / taste trials.

- Promote functional food and *create awareness* in the public and businesses around the link between diet and health in maintaining health and preventing illness.
- Support *positive branding* (c.f., ‘Origin Green’) of functional food by empowering consumers and ‘ageless’ product positioning in Western countries. Development of prospectus / marketing materials for use by Bord Bia and businesses, through international trade missions, events and so on.
- Include nutrition as a *key module in education* of healthcare professionals, including the issue of malnutrition which is common among the older population.
- Help Irish SME’s grow by *commissioning global studies* and position their products in functional food.
- Enable access to substantial additional (competitive) resources through various EU platforms (e.g. European Technology Platform on Food For Life, NU-AGE, etc.).

6.2.2 Connected Health

The opportunity: Develop and commercialise sensor, information and communication technologies that facilitate the remote delivery of care and effective intervention, thereby improving medical outcomes and quality of life for older people, while also improving the management of healthcare resources

- *Facilitate experimentation* with novel systems through connecting research, industry and clinical actors that could lead to new products / services and a step change in clinical practices. One way to achieve this is to link up primary care providers with centres of excellence in the US.
- Support translation of knowledge by supporting innovative SMEs via Small Business Innovation & Research (SBIR) programmes in connected health. Facilitate market entry for innovative solutions to intermediate markets, between public healthcare and private individuals, such as care homes and sheltered housing.
- Expand and *scale up demonstrator projects* and ‘living labs’ to the national level to show the economic and social benefits of the project. Scaling up the Health Innovation Hub to the national level (based on the experience from the Cork Demonstrator Project) could be a practical way to increase health innovation in general and targeting the older people in particular.
- Build on existing primary healthcare IT infrastructure and support the development of a national electronic *scorecard and telehealth for chronic conditions*.
- Create awareness programmes and *training for frontline staff* and end-users about benefits of connected health solutions.
- Explore the feasibility of a health and welfare *technologies programme*, similar to that found in Denmark, a self-financing scheme with industrial stakeholders involving large hospitals, to promote / support innovation in Smart Ageing. The introduction of such a programme may be linked to the review of objectives of existing infrastructure, i.e. ARCH and the Health Innovation Hub.
- Promote wider access to EU funding and networks in connected health and assisted living.

6.2.3 Assisted living

The opportunity: Develop and commercialise physical and electronic devices connected to communication technologies that enable older people to monitor and manage their health, thereby living longer, healthier and happier in their homes.

- *Coordinate activities* across research, industry, clinicians and older people to effectively co-design innovative products and services and ensure maximum social and economic benefits of the project and accelerate pilot programmes to reach market.
- Expand and *scale up living-lab* projects to the national level ('large incubator') in order to demonstrate utility for the end user and profitability for private enterprises on a large-scale.
- Create an *innovation programme in the assisted living* space and attract international firms to Ireland to import specialised know-how and technology.
- *Challenge industry to develop games* for older people, linking physical (mobility) and brain training for improved cognition.
- Promote (along with insurers) and implement the concept of assisted living, including the 'social inclusion technologies'.
- Establish training and *awareness programmes* for designers, entrepreneurs, and end-users.
- Expand the coverage of national telecommunication and broadband infrastructure.

6.2.4 Adaptable housing

The opportunity: Develop the know-how and commercialise the knowledge of smart housing adaptation to support assisted living for older people in their homes. This represents an export opportunity of services for specialised consultancies and internationalisation of indigenous companies.

- Review the possibility of creating an *international competition for Adaptive design*, for housing and for retrofit, as part of Irish Design 2015. This will bring in solutions from around the world as well as energising Irish architects, and whoever wins it will help demonstrate the potential of novel design solutions, build relationships between Ireland's design and construction industries and global leaders.
- Consider supporting RIAI and the Construction Industries Federation in *developing working groups* / market research and international promotional campaigns.
- Encourage *collaborations between research groups, designers and technology firms*, to encourage development of smart buildings and smart building technologies for retrofit.
- Bring *housing and assisted living* together to create added value for both application areas.
- Identify links between 'solutions for adaptable housing' and adjacent government policies including social housing and *energy efficiency* for older people. Look to promote the case for 'adaptation' within those policies and initiatives.
- Consider launching a scheme like the SBRI to give greater focus / innovation to that procurement activity, allowing designers and developers to benefit from these lead markets in the social housing sector.
- Support efforts around *Universal Design*, which are seeking to develop solutions for lifetime homes / lifetime neighbourhoods.

- Expand the volume of underpinning research, in both the design space and in the technology space, perhaps by creating a virtual centre of excellence for ‘adaptation in housing for the older person’. This would bridge existing centres and allow their individual research groups to attain critical mass and greater visibility.
- Replicate demonstration projects, which bring together the HSE with Local Authorities with designers, academic groups and industry to develop / showcase novel residential homes and community centres.
- Review planning rules with a view to increasing flexibility in terms of use / reuse of dwellings and mixed use in neighbourhoods. Look at ways to expand the Housing Adaptation Grants scheme, so it is available to a larger number of people.

6.2.5 Tourism

The opportunity: Develop globally competitive (smart) tourism market tailored specifically to older people thereby contributing to economic growth, utilising and enhancing existing capacities in Ireland.

- Enhance tourism services in Ireland by continuing to improve infrastructure linked to the needs of the older visitors: accessible transport, age-friendly hotels and B&Bs, and communication technology.
- Support overseas marketing of tourism in Ireland and create a strong image / brand around ‘experience’, ‘cultural heritage’ ‘environment’ and ‘wellness’ in activities.
- Continue to promote ‘inclusive’ and ‘culturally curious’ tourism in established markets (UK, US, Germany) as well as for tourists with high disposable income from emerging markets in Asia and South America.
- Create a new or extend an existing annual event (e.g., Bealtaine Festival), with the involvement of the entertainment industry, so that older people return to Ireland as tourists.
- Offer advice and training to staff on how to build technology into services to older people. Consider training the 50+ age group in Smart Tourism.
- Review regulation so that it facilitates the introduction of innovative approaches such as those attractive to older international visitors. For example, by developing standards and introduce ‘age friendly’ certification in hotels and other service facilities.
- Provide specific incentives from government for innovative entrepreneurs to invest in this space both in the short-term, e.g., to build age-friendly hotels, and longer term, e.g., to build a brand in untapped markets.
- Build networks with other EU regions so that Ireland is part of EU-wide offerings, e.g., via the Irish Regions Office and local authorities town twinning schemes.
- A clear reference to the importance of the 50+ cohort should be made within the forthcoming Strategy on Tourism.

6.3 Smart Ageing strategies, structures, and governance

6.3.1 Political leadership

- A central government department is best placed to ‘own’ Ireland’s national ‘Smart Ageing’ strategy, as the issues are clearly cross-departmental, from employment to health, from education to tourism.

6.3.2 Governance

- In terms of structures, it may be appropriate for the Inter-Departmental Working Group to be transformed into a standing committee that would bridge departmental interests and deliver the necessary political commitment.
- An Inter-Departmental Committee on Smart Ageing (IDCSA) would deliver political leadership and oversight; it would not be involved in detailed planning or implementing the national strategy.
- Create a **Smart Ageing Leadership Council for Ireland** (SALCI), to engage the private and third sectors, alongside central and local government, to ensure political leadership is mirrored in industry and third sector strategies.
 - SALCI would benefit from having a secretariat and small budget, to develop the detailed Smart Ageing strategy and to drive forward that agenda in multiple policy and industry settings, through advocacy, communication, coordination, etc.
 - SALCI would need the authority / capacity to convene and support working groups, with the expertise and resources to drive forward the Smart Ageing agenda in a specific area, whether that is Education or Financial Services.
 - While there may be no immediate big win (business opportunities / jobs) for Ireland in say Education or Employment, they are very important issues for an ageing population and it would be appropriate / timely for the people responsible for Ireland's national strategies in those areas to be challenged / advised about 'Smart Ageing' (e.g. Financial Services Strategy, Social Housing Strategy).
 - Membership of those working groups will need to comprise experts (not representatives) from relevant stakeholder groups.

6.4 Implementation of cross cutting actions

- Implementation strategies need to recognise there are many pre-existing initiatives / investments, to which they should add value by galvanising (connect and catalyse) actors around a bigger vision or national agenda.
- Coordination, co-investment, synergy, etc., should be the watchwords rather than 'a new programme of investment'.
- A national Smart Ageing competition may be an economical model, offering a small number of sizeable and high-profile prizes for major innovations related to different aspects of Smart Ageing. This could be organised as a 'National Design Challenge' for Smart Ageing.
- SALCI should consider creating a **National Centre for Smart Ageing**, to bring together Ireland's research capabilities across thematic application areas, based on the opportunity areas outlined in this report. A multidisciplinary approach dedicated to Smart Ageing is currently missing in Ireland that would catalyse, incentivise and operationalize collaborative activities, and help to translate, promote and disseminate the knowledge generated through the various programmes. The new centre would provide a much needed focal point for international businesses interested in Smart Ageing in Ireland. The 'Silver Valley' hub in Paris could be a model to emulate with a sustainable, public-private partnership business model. For a short description of the main features of Silver Valley see Box 2, for a more detailed description, see Appendix D.

It is essential to establish a National Centre for Smart Ageing even if as a 'virtual organisation' initially to highlight the ambition of Ireland and capture the attention of the public and the international community. This may in practice be a 'Federation of Centres' working together in the background. Without a flagship

organisation, however, the Smart Ageing project of the Irish government and the older population may well risk to be forgotten and the corresponding economic opportunities not fully exploited.

Box 2

Silver Valley: An ecosystem for ageing better

In 2010 a ‘cluster of innovation’ was established and in 2013, when the French government officially recognised the silver economy sector as a priority industry on its own right through an integrated network agreement, Silver Valley⁶³ was born.

Silver Valley is a non-profit association that unites the actors of the silver economy in the Ile-de-France region⁶⁴. It has the ambition to boost the development of innovative economical activities (through growth and employment in the region) that meet the older people’s needs for better ageing. Silver Valley’s mission is to

1. Strengthen an ecosystem that generates the conditions favourable to the development and commercialisation of ‘Smart Ageing’ solutions
2. Develop an awareness of public, private and academic players about ‘Smart Ageing’ opportunities
3. Support the actors in the silver economy to help understand the needs and practices of the older people and to develop their innovation strategy
4. Develop the regional attractiveness of Ile-de-France and promote French products and services on an international scale

Silver Valley has developed a sustainable business model with equal level of public and private financing. External services offered by Silver Valley include training, consulting, conference organisation, and acting as reviewers for project selection committees. Silver Valley is run by a 5 FTE strong team that includes business development, marketing, communication and finance.

Silver Valley is a member of the InnoLife consortium, gathering 144 European players⁶⁵: leading businesses, research centres and universities from 9 EU countries. It has been selected in December 2014 by the European Institute of Innovation and Technology (EIT) as the Knowledge and Innovation Community (KIC) for EIT Health. With a total volume of €2.1bn it is one of the largest publicly funded initiatives for health worldwide.

⁶³ <http://www.silvervalley.fr>

⁶⁴ Ile-de-France has a population of 12m, an area of 12,000 km² and a per capita GDP of \$66,000; Republic of Ireland has a population of 4.6m, an area of 70,300 km² and a per capita GDP of \$43,600 (2012).

⁶⁵ Trinity College Dublin is an academic partner in the consortium that builds the UK-Ireland co-location centre

Appendix A Workshop Report

Evaluating Business Opportunities in Smart Ageing

Notes of two stakeholder workshops held in Dublin

Wilton Park House, Wilton Place, Dublin 2

19th and 20th November 2014

A.1 Background to the workshops – a larger study on ‘Smart Ageing’

The workshops are a critical step within a larger study on ‘Smart Ageing’

- The study is entitled “A Mapping of Smart Ageing Activity in Ireland and Assessment of the Potential Smart Ageing Opportunity Areas”
- The term ‘Smart Ageing’ is used to signify the intersection between the needs of older people and the solutions proffered by new technology and innovation
- More specifically ‘Smart Ageing’ is defined as ‘... using technology and innovation in both the public and private sectors to produce products, services, solutions and systems to improve the quality of life for people aged 50 and over’

The study is being carried out for a Steering group, chaired by the Department of the Taoiseach and supported by the Strategic Policy Unit in the Department of Jobs, Enterprise and Innovation.

A.2 Action Plan for Jobs 2014

The study was launched in response to commitments made in the Action Plan for jobs, 2014. It comprises four components, and will report in January 2015

- Map Ireland’s ecosystem for Smart Ageing
- Assess the relative strengths of the main elements in that ecosystem
- Assess the potential business opportunities for Ireland in the area of Smart Ageing from both a domestic and international market perspective
- Identify the policy enablers to exploit opportunities and propose policy actions

The study has a broad thematic scope, exploring opportunities in 8 areas, from healthcare to housing, from food to financial services

- Healthcare and self-care, including biomedical solutions
- Educational and training services for older people
- Financial services for older people
- Food and nutrition for older people
- Connectivity and social participation
- Lifestyle products and services including tourism
- Employment
- Housing and transport

A.3 Workshops

Two stakeholder workshops were organised to debate economic opportunities for Ireland in the area of smart ageing with a particular focus on jobs and exports but also taking into account the underlying social benefits that may accrue to Ireland:

- Workshop 1 discussed Connected health; Assisted living; and Food;
- Workshop 2 discussed Housing, transport, & tourism; Employment & education; and Finance

The workshops were used to test and expand upon ideas developed through the mapping exercise and suggest potential policy actions.

The workshops followed a common Agenda:

- Welcome from Department of Taoiseach and introduction to study
- Group discussion of business opportunities / priorities
- Q&A in plenary 1
- Group discussion of actions needed to make it happen
- Q&A in plenary 2
- Next steps and closing

An excellent turnout was achieved, with around 40 delegates attending each event, from the public, private and third sectors. The following sections record the key points made during the course of the breakout groups and plenary discussions. The material is organised by thematic areas (breakout group) and sectioned according to

- Background and context
- Opportunity areas
- Strengths and weaknesses
- Key actions

The points comprise proposals recommended by the room, and while this is not a verbatim record, the authors of this note have not attempted to prioritise among the many ideas. Moreover, it is important to stress that the following content captures the personal views of the participants and does not imply a consensus across the room. We have included further sections from the closing discussions

- Cross-cutting issues
- Enablers
- Evident priorities

A.4 Workshop 1 – Connected health; Assisted living and wellbeing; and Food

A.4.1 Connected Health (group 1)

Background and context

There were many remarks about the need for improvements in Ireland's health and welfare systems, as a precondition for the development and commercialisation of connected health systems in Ireland:

- Changes in the culture of healthcare provision in Ireland and a willingness to embrace / experiment with novel systems
- Greater organisational integration among elements of the healthcare system, to allow increased levels of connectedness and interoperability
- Greater awareness of regulatory context, and implications for developing new systems

There was also a reminder that health issues do not only relate to the 'unwell'. We need to recognise the healthy old may be a bigger opportunity than the 'unwell'

Opportunity areas

- Remote patient monitoring
- Health care analytics
- Application Programming Interface (APIs), which support the development of software applications specific to connected health
- Security / data protection tools to cope with CH
- Smart devices / apps that will connect older people to the health system
- Health avatars – intelligent virtual assistants
- Consultancy for system design; private provision of post-discharge services

Strengths and weaknesses

- Ireland has strong tech / software companies that ought to be able to address CH markets: some companies, both indigenous and MNCs, are currently active and in some instances well-established in this space serving both the domestic and overseas markets
- Ireland doesn't have a supportive healthcare and regulatory system
- We need more demonstration facilities where one can showcase and trial systems
- It may be helpful to think about targeting intermediate markets in the first instance, between public healthcare systems and private individuals, including for example care homes or sheltered housing

Key actions

The group continued to be exercised by the current situation in Ireland, and wished to see urgent action on several fronts

- Political leadership to promote changed attitudes in the health and welfare systems towards technological innovation and increased integration across services
- Creation of demonstrators, living labs, to demonstrate the feasibility of such CH systems, and the benefits they can deliver (social and economic)

The group did take the view that Ireland has strong capabilities in software and this provides a platform for technology development for CH, focusing on overseas markets and global supply chains

- Creation of a health and welfare technologies programme, similar to that found in Denmark, to promote / support innovation
- Support for existing centres of excellence with the wherewithal to push the development of CH related devices and applications, from APIs to security, from medical avatars to games for cognition

A.4.2 Assisted living and wellbeing (group 2)

Background and context

There was a wide-ranging discussion of contextual issues that colleagues argue the need to be kept in mind when judging opportunities

- “What technology tells us is more important than technologies themselves”
- Early identification of unmet need requires collective working
- Once model/mechanism is understood, spin-offs follow
- Promote change in behaviour so that products/services can be personalised

- Recognise science as a service in the Knowledge economy. Discussion reflected identifying the need and creating the next market
- Focus should be not only on device/technology development, but selling interpretation of data and knowledge
- Integrate products and services into solutions
- Engage with HSE: carers/frontline staff need to use e-data capture technology, current system is not integrated and slow

The group's focus remained firmly on healthcare, with limited discussion of issues to do with 'wellbeing'

- Medical professionals need protected time for research and testing
- More choices need to be given to people; there should not be a contradiction in health policies between long-term nursing vs home care
- Long term care budget is ring-fenced (HSE); need to open up Fair Deal budget for home care
- "Money comes in buckets rather than money following people"
- Assisted living and wellbeing results in lower public cost and longer independent life

Opportunity areas

The group identified three areas where there ought to be business opportunities relating to assisted living and wellbeing.

- Electronic early warning scorecard for chronic conditions

There may be an opportunity to develop a national scorecard for use outside hospitals and in connection with chronic conditions. This would involve data capture, integration and interpretation, segmenting the older population, and resulting in intervention as output. The scorecard would enable mobile, ambient, wearable sensor technologies.

- Independent living, wellness, mobility and cognition

Adapt the physical and community spaces by retro-fitting. Focus on mobility as a key factor to independence, prevent and predict physical and cognitive decline.

- Gaming and cognitive training

Challenge industry to develop games for older people, linking physical and brain training for improved cognition. Create links to entertainment industry (+ educational video) thereby helping the engagement with healthcare technology and changing behaviour. This is a big market already and predicted to grow strongly in the future, new games with increased functions and connectivity may be highly saleable.

Strength and weaknesses

- Ireland has a leading research group at UCC working on scorecard for acute conditions and has links with systems in use in UK and US
- Ireland has good med tech companies and strong software capabilities, albeit US businesses currently dominate ambient, and wearable sensor technologies

Key actions

- More demonstrators are needed for innovation to be quickly scaled up for commercialisation
- Look at competitions or calls for proposals that would challenge industry to come forward – possibly with research groups – to develop novel solutions

A.4.3 Functional Food (group 3)

Background and context

- The breakout group suggested renaming the category 'functional foods' as 'improved nutrition for healthy ageing'
- Notwithstanding the focus on older consumers, there is a need to consider a much broader age group than the over 50s
 - The 'food dudes' programme at schools was cited as relevant
 - Opportunity to create 'customers for life'
- Marketing and positioning is key to success
- Emphasis on global marketing
- Good access for research is available to target groups, however, health claims concerning food is a regulatory challenge

Opportunity areas

- Development of mainstream products addressing the particular needs of older people, which will support wellbeing and prevent illness
- There are also opportunities for new products to treat / manage particular diseases or conditions
- These should be global opportunities
- There are also opportunities for combining know how about nutrition with for example 'smart appliances'
 - Combine sensor technology with nutrition (e.g. a device to measure body mass may also give advice on nutrition and physical exercise)

Strengths and weaknesses

- Ireland has a large and globally competitive agri-food sector with established capabilities in function foods (esp. dairy, ingredients and beverages)
- Ireland has world-class research capacity in relevant areas, from nutrition to microbiology, from genetics to novel bioactives / functional ingredients
- Ireland has a reputation for 'healthy food' and a national strategy to pursue research and business opportunities in this area (bigger than 'smart ageing')
- The global market for functional foods, including nutraceuticals, is growing quickly although it has a significant number of well-established players
- Older customers tend to be somewhat conservative in their habits and also keenly concerned with value for money
- There are additional regulatory issues to be dealt with
 - Use of food in a medical context brings new levels of regulation
 - Depending on the product, there may be a role for the Food Safety Authority of Ireland / EFSA in health claims so as to help consumers make informed and meaningful choices

Key actions

- Positive endorsement by professionals and educators
 - Include nutrition as a key module in education of healthcare professionals, including the issue of malnutrition which is common among elderly
 - Improve education in general: nutrition as a concept for a healthy life

- Industry marketing:
 - Simpler messages – e.g. “protein is good for you”
 - Use positive messages on labelling
 - Use the ‘Origin Green’ model for healthy ageing
 - Engage with B2B and B2C (Ireland is often selling ingredients)
 - Selling earlier (target the customer in their twenties, cf cosmetics industry)
- Role of insurers – reimbursement of food products
 - No strategy identified; but it is an issue for the insurance market
 - There is a disincentive for insurance companies to provide discounts

Overall roadmap

- Industry and government should set a national target for Smart Ageing including for ‘Food for health’
- Success on that scale will require pro-active efforts by all stakeholders, and there may be a role for government in helping to create / support a coordination mechanism
- Creation of an open platform for all stakeholders that will help to define action plans, share insights and lessons learned and facilitate collaboration and partnerships among businesses / supply chains and between businesses and universities / research institutes
- Ireland has substantial investment in this area already, however, there is substantial additional resource available (competitively) through various EU platforms (e.g. European Technology Platform on Food For Life [ETP])

A.4.4 Cross-cutting issues in Workshop 1

- The room agreed Ireland should focus on a small number of big ticket items, with wide applicability, and in particular
 - The prevention / reduction of chronic diseases (e.g. heart disease) in later life, addressed through wearable technologies and functional foods for example
 - Connected health raises the issue of security of data holdings and comms, between citizens and public health and welfare systems
 - Ireland has good medical research and software development capabilities so may make most sense to focus on models for data analytics and interpretation rather than devices
- There was a fourth opportunity foreseen, albeit narrower in scope
 - Development of software tools that encapsulate national and international regulations, which will help software developers / apps get closer to a compliant product first time
- Setting national target for Smart Ageing was suggested, e.g., 15%-20% of Smart Ageing Products and Services sold globally are sourced in Ireland

A.5 Workshop 2 – Housing, transport and tourism; Employment and education; and Finance

A.5.1 Housing, transport and tourism (group 1)

This thematic area covered a wide-ranging set of issues, albeit with strong synergies, and the ideas discussed are therefore presented under each heading in turn

Housing: Background and context

The group rehearsed a series of housing issues in Ireland, which need to be kept in mind when thinking about business opportunities

- Core of the city centre is empty, periphery disconnected, urban regeneration is needed to limit loneliness and enhance social connectivity
- Current market demand is for 3-bedroom family houses, which are not ideally suited for older people nor are they readily adaptable
- People like to own their homes, stay close to their family and rarely move (1.4 times on average across one's lifetime)
- There is no demand for new homes with accessible design
- A lot of new development is (too) high-density

Housing: Opportunities

- Retrofitting homes for older people
 - Many older people live in homes that are not well adapted to their needs
 - Need to equip homes with predictive rather than reactive solutions
 - Energy efficiency considerations are especially relevant for older people (security, warmth, cost), and insulation / green energy is possibly a big market in Ireland
 - Design expertise may be exported as may some smart / green systems, as retrofit for older residents will be a big market in very many countries
- Repurpose hotels as 'step-down facilities' and rehabilitation centres
 - Many hotels were built in the wrong place and are currently empty with market value below replacement cost. There is a potential for re-purposing.

Housing: Strengths and weaknesses

- Limited business incentives available
- Many older residents cannot afford to buy services personally
- Housing adaptation scheme is slow

Housing: Key actions

- Replicate demonstration projects, which bring together the HSE with Local Authorities with designers and academic groups to develop / showcase novel residential homes and community centres
- Support / extend collaborations between research groups, designers and technology firms, to encourage development of smart buildings and smart building technologies for retrofit
- Support efforts around Universal Design, which are seeking to develop solutions for lifetime homes, lifetime neighbourhoods
- Explore opportunities for making planning more flexible / receptive to changes in use for existing buildings or new developments
 - to allow repurposing of hotels
 - sub-division of homes to help downsizing
 - build small apartments in rural settings

Transport: Background and context

- The breakout group noted a number of challenges
 - Rural transport is largely missing. There are private, e-tagged buses that could effectively transport patients to hospitals for care. “Drive to care” solution based on volunteering
 - Rural communication infrastructure is missing (wifi, 3G, etc.)
 - Only Dublin city buses are 100% accessible

Transport: Opportunities

- The group sees many transport related needs for older people, but saw few immediate business opportunities and none with any real export potential
- Need to make train, boat accessible for 50+ tourism. Need seats/sheltered stops, real-time info for better planning
- Older customers do look for particular qualities / functions in vehicles and transport systems, so there ought to be opportunities for new designs / products globally

Transport: Strengths and weaknesses

- Ireland has no substantive automotive sector (design, manufacture, components, operations, etc.)

Transport: Key actions

- Transport is an important social infrastructure, needed outside of major cities, and acts as an enabler for industries e.g. tourism, however, does not seem to be a priority for a ‘Smart Ageing’ strategy

Tourism: Background and context

- Majority of businesses linked to B&B and pubs with owners 50+ who need advice / training on how to build in technology in their offering
- Strong links to Housing and Transport (also Food) for older people. What is needed to draw in 50+ tourists is the right physical space (inside and outside); transport, technology to connect resources; and the right sorts of staff: older people for older tourists

Tourism: Opportunities

- Augmented reality, apps in culture and heritage trail; technology + culture – interactive technology in museums for 50+ not just for kids!
- Develop apps to connect to other people / services for tourists and enjoy a mixed local community
- Medical Tourism: use high quality specialist clinics with suitable capacity to attract international (US) patients to e.g., Blackrock Clinic, Beacon Hospital, or Santry Sports Clinic
- High-net worth individuals retiring in Ireland to take advantage of the ‘experience’ and environment
- Develop standards and introduce ‘age friendly’ certification: physical space (hotels, gyms, etc.) and business services

Tourism: Strengths and weaknesses

- Globally competitive offer, with strong presence among older tourists
- But fragmented Irish tourism industry needs linking up

- Local authorities and Failte Ireland need to work together more successfully
- Need specific incentives from government to invest in this space

Tourism: Key Actions

- Update out-dated laws and legislation as “it would be very difficult to obtain permission for a special, age-friendly hotel.” By removing barriers – facilitate innovation in tourism
- Build networks with other EU regions. Need to stay “local” at European level
- Adapt Great Western Greenway for older people
- Promote “Experience” and “Annual events” so that tourists return
- Link tourism to age-friendly country programme, ‘dementia friendly communities,’ etc.

A.5.2 Employment and education (group 2)

Background and context

- ‘Education and lifelong learning’ is part of the Positive Ageing Strategy in Ireland
- Strong engagement by third sector and universities
- Ireland has age friendly cities

Opportunity areas

- Capacity building in gerontology
 - Opportunity for courses and modules
 - Environmental and industrial gerontology
 - Centres for life studies
 - Innovative marketing of programmes
- Online learning and blended learning
 - Are generally free. Opportunity in specialized courses using blended programmes. Requires investment in getting mature students online
- Age friendly workplace (includes HR models for older workers)
 - Deal with ‘ageism’. Create awareness and factor in age awareness as an opportunity to reap benefits
 - Invest in organisational flexibility and adequate physical environment for all employees of ages
 - Promote Ireland as a country with an age-diverse culture in workforce (intergenerational learning)
- Occupational health services
 - Next year is the year of design in Ireland, which may provide opportunities to promote ergonomics for older people (e.g. in workplace)
 - Include environmental and industrial gerontology on the agenda of urban planning
- Pension reform, allow for part-time working
 - Credit system for home workers
 - Reintegration of older people in workforce through reskilling / role redesign has pension consequences; realign pension with working life

- Silver Entrepreneurship
 - Older people often have relevant experience and resources

Strengths and weaknesses

- Third sector active and enjoying success in both training and participation
- Universities developing age-friendly policies and courses
- No strong showing by the private sector

Key actions

- Gerontology
 - Expert Group on Future Skills Needs to undertake skills needs analysis to define the training requirements for Smart Ageing
 - Department of Education: explore options to develop flexible modules
 - Consideration around language – term ‘gerontology’ is not understood
- Look at options for silver entrepreneurship
- Draw on experience of older people to improve care
- Create a national award for the most ‘age friendly’ workplace
- Leverage local authorities in the silver economy and for support in online learning
 - Use local libraries
- Flag pensions on the policy agenda
 - Pension reform lacks momentum (main emphasis is on increasing the retirement age)

A.5.3 Financial Services (group 3)

Opportunities

- Finance and insurance for independent living
- Managing pension funds for the rest of the world
- Cross-border / portable pensions
- Better equity-release schemes
- Products / tools to protect older customers from risk of abuse / fraud
- Re-insurance policies to insure against care costs
- Age-proofing design services for financial products
- FinTech products more generally (e.g. payment systems, mobile banking, peer-to-peer lending, privacy and security [e.g. security grading system], etc.)
- Possibly target emerging economies too (China, India, etc. all ‘under-banked’, but not perhaps a ‘smart ageing’ priority)
- There were several other proposals mentioned that were judged to be too broad (e.g. managing non-performing assets; and anti-money laundering)

Strengths and weaknesses

- Ireland is judged to be well placed on several fronts
 - FinTech
 - Fund / pension management in international markets

- Equity release initiatives
- Health insurance for long-term care

Key actions

- Increase funds / capacity available for incubators / accelerators to support emergence of more FinTech businesses focusing on new products or services of relevant to older clients
- Support existing centres of excellence in their work with businesses (upstream and downstream) with a view to developing new concepts and new service models
- Develop financial services test beds to explore novel financial products and delivery channels, from hybrid mortgages through to novel payment methods for generic bills (e.g. utilities, property tax, etc.) with older people; use to support showcasing
- Support the FinTech and Financial Services industries develop and test the feasibility of novel (proprietary) ideas for products for older people in international markets

A.5.4 Cross-cutting issues in Workshop 2

- The idea of “Older people” as a group is challenging; it is a diverse group, from 50+ at work and active / healthy to 85+ and frail
- Beware falling into the trap that new technology can be a replacement for social contact; active user participation in co-design, co-creation is needed
- Low levels of general awareness / knowledge about ‘Smart Ageing’ among businesses or the public
 - Consumers would benefit from an increase in the flow of information / stories about: healthy & active ageing, technology assisted living
 - Entrepreneurs too, but they may also need help with: universal product and service design considering older people
 - “Smart Ageing Challenge” needed with a good venue, respected panel, and a prize to crowd-source ideas. “Smart Ageing Design” competition as part of Irish Design 2015

A.6 Enablers – General needs and ideas

- Ireland needs to continue to improve its physical and communications infrastructure to provide the platform for businesses to develop ‘Smart Ageing’ products and services nationally and which can then be sold more confidently internationally
- Ireland might also reasonably look to support a larger number of demonstrators, where local authorities, public research, businesses and end-users are connected in a safe, collaborative environment in an emerging ecosystem
- Irish landscape is fragmented, many companies do “little things,” need to connect players (across industries). Create a ‘Silver Valley’ in Ireland similar to the one in France, to achieve synergy. A ‘one stop shop’ where industry can “bring in its own technology” to meet end-users
- Support efforts around Universal Design, developing capabilities among design professionals and novel solutions
- Create a national ‘Smart Ageing’ competition with prizes for ‘Age Friendly’ product designs, apps, workplaces, etc.

Appendix B Mapping submission data

B.1 Submission counts

B.1.1 Government departments and agencies

The survey was sent to a range of governmental departments and agencies. The Health Research Board (HRB) returned an overview of 183 projects related to smart Ageing. These projects were funded by the HRB but implemented by HEIs. The Department of Jobs Enterprise and Innovation, the Department of Transport, Tourism and Sport, the Department of Environment, Community, Local Government, the Department of Justice and Equality, and the Department of Agriculture, Food and the Marine all submitted a substantial amount of initiatives. The Central Statistics Office and the Department of Children and Youth Affairs did not submit any policies or strategies related to smart ageing.

Figure 34 Count of initiatives submitted by Government departments and agencies

Name of organisation	Number of initiatives cited
Health Research Board	183
Department of Jobs, Enterprise and Innovation	26
Department of Transport, Tourism and Sport ⁶⁶	25
Department of Environment, Community, Local Government	24
Department of Justice and Equality	24
Department of Agriculture, Food and the Marine	19
Department of Health	18
Department of Social Protection	12
Department of Arts, Heritage and the Gaeltacht and the bodies from the Department's vote group	10
Department of Education and Science	7
Department of Energy, Communications and Natural Resource	6
Department of Finance	5
Office of Public Works	2
Revenue Commissioners	2
Department of Foreign Affairs and Trade	1
Department of Defence	1
Department of Public Expenditure and Reform	0
Central Statistics Office	0
Department of Children and Youth Affairs	0
Total	365

⁶⁶ Initiatives under the Department of Transport, Tourism and Sport include submissions by the Dublin Bus (6), Dublin Airport Authority (4), Road Safety Authority (2), Sports Capital Programmes (2), Bus Eireann (2), Railway Procurement Agency (1), National Transport Authority (1) National Roads Authority (1), Sports Policy and Irish Sports Council (1), and Iarnród Éireann / Irish rail (1).

B.1.2 Third sector

A large range of NGO and voluntary activity related to smart ageing was funded via Atlantic Philanthropies; the number of initiatives (primarily collected via desk research rather than via the survey) amount to 93. Age Friendly Ireland likewise submitted several initiatives related to Smart Ageing.

Figure 35 Count of initiatives either through desk research or submitted by NGOs

Name of organization	Number of initiatives cited
Atlantic Philanthropies	93
Age Friendly Ireland	33
The Alzheimer Society	10
National Council for the Blind	10
The Carers Association	9
Aontas	8
Third Age Ireland	6
Age Action	5
St Vincent De Paul	5
Alone	4
Irish Wheelchair Association	4
Rehab Group	3
Age and Opportunity	3
Friends of the Elderly	2
Older and Bolder	2
The Irish Hospice Foundation	2
The Irish Deaf Society	2
The Irish Senior Citizens Parliament	1
Retirement Planning Council	1
Respond Housing Association	1
Arthritis Ireland	1
National Active Retirement Ireland	1
An Garda Siochana Older People Strategy	1
Genio	1
Muintir na Tire	1
Flexibus	1
Active Ageing Partnership	1
Fold Ireland	1
Disability Federation of Ireland (DFI)	1
Irish Association of Older People	1
Total	214

B.1.3 Enterprise sector

The activity of the for-profit private sector is documented via several intermediaries and research material. Rather than collecting information on an activity, programme or policy we collected information on the enterprise involved. The information includes a list of 66 enterprises active in home care solutions, a list of companies

supported by Enterprise Ireland that work in areas related to Smart Ageing (52), Industry Partners in large-scale SFI Research Centres, CSETs, SRCs and Technology Centres (37). Companies that were included in multiple lists (submissions) are only recorded once.

Figure 36 Count of initiatives desk research / submitted documenting enterprise activity

Name of organization	Number of enterprises
List of enterprise active in home care solutions	66
Enterprise Ireland	52
Industry Partners in Technology Centres, CSETs, SRCs	37
Health Innovation Hub (Test bed activity)	17
Silver Technology Report, DJEI (prepared by Forfás)	8
IDA Ireland	6
Connected Health in Ireland: An All Island Review	68
Total	254

B.1.4 Universities and colleges

Based on the information submitted by the higher education sector (HEIs), one can see there are several HEIs with a substantial number of activities in Smart Ageing, in particular: University College Cork, Dublin City University, Trinity College Dublin, and the Royal College of Surgeons. The Dun Laoghaire Institute of Art, Design and Technology and Limerick Institute of Technology have not forwarded any activities for the mapping.

Figure 37 Count of initiatives submitted by HEI

Name of organization	Number of initiatives cited
University College Cork	67
Dublin City University	29
Trinity College Dublin	22
Royal College of Surgeons	19
University of Limerick	15
Cork Institute of Technology	12
NUI Galway	12
Dundalk Institute of Technology	7
ITT Dublin	5
Galway Mayo Institute of Technology	5
University College Dublin	5
Athlone Institute of Technology	5
NUIM	4
Institute of Technology Sligo	2
IT Tralee	1
Marino Institute of Education	1
Limerick Institute of Technology	0
Dun Laoghaire Institute of Art, Design and Technology	0
Total	211

B.1.5 Other actors

Finally, information was collected based on Ireland's involvement in several EU programmes relevant to Smart Ageing. Information was submitted for: the Active and Healthy Ageing European Innovation Partnership (EIP), the EU 7th framework programme (FP7), the EU Joint Programming Initiatives (JPI), and the EU Ambient Assisted Living (AAL) programme.

Figure 38 Count of initiatives submitted under internally funded research

Name of organization	Number of initiatives cited
Active and Healthy Ageing EIP	60
FP7	18*
JPI	10
AAL	6
Total	94

* The selection of FP7 projects (18) includes only projects that were flagged as relevant (rather than 'some relevance' or 'not relevant'). Ireland is included as both lead applicant and partner. This is due to the fact that for the projects with 'some relevance', it is not known whether the role of Ireland in the consortium actually is always related to Smart Ageing.

B.2 Analysis and classification of the initiatives submitted

In working with the data we distinguish between those organizations that are the informants, i.e. the information providers, and the organizations that have a leading role in executing the relevant initiative or are the primary contact for the initiative. In several instances, the informant and the executing organization are the same.

The executing organization is categorized as either: Enterprise, Government, Hospital, HEI, International funding agent, NGO, Regional partnerships / regional councils, Research centre / publically funded research agent, or test-bed. Each initiative was classified in one of the following application areas (sectors): Healthcare and self-care (including biomedical solutions), Educational and training services for older people, Financial services for older people, Food and nutrition for older people, Lifestyle products and services including tourism, Connectivity and social participation, Housing and transport, Employment. We additionally allowed for the option of 'other application area' and that of 'multiple application areas - interdisciplinary'.

Linkages between sectors and actors are established as follows. Whenever the informant organization is different from the executing organization - by type -, a sector is allocated to the informant within the context of the initiative. In addition, reference to other collaborations, financial support, and connection is likewise documented and formally categorized by actor and type. The details of linkages and collaborations are described in Appendix C.

Figure 39 presents an overview of the number of initiatives classified by executing organization type and by application area. A majority, 598, of the initiatives have been classified under 'healthcare'. Another substantial amount of initiatives have been classified under 'housing & transport' and 'interdisciplinary'. Figure 40 illustrates the percentage distribution of the initiatives across the types of actors, by application area. There is considerable variation in the type of organization documented across application area. In the application areas, healthcare and transport, the for-profit sector is relatively well represented. Further, in the application areas 'education' and 'connectivity' NGOs are relatively well represented. Test-bed activity and hospitals are only represented in 'healthcare'.

Overall, there is some uncertainty regarding the extent to which the mapping captures the entire Smart Ageing landscape and, in particular, the enterprise base. However, the heterogeneity in the distribution of the types of actors in certain application areas

does not necessarily point to a gap in our database but rather to the current state of activities currently relevant to Smart Ageing.

Figure 39 Executing organization by primary sector and number of initiatives submitted

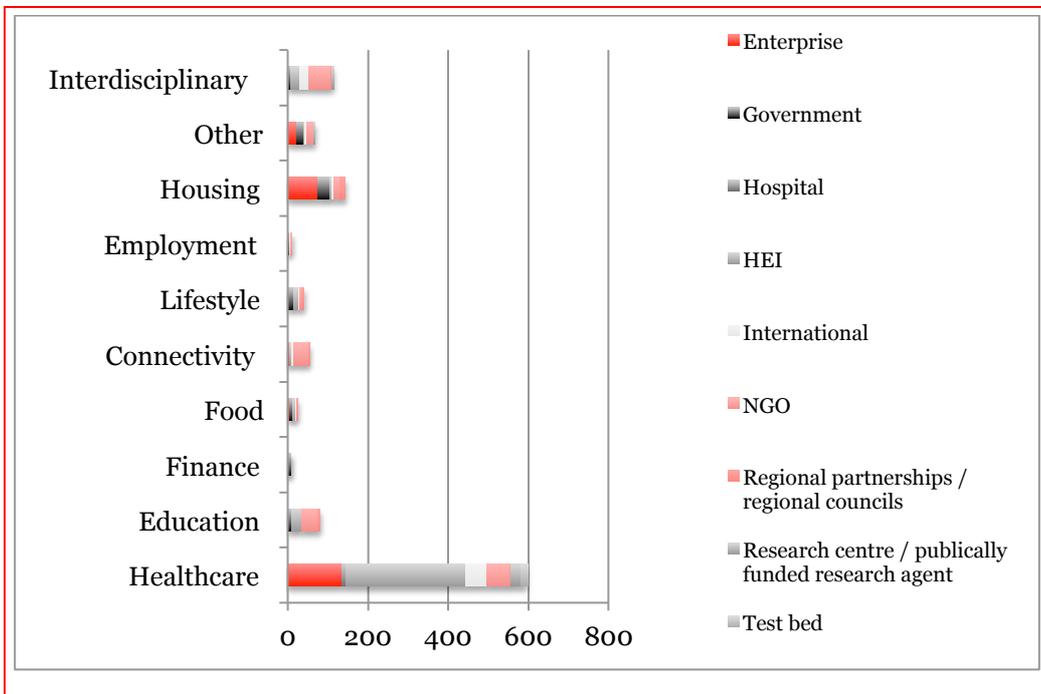
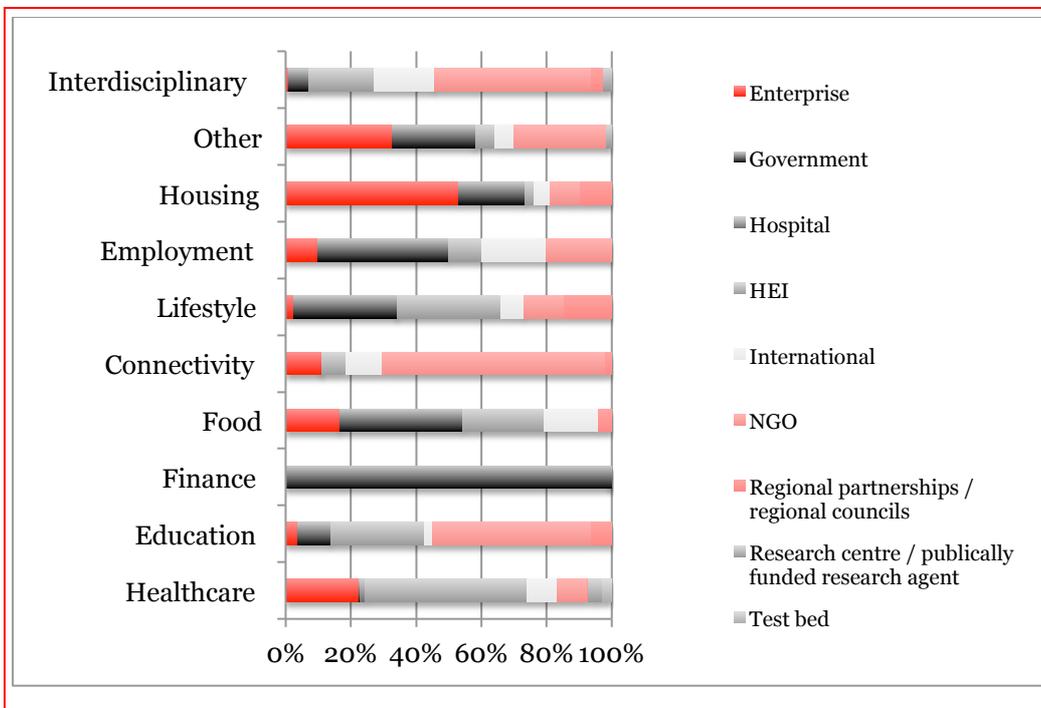


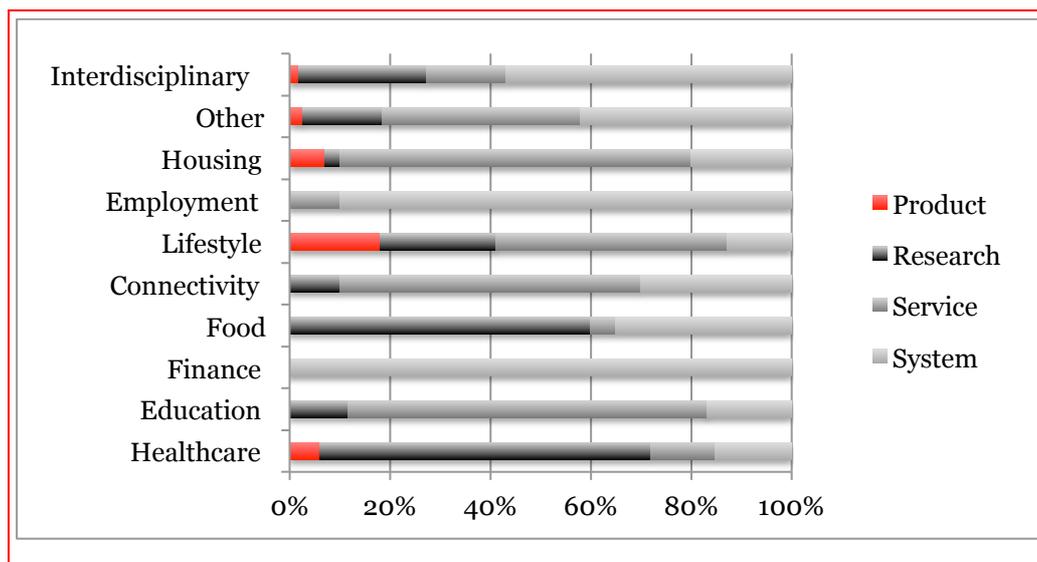
Figure 40 Executing organization by primary sector, percentage distribution



Each of the initiatives has also been classified into a type of initiative. The data contains policies and programmes and we categorize each of these under the

following: Products, Research initiatives, Services, and Systems. Systems include initiatives that aim to set up a network and also include strategies. As a result of some missing information, a small number of initiatives remain unclassified; in total 947 initiatives have been classified. Figure 41 illustrates the percentage distributions of the initiatives over type. Whilst we only identify a small number of products (in ‘lifestyle’, ‘healthcare’, ‘housing’, and ‘other’ and ‘interdisciplinary’), the other types are, for the most, well represented. Particularly, in ‘healthcare’ and ‘food’, the majority of initiatives are research initiatives. Services apply mostly to housing, lifestyle, connectivity and education. Not surprisingly, the initiatives that are classified under finance are also ‘systems’.

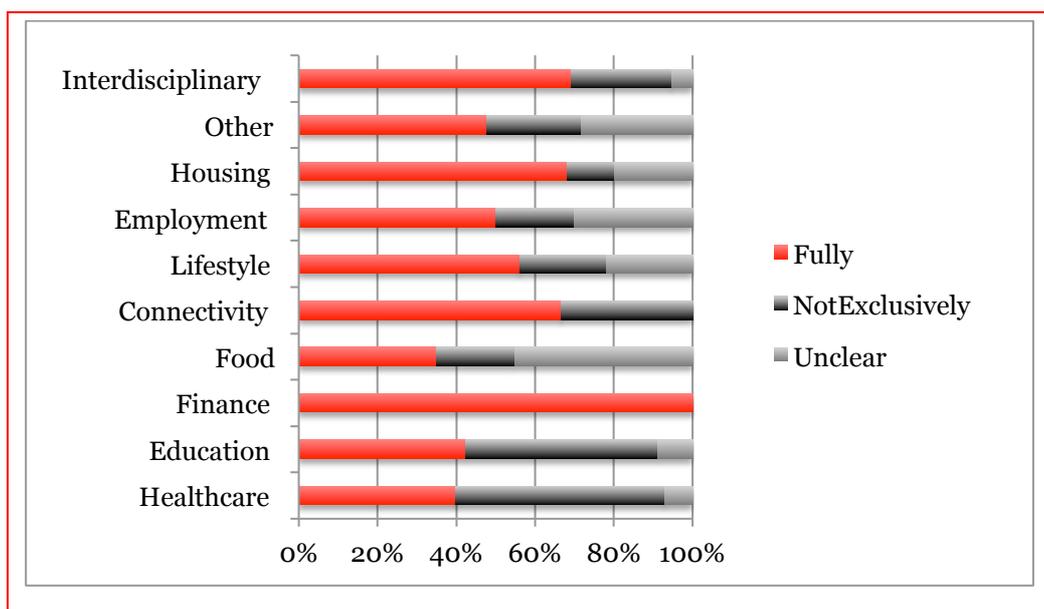
Figure 41 Initiative type by primary sector, percentage distribution



Although the organizations that submitted the initiatives to be included in the Smart Ageing mapping exercise, some e.g. research projects, services are more clearly related to Smart Ageing than others. A total of 971 of the initiatives are classified in the following categories: ‘(i.) Fully’, when they fully target the 50+ age-group, (ii.) ‘Not exclusively’, when they target the older population but also specific another population cohort or group such as the disables population, (iii.) ‘Unclear’ when it is not clear how the initiative targets the 50+ population. The unclear category includes initiatives for which we do not have enough information to identify a different category and, usually, represents initiatives that benefit older people, along with the other age-cohorts.

Figure 42 presents the percentage distribution of the initiatives according to the ‘Smart Ageing’ category. On average, across the sectors, 50% of the initiatives fully target the older population in Ireland. All of the initiatives under ‘Finance’ target older people. It appears that a relatively large percentage of the initiatives under ‘food’ are not specifically restricted to older people. Under ‘connectivity’, ‘education’ and ‘healthcare’ a relative substantial proportion of the initiatives apply to older people, along with other (minority) groups. For example, in healthcare, several research projects aim to provide solutions to health issues that are more prevalent amongst older people.

Figure 42 Focus on Smart Ageing by primary sector, percentage distribution



The surveys sent to each of the organizations also asked to identify the scale of the initiative. For 455 initiatives (40%) we received an indication of the value. For several initiatives, such as strategies or policies, it is not surprising that budgetary information is not provided. It proved to be rather challenging to identify a common scale; the figures include annual budgets, multiannual budgets, the value of the project attributed to the executing organization, and total budgets. Nevertheless, the values still give an idea of the size of the smart ageing industry across each sector. We classify the budgets into three categories:

- Small = initiatives with value less than € 100,000
- Medium = initiatives with value equal to or more than €100,000 and less than €1,000,000
- Large = initiatives with value equal to or larger than €1,000,000

Figure 43 and Figure 44 present an overview of the distribution of the value of initiatives across application area. It appears that the majority of initiatives documented have a value somewhere in the range of €100,000-€1,000,000. Initiatives that are smaller than €100,000 are relatively frequently reported in relation to ‘housing’, ‘connectivity,’ and ‘education.’ Initiatives with value above €1M are relatively more frequent in ‘employment’ and ‘food’ and, in absolute number, in ‘healthcare’. Likewise, in ‘finance’, the initiatives documented have a cash equivalence value that is larger than €1M (the initiatives include tax rebates).

Figure 43 Relative size of the initiatives in monetary value by primary sector, by number of initiatives

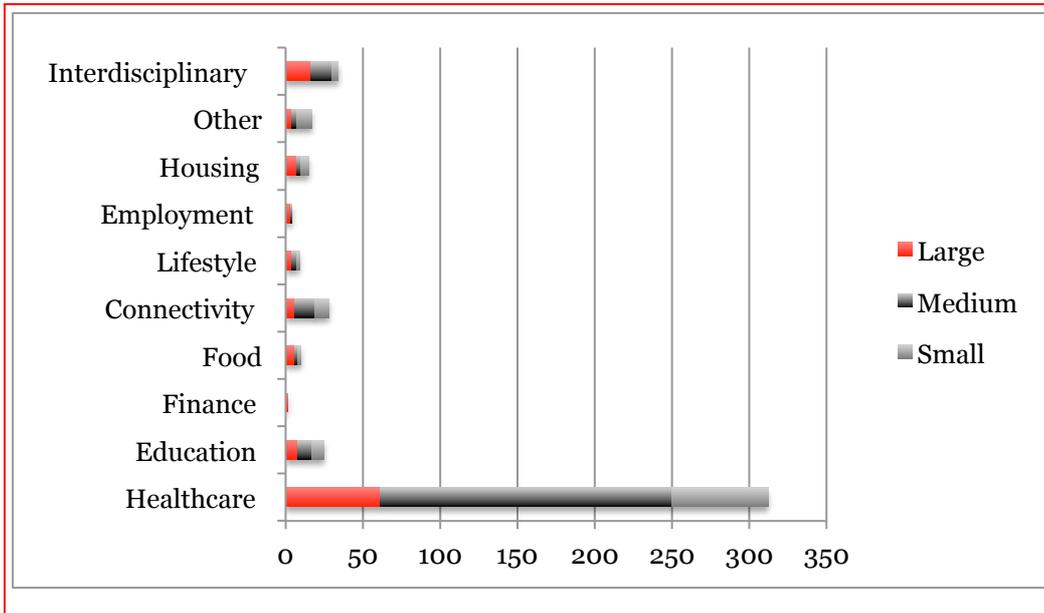
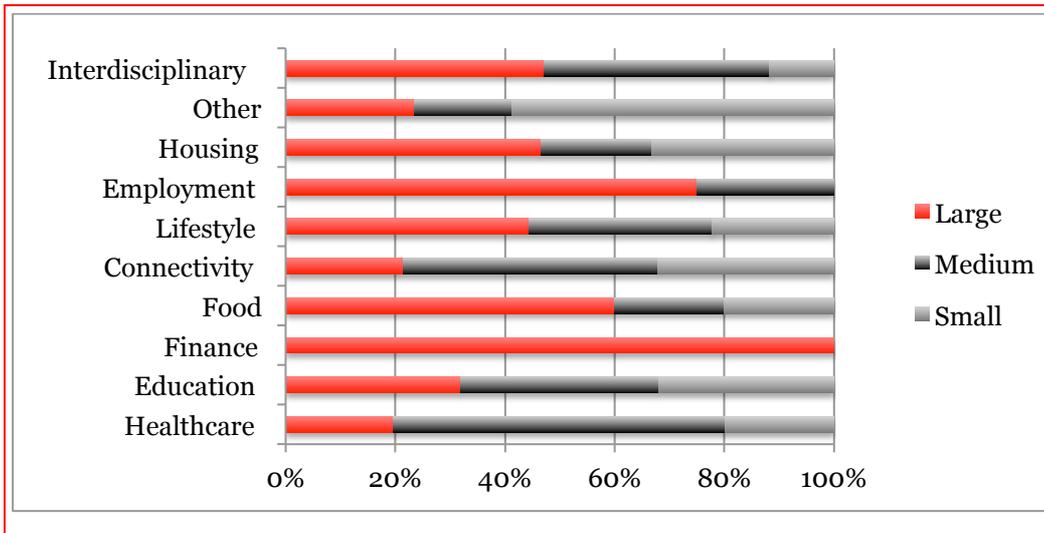


Figure 44 Relative size of the initiatives in monetary value by primary sector, percentage distribution



Appendix C Network analysis

In this section we present an overview of the relations across the different application areas and across types of actors. The types of actors and their abbreviation are indicated in Figure 45. For example, a government department ('G') working in the application area 'Healthcare' can have a relation with an international funding agent ('I') that likewise is working in healthcare and with enterprise ('E') active in the application area 'Food'. The types of relations or collaborations across actors and industries can consist of e.g. partners in a consortium, a funding allocation and work on a joint-project/initiative.

Figure 45 Notation implemented

Application area, abbreviation	Application area	Actor, abbreviation	Actor
Healthcare	Healthcare and self-care, including biomedical solutions	G	Government
Education	Educational and training services for older people	HEI	Higher Education Institutes
Finance	Financial services for older people	E	Enterprise
Food	Food and nutrition for older people	NGO	NGOs and volunteers
Connectivity	Connectivity and social participation	I	International funding agents
Lifestyle	Lifestyle products and services including tourism	TB	Test bed activity
Employment	Employment	R	Regional partnerships / regional councils
Housing	Housing and transport	H	Hospital
Other	Other application area(s)	RC	Research centre / publically funded research agent
Interdisciplinary	Multiple application areas		

The network analysis captures relations/collaboration between different types of actors and application areas. This means that, we establish a link between actors of a given type (e.g. HEI and Hospitals) that are engaged in a given sector and different actors of a given type that are engaged in a given sector.

For example, we tracked the *research* initiatives submitted by NGOs for which we establish different collaborations: 42 in total. 14 of these research initiatives have a primary focus in health care and self-care. Following this example, all of these NGO collaborations are with other actors in the healthcare sector:

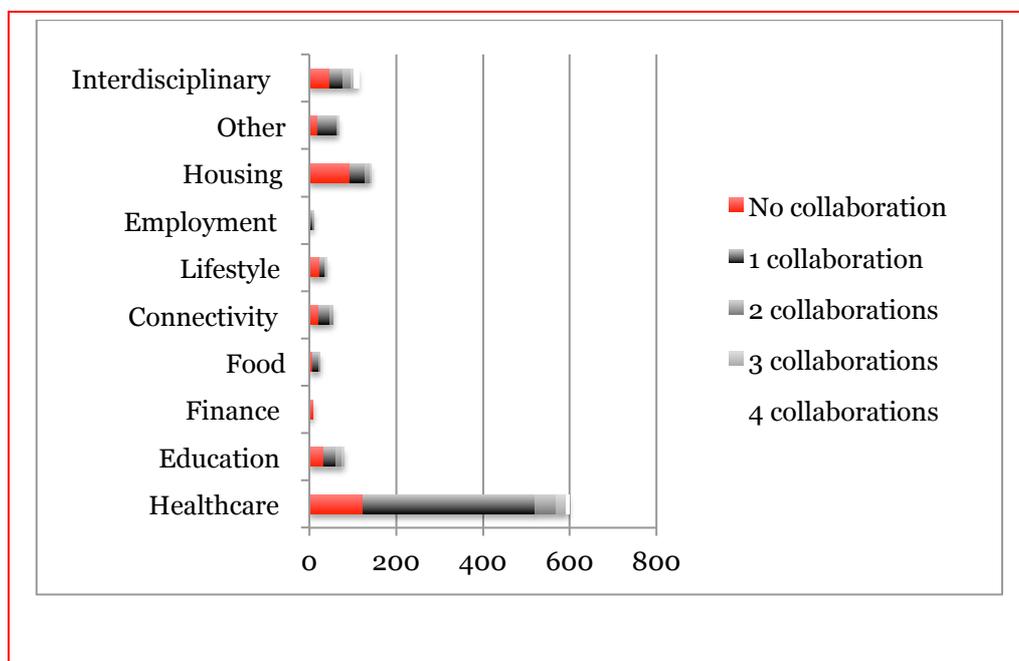
- 6 collaborations with a HEI;
- 4 collaborations with a research centre;
- 2 collaborations with governmental bodies;
- 1 collaboration with an enterprise;
- 1 collaboration with a hospital

Before presenting the results of the network analysis it is important to outline some of its limitations. First, we do not have information about the complete network of the

actors. Second, we do not establish linkages between actors and sectors of the same kind. For example, no relation is made between UCC and UCD when both universities are working in healthcare (on a given initiative). Third, we only establish a direct link between the executive actor and other actors – e.g. actor 2 and actor 3 - and we do not assume a link between actor 2 and actor 3. Fourthly, the data includes ‘duplicates’ or overlaps when different informants report the same initiative and partners.⁶⁷ In addition, the analysis includes only a limited overview of enterprise activity. We included several companies that are active in Smart Ageing, but further research is required to establish the extent to which these companies are connected to research or the healthcare system.

Figure 46 and Figure 47 illustrate the number and percentage of initiatives for which we establish one, two, three, four or five collaborations. And, the figure illustrates that for all application areas there are initiatives for which we do not establish a relation across sector and actor type. In the application area finance we establish no cross-sector/actor collaborations. As a result, none of these initiatives are carried forward in the network analysis. Also, a relative large proportion of the initiatives in the housing industry do not involve multiple partners.

Figure 46 Initiatives with collaboration (relations) across different sectors and / or actors, by absolute numbers



⁶⁷ Because we do not have full information about the project details, it is unclear if some initiatives are identical or refer to different parts of a common project.

Figure 47 Initiatives with collaboration (relations) across different sectors and / or actors, by percentage

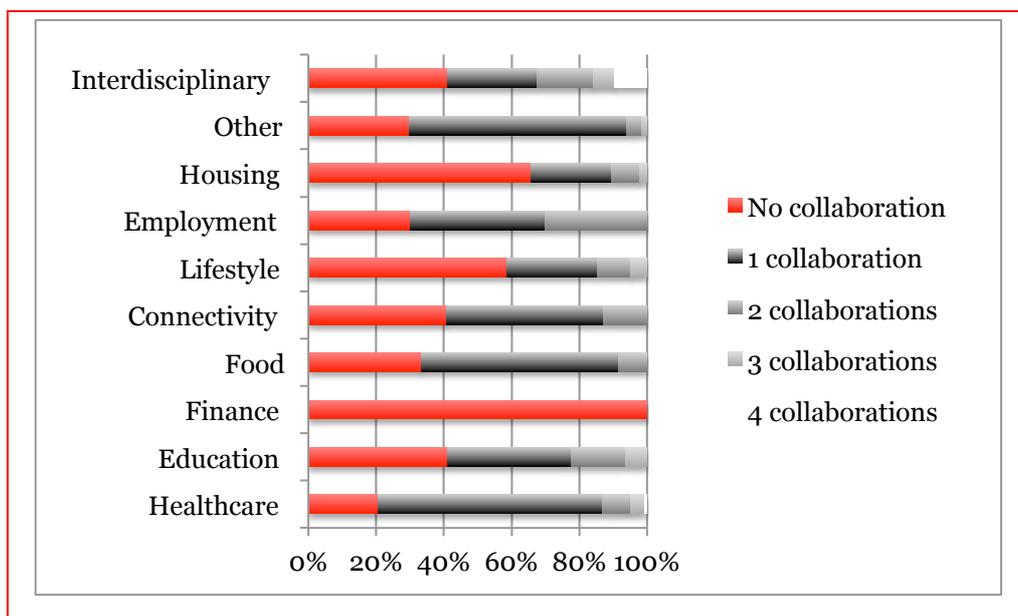


Figure 48 present a first overview of the network across types of actors and application areas in the field of Smart Ageing. This figure includes all initiatives whenever the number of initiatives between a given actor/application area and a different actor/application area sum up to five or above. Thus, the application areas employment, finance, food and lifestyle - where we only find few initiatives - are not represented in the network diagram. The *thickness of the lines*, connecting actors in given application areas, represents the number of initiatives (thin = relatively few initiatives and thick = relatively many initiatives).

- The figure illustrates that there are four clusters: a small cluster which comprises of actors in the housing industry, a small cluster which comprises of actors in ‘other’ industries, a group of actors in interdisciplinary industries, and a large cluster which includes collaboration across the application areas education, connectivity, and healthcare.
- In the cluster that includes initiatives in multiple application areas, what is noticeable is the degree of centrality of NGOs.
- In the large cluster, NGO activity in ‘connectivity’ is connected to NGO activity in ‘education’, activity of RC in ‘healthcare’ and to government activity in ‘connectivity’. Aside from the centrality of NGOs, governmental bodies are also well connected to various actors: enterprise, test-bed activity, NGOs and research centres.
- The actors in the healthcare cluster are particularly well connected. And, as depicted by the relative degree of *thickness of the connecting line*, there is a substantial concentration of activity between the government and enterprise in healthcare.

Figure 48 Initiatives across application areas and type of actor (where five or more initiatives exist for a specific linkage)

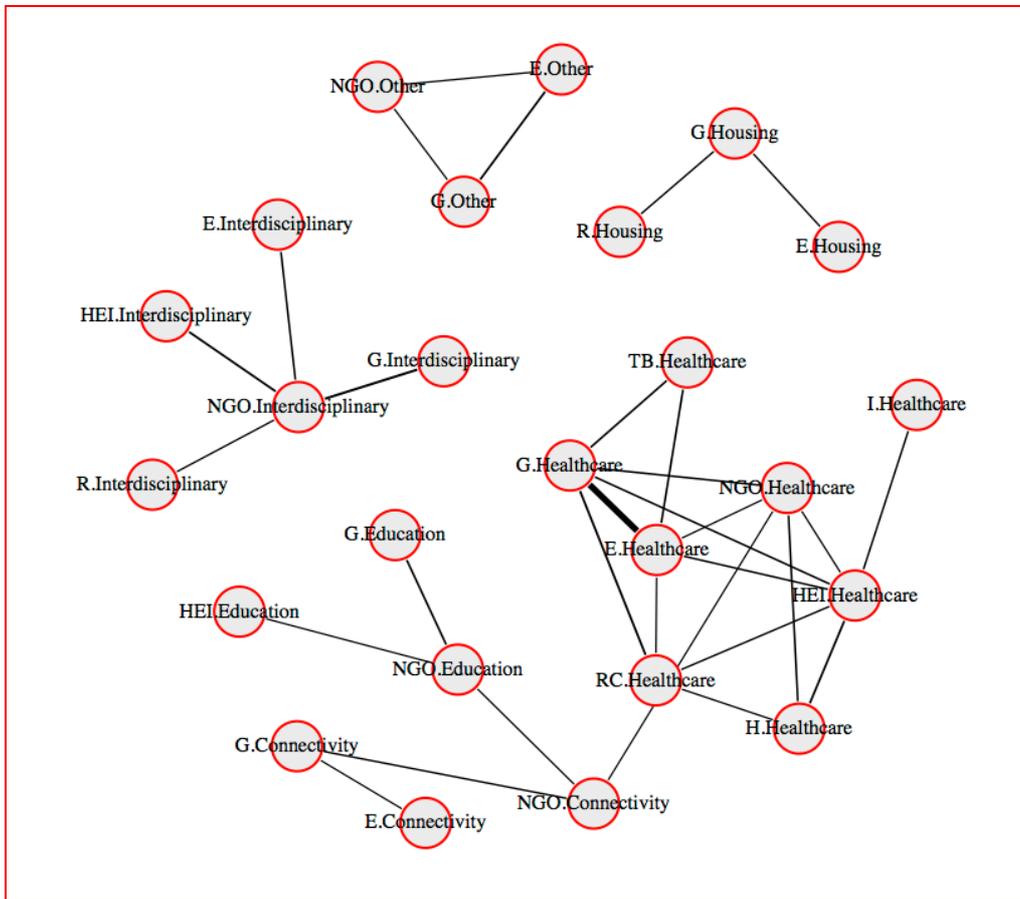


Figure 49 presents an overview of the relations across actors and application areas for the initiatives that are specifically targeted at the older population. Connections are reported whenever the sum of activities (across given actors in given application areas) is two or more. With respect to the previous figure we identify the same clusters and cross-sector collaborations. There are also some notable differences:

- We are unable to establish a direct link between government and enterprise that engage specifically in healthcare initiatives targeted to the 50+.
- There is a relative concentration of activity between HEIs and research centres in health care (50+ projects)
- There is a relative concentration of activity between NGOs and government, NGOs and HEIs, and NGOs and enterprise in sectors with multiple application areas.
- We establish a relation between international funding agents (typically focussed on healthcare) and initiatives by HEIs in housing. No substantial evidence is found connective HEIs in housing with the other actors active in housing related initiatives.

Figure 49 Initiatives targeted at 50+, across application areas and type of actor (where two or more initiatives exist for a specific linkage)

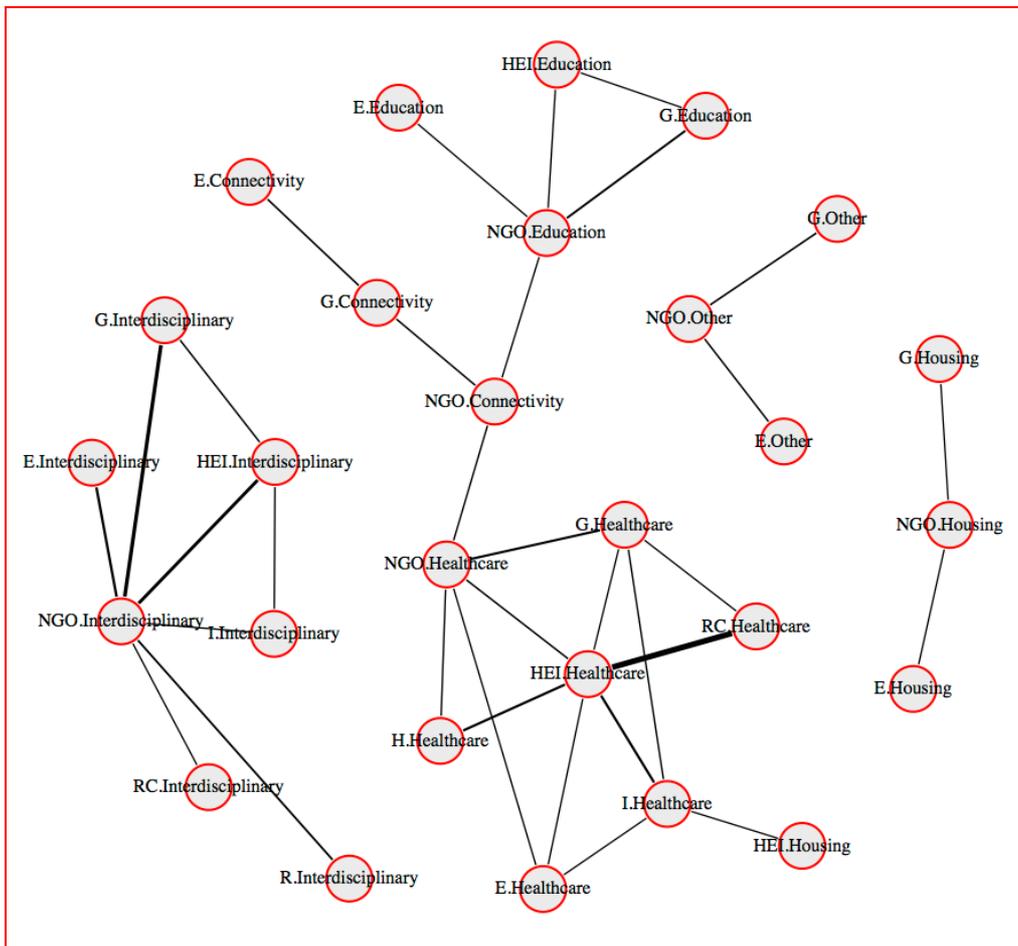
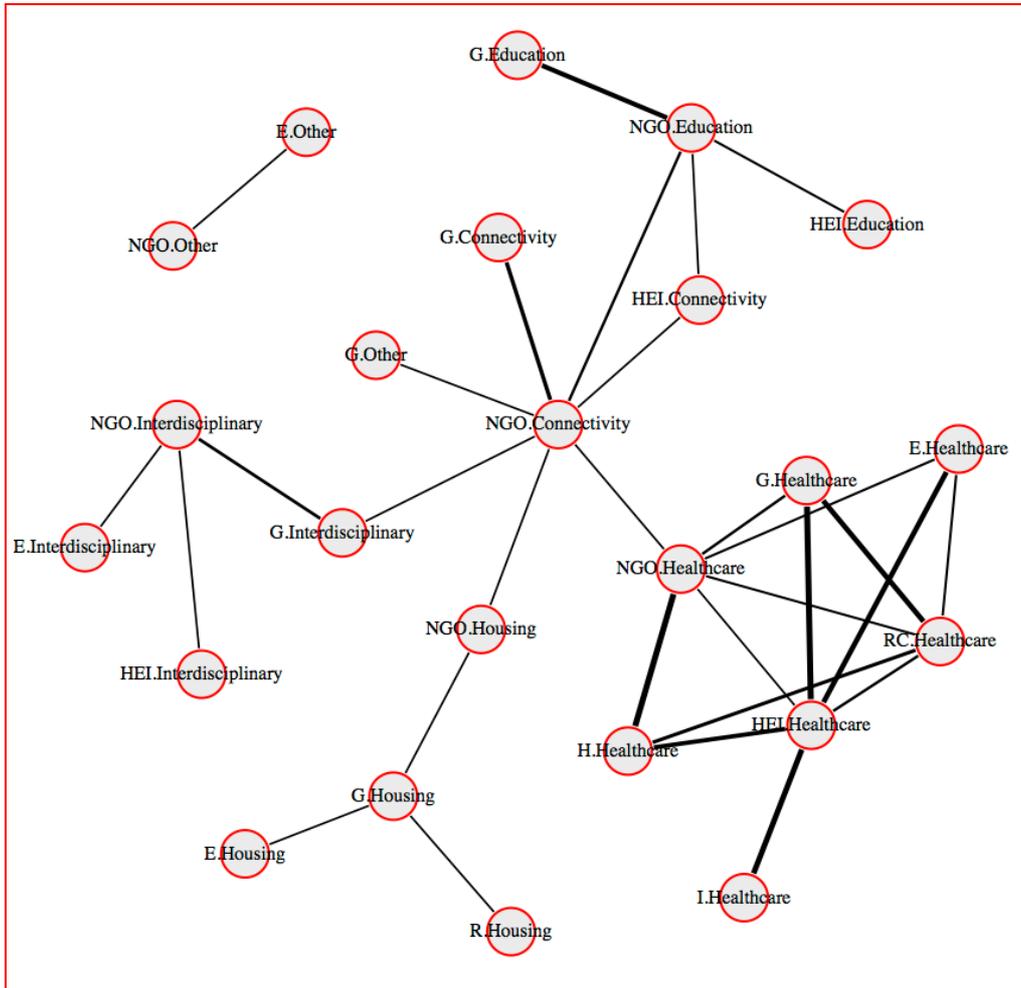


Figure 50 illustrates the connections across actors and application areas for initiatives that are not exclusively targeted at the older population. A typical example is a project that supports the mobility of older people and the disabled. Again, with respect to the results discussed above, we find some interesting differences when looking at this network

- We find a substantial high degree of activity across the healthcare sector and a range of actors: international funding agents, HEIs, hospitals, NGOs, research centre, governmental bodies and enterprise.
- There appears to be a hub and spoke model in which NGOs working in the application area ‘connectivity’ play a central role, connecting other actors active in the same application area as well as connecting with NGOs in housing, healthcare and education.
- Governmental bodies undertaking initiative related to ‘housing’ are central actors in this application area, contracting or providing funding to enterprise, regional bodies and NGOs.

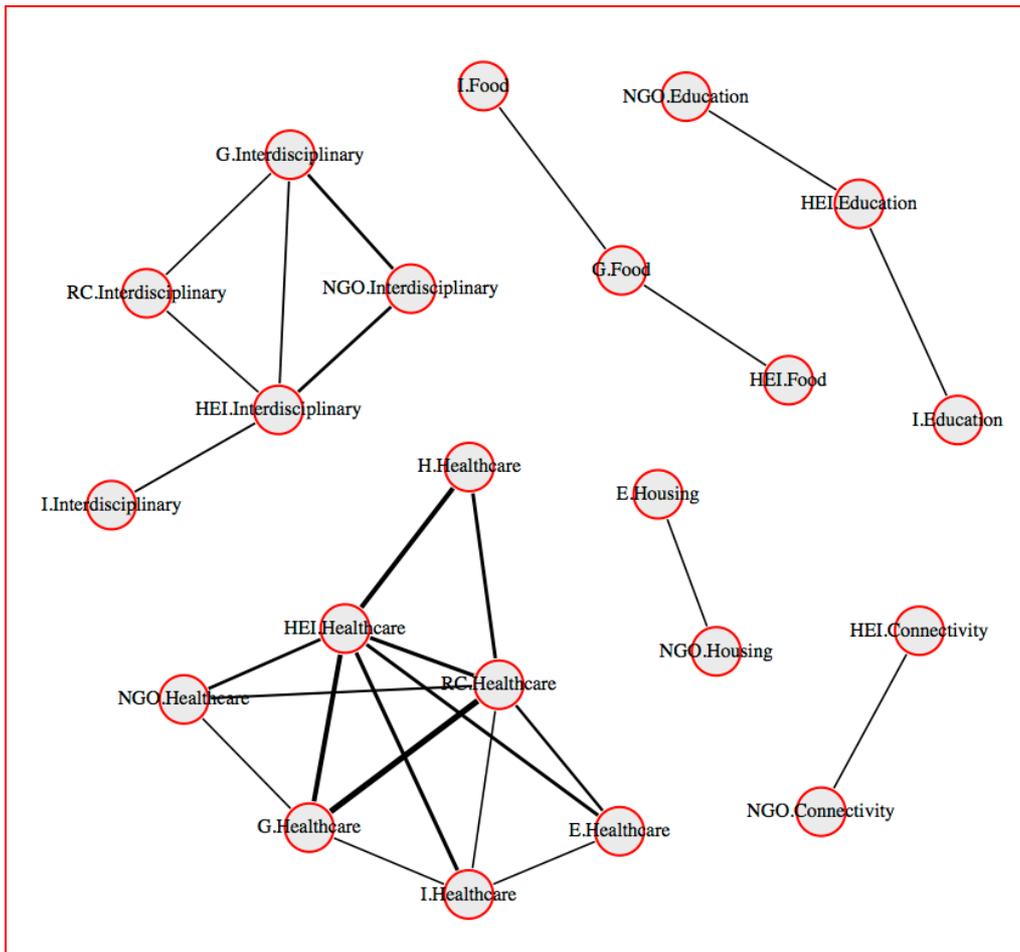
Figure 50 Initiatives not exclusively targeted at the 50+, across application areas and type of actor



In Figure 51 we document all research initiatives and the relations across actors and application areas. This figure yields some surprising results.

- Although there remains a strong cohesion within given application areas (in particular healthcare), we no longer find evidence of collaboration across application areas. Specifically, we no longer find a relation across healthcare and housing and across healthcare, connectivity and education.

Figure 51 Research initiatives across application areas and type of actor



In contrast to Figure 51, in Figure 52 we present the result of initiatives classified as services.

- There is a strong degree of connectivity across actors and application areas dedicated to providing services. NGOs (including volunteers) and governmental bodies dedicated to providing services related to connectivity play a central role in connecting actors across different application areas: i.e. education, housing, and healthcare. Also NGO activity in the field of lifestyle is represented, in connection to governmental initiatives in housing.

Figure 52 Service initiatives across application areas and type of actor

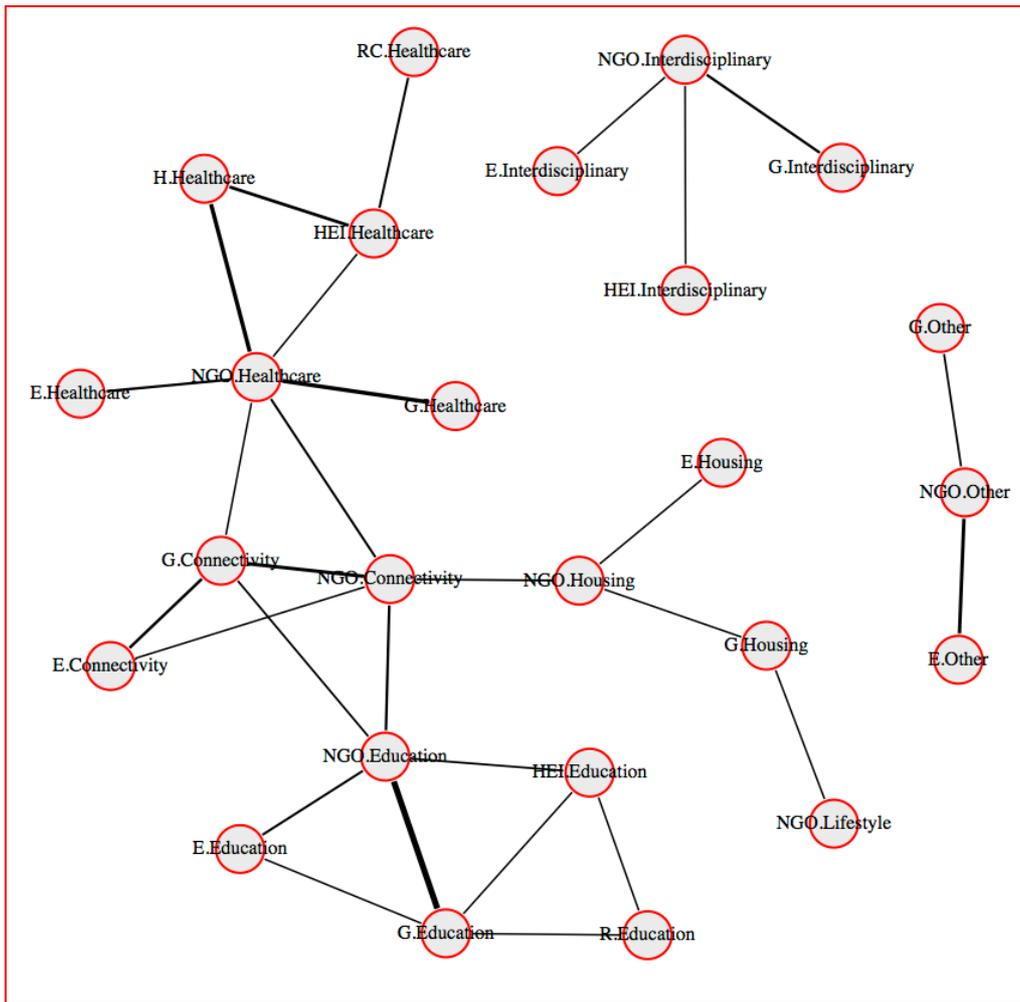


Figure 53 presents an overview of the initiatives when categorized as systems.

- The applications areas represented under the systems initiatives are healthcare, housing, food, and multiple application areas.

Figure 54 presents an overview of the product initiatives.

- The applications areas represented under products are healthcare and housing. Under housing, we have not identified a specific set of enterprise. Under healthcare, we find substantial activity linking enterprise, test-bed activity and governmental bodies.

Figure 53 System initiatives across application areas and type of actor (where two or more initiatives exist for a specific linkage)

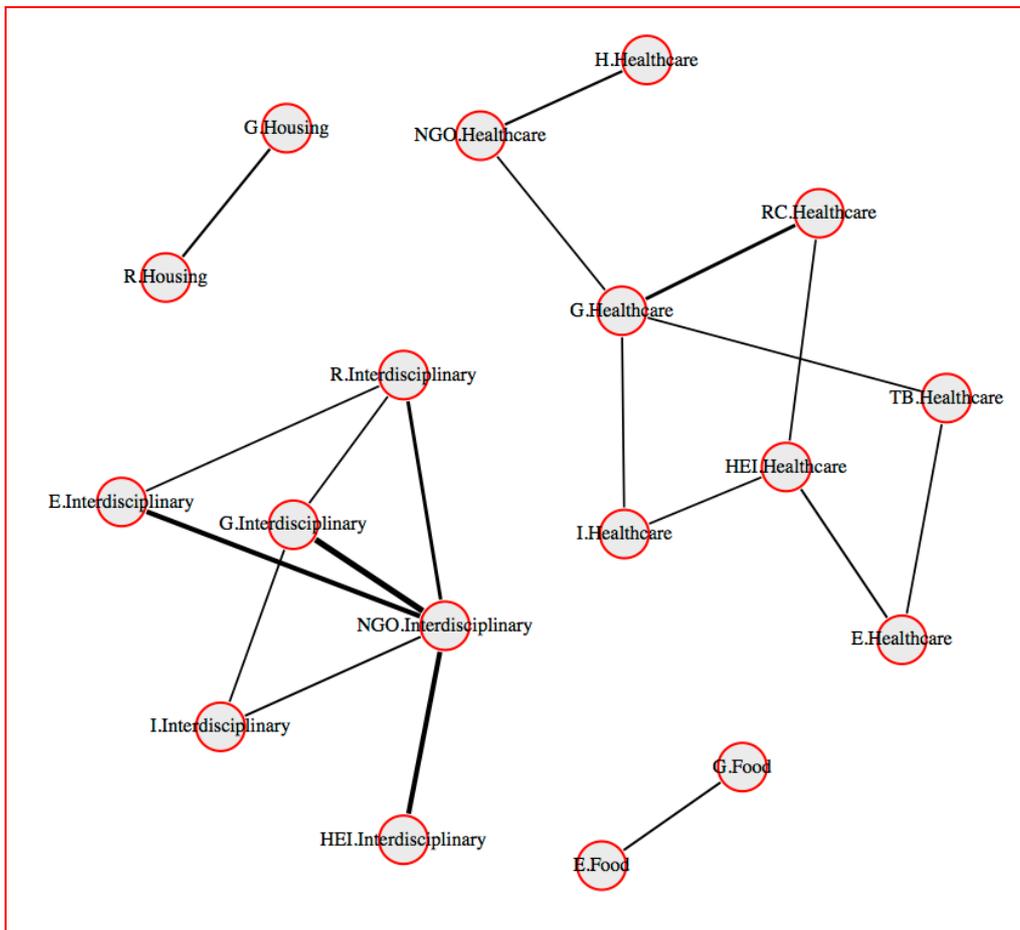
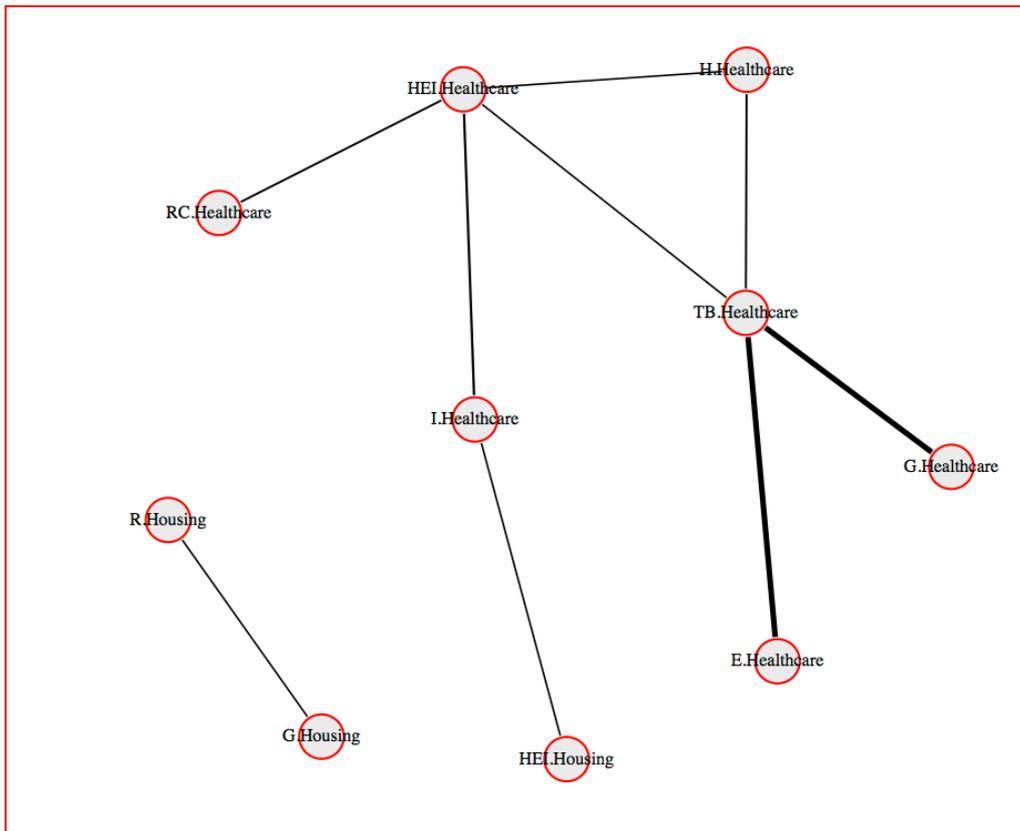


Figure 54 Product initiatives across application areas and type of actor



Finally, we graph the connections across actors and application areas based on the sum of the monetary value (instead of number of initiatives). Because several of the initiatives do not have a budget associated or documented the number of initiatives documented is relatively smaller. Nonetheless, the results are presented in Figure 55, which is considerably less interesting, and Figure 56. For readability, Figure 55 only includes the interactions when the sum of initiatives is equal to €10M or more. Figure 56 only includes the initiatives that are fully targeted towards older people.

- Figure 55, mainly illustrates that there are a number of initiatives, which have some connection to smart ageing, that result in sizable transactions / interactions across governmental bodies and enterprise active in the food sector. This connection represents the subsidies given under agricultural projects.
- Figure 56 illustrates that, in terms of volume of spending, there is substantial collaboration / relations on initiatives in the following areas:
 - Governmental bodies and regional bodies both working in the application area housing;
 - NGOs, HEIs, and governmental bodies working in multiple application areas on initiatives that fully target the 50+ population.
 - HEI, hospitals, research centres and international funding agents working in healthcare.

Figure 55 Initiatives across application areas and type of actor, total sum of €10M or more per linkage

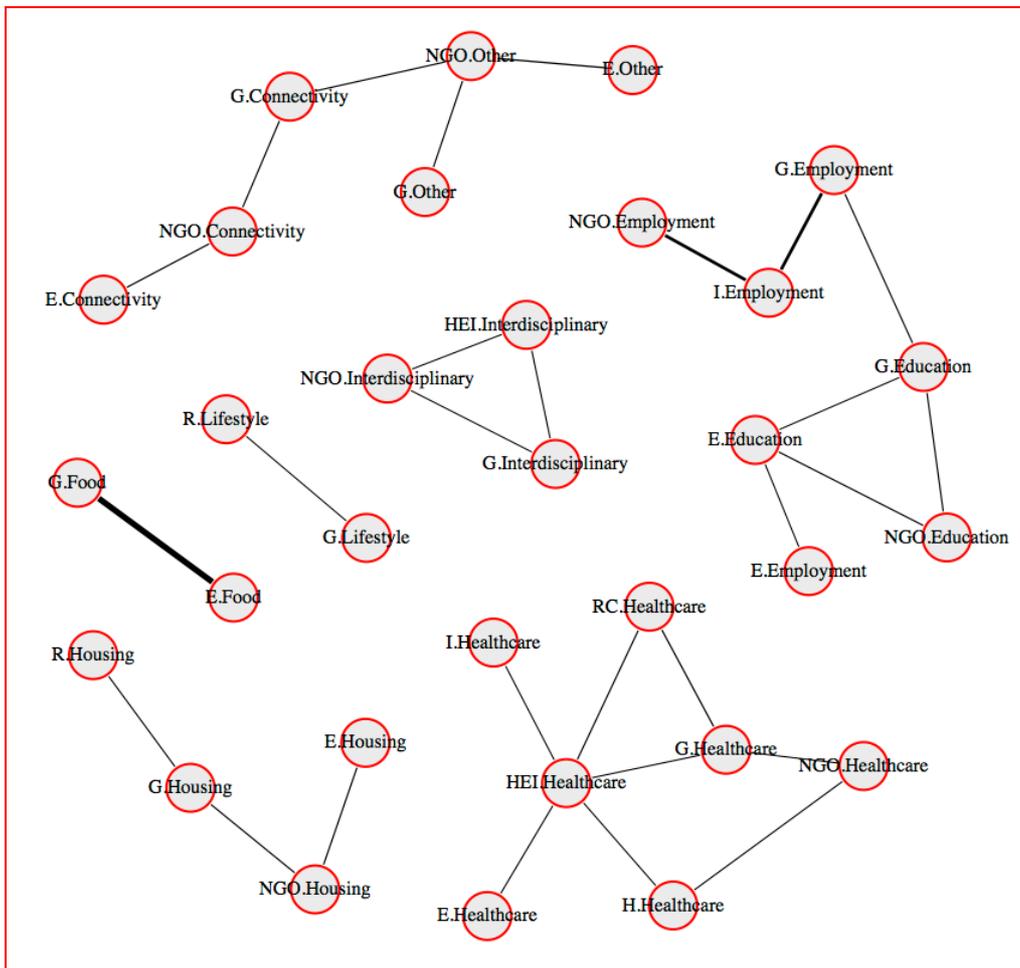
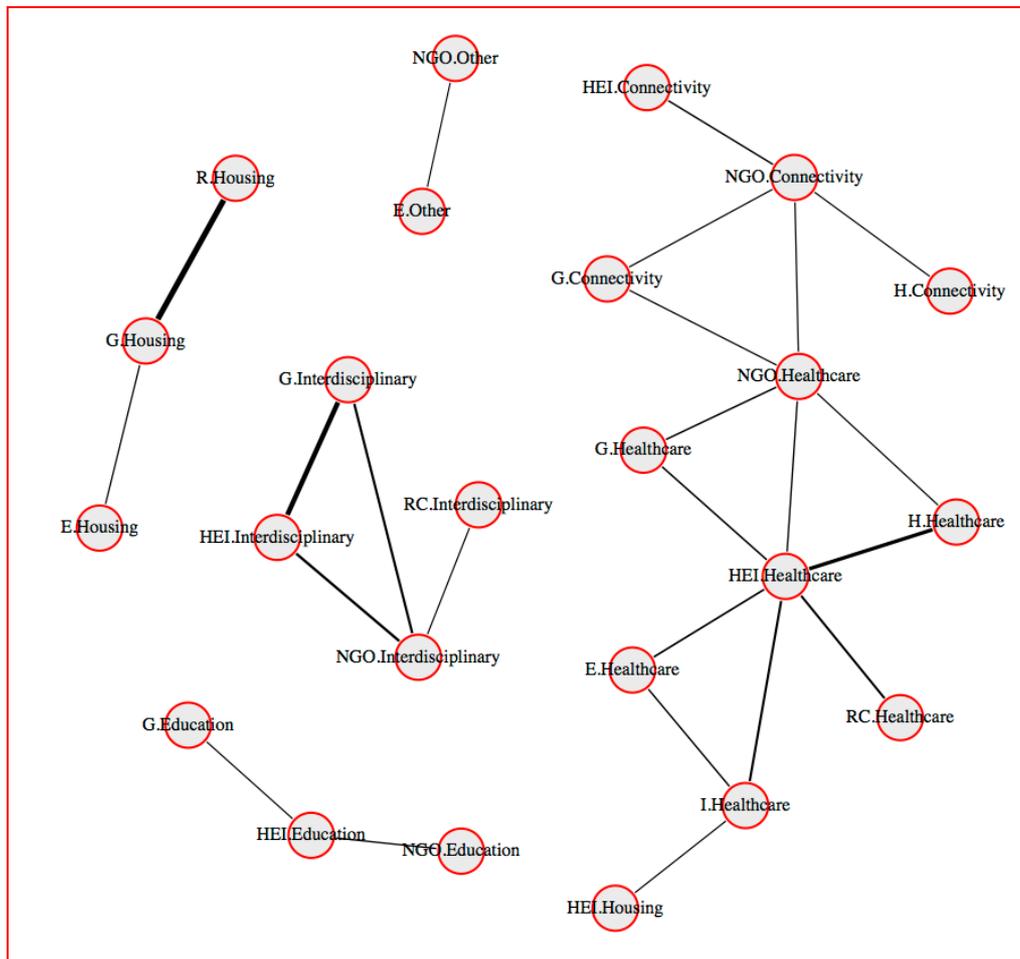


Figure 56 Initiatives targeted at the 50+ across application areas and type of actor, by total value across actors and industry.



Overall, the network analysis allows us to establish connections across several actors and industry. The healthcare industry appears to be relatively well connected to other Smart Ageing application areas, in part as a result of the sheer magnitude of the sector. Moreover, the network analysis identifies several actors that are centrally connected: NGOs, HEIs, International bodies and national government bodies.

One interesting observation is that in the Smart Ageing application areas where NGOs are relatively active, there appears to be a less active enterprise base. As such, the presence of NGOs can be an indicator of lack of commercial opportunities. At the same time, NGOs such as Third Age Ireland, Age Friendly Ireland, Atlantic Philanthropies as well as grass root NGOs and volunteers play an important role in connecting actors and sectors and may be important partners for enterprise to engage with. NGOs, may help reach out to older people and contribute to better understand the needs of the older population.

Appendix D Silver Valley: An ecosystem for ageing better

Silver Valley was established in the South-East of Paris where research organisations, hospitals, and industry co-locate. Its origin can be traced back to the Charles Foix teaching hospital in Ivry-sur-Seine with foremost expertise in geriatrics in France. Here the “Pôle Allongement de la Vie Charles Foix” was established in 2001 with a mission to conduct research and teaching into ageing, and drive corresponding economic development. A prize and a bursary scheme ‘Charles Foix’ was then established for innovative projects where selection criteria were innovation, utility, profitability, and feasibility. In 2010 a ‘cluster of innovation’ was established and in 2013, when the French government officially recognised the silver economy sector as a priority industry on its own right through an integrated network agreement (“Contrat de Filière Silver Economie”⁶⁸), Silver Valley⁶⁹ was born.

Silver Valley is a non-profit association that unites the actors of the silver economy in the Ile-de-France region⁷⁰. In 2013, it had 80 members, in 2014 175 members, and it is projected to grow to 300 members by the end of 2017. It has the ambition to boost the development of innovative economical activities (through growth and employment in the region) that meet the older people’s needs for better ageing. Silver Valley adopted a broad approach to ageing considering sectors including health, leisure, transport, social participation, housing, security, etc. to create economic and social wealth. Its core role is supporting ‘open innovation’ and the acceleration of innovation for better ageing. Silver Valley’s mission is to:

5. Strengthen and animate an ecosystem that generates the conditions favourable to the development and commercialisation of solutions for ageing well
6. Develop an awareness of public, private and academic players about the opportunities brought about the ageing population through lobbying at national and European levels
7. Support the actors in the silver economy to help understand the needs and practices of the older people and to develop their innovation strategy
8. Develop the regional attractiveness of Ile-de-France and promote French products and services on an international scale

Silver Valley has developed a sustainable business model with equal level of public and private financing. Public funds come from various regional (‘agglomeration community’) agency subsidies, while private sector income is through membership fees, provident funds⁷¹ and external service provision. External services offered by Silver Valley include training, consulting, conference organisation, and acting as reviewers for project selection committees.

Silver Valley members are grouped into three categories:

- Providers of goods and services to the older people (start-ups, SMEs and multinational companies)
- Partners of innovation that support ‘Providers’ (academic researchers, financiers, development agencies, service providers, etc.)

⁶⁸ http://www.social-sante.gouv.fr/IMG/pdf/Contrat_Silver_economie-MEP-9-12-2013-v6.pdf

⁶⁹ <http://www.silvervalley.fr>

⁷⁰ Ile-de-France has a population of 12m, an area of 12,000 km² and a per capita GDP of \$66,000; Republic of Ireland has a population of 4.6m, an area of 70,300 km² and a per capita GDP of \$43,600 (2012).

⁷¹ Provident funds are partly private social welfare groups to provide insurance and pension services among others. See for example AG2R LA MONDIALE (www.ag2rlamondiale.fr).

- User groups that represent the older people (public authorities, retirement homes, interest group, etc.)

The level of the membership fee depends on the status of the member, turnover of the enterprise, etc. and varies between €250-€2,000 per annum amounting currently to about 10% of total budget. Silver Valley’s membership provides members easy access to the following services:

- Integrated resources: office and lab space, financing, and professional services in design, marketing, and technology watch
- Networking: Silver Valley connects members with other experts, businesses, and users through dedicated regular meetings and thematic sessions
- Expertise: consulting on business plan, project development and prioritisation, innovation management, and thematic trainings

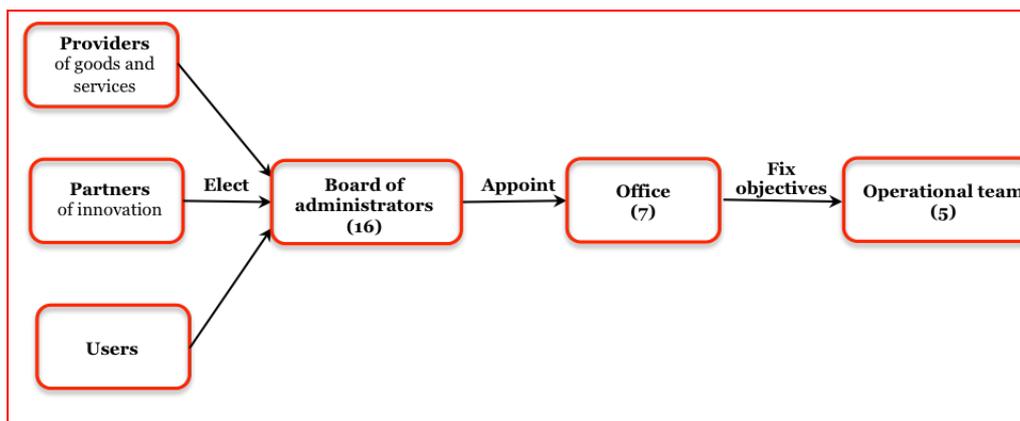
Small and medium-sized companies may thus benefit from testing business models and building prototypes in a safe environment, while larger enterprises can create an ‘open innovation’ system and have access to innovative projects.

Silver Valley also manages the Bursary ‘Charles Foix’ that provides €15,000 for three innovative companies each year and a personalized support from Silver Valley on strategic and operational issues. Since 2004, over €400,000 have been distributed to over 30 companies.

Silver Valley shares its expertise on an international level in order to help to develop similar clusters elsewhere: in 2013, it helped to set up the SAGE-Innovation cluster in Sherbrooke, Quebec, and established a framework agreement between the two organizations in 2014.

Silver Valley is run by a small and dedicated team that includes business development, marketing, communication and finance. The 5 FTE strong operational team is overseen by the ‘Office’ of the association that in turn is appointed by the ‘Board of Administrators’; the 16-member board is elected from the three main member groups (Figure 57).

Figure 57 Governance structure of Silver Valley



Source: Silver Valley presentation

Silver Valley is a member of the InnoLife consortium, gathering 144 European players: leading businesses, research centres and universities from 9 EU countries. It has been selected in December 2014 by the European Institute of Innovation and Technology (EIT) as the Knowledge and Innovation Community (KIC) for EIT Health. With a total volume of €2.1bn it is one of the largest publicly funded initiatives for health worldwide. As of spring 2015, Silver Valley will be located in the innovation hub “Silver Innov”, a building dedicated to the Silver economy, including a showroom, a living lab, a business incubator and office space.

Appendix E List of Interviewees

Interviewee	Organisation
Jens Bleiel	UCD / Food for Health Ireland
Rodd Bond	Dundalk Institute of Technology
Sarah Bowman	Trinity College Dublin
Anne Connolly	ISAX
Cathy Craig	Queen's University Belfast / CARDI
Susan Davies	Susan Davis International
Helen King	Bord Bia
Anthony McCauley	Fujitsu Ireland
Mark McCrohan	VHI Healthcare
Leonard O'Sullivan	University of Limerick
Tom Scharf	NUI Galway
Céline Schricke	Silver Valley, France

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