Photo: Viewminder

AGE 3.0

Addressing the challenges coming with **An Ageing Population**

— A National Strategic Innovation Agenda —

Key words: ageing population, elderly, senior citizen, sustainable society, health, nutrition, housing, mobility, safety, welfare technology
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Vision

"An age-friendly society adjusted to the changing demography. Each senior citizen can live a good life, with access to services and products suitable for his or her changing needs and wishes."

Mission

"Employing research knowledge and building an innovation infrastructure to develop 'senior-citizens-centred' services and products as well as developing the societal systems and structures."

Contents

Foreword

A national strategic agenda 'An Ageing Population' was first developed in a project led by SP Technical Research Institute of Sweden. The project was partly funded by VINNOVA, and some 30 organisations and companies took part, varying in size and representing both the public and private sectors. Work on the agenda was conducted on a multidisciplinary basis and addressed on several fronts the societal challenge of the ageing population.

Below organisations participated in the project:
SP Technical Research Institute of Sweden, IKDC (Ingvar Kamprad Design Centre), the Swedish Construction Federation, the Swedish Institute of Assistive Technology, Robotdalen, New Tools for Health, Aspekta, the Royal Institute of Technology – Centre for Health and Building, SIK – Swedish Institute for Food and Biotechnology, the Skåne Association of Local Authorities, Findus, Sahlgrenska Academy, Kristianstad University, Lund University Faculty of Engineering, UKS Life Science, Doro, Medirest, the Swedish Centre for Innovation and Quality in the Built Environment, ICA, the School of Design and Crafts, Innventia, Pelàtis, the Skåne Food Innovation Network, Connect, Valhalla Science Park, Alingsåshem, Örgryte Bostads AB, Lund Municipal Authority, the Swedish Civil Contingencies Agency, the Swedish University of Agricultural Sciences Balsgård, SCA, the Swedish National Pensioners' Organisation, Nine, Sensinet, Sigrun, the Skåne Region and others.

Below is a list of other strategic agendas that were developed in parallel and where contacts were established and cooperation was carried out:

- Lund Lighting Initiative 2020 (Lund University)
- Health and Social Care in the Information Society (SP)
- Sweden as an International Centre for Life Science (Stockholm County Administrative Board)
- ICT-BIM for Better Processes and Products (Swedish Centre for Quality and Innovation in the Built Environment)
- LivsStrat 2022 (SIK)
- Triple-i-Zero – A Safe Future for the Community and Business (Chalmers University of Technology)
- Patient Involvement for Service Innovation. An Agenda for Research and Innovation in Healthcare and Social Service (Karlstad University)
- IoT Sweden (IVA)
- Agenda – National Transport Initiative 2050 (SP)
- Design for Increased Competitiveness (SVID)

Our sincere thanks to everyone who has been involved and contributed to this agenda. The proposals in the agenda is a result of a joint effort made possible only by contributions from all participants and great collaboration.

This revised agenda has been further developed in collaboration with Susanne Iwarsson and Steven Schmidt, Lund University Faculty of Medicine; Britt Östlund, Royal Institute of Technology, School for Technology and Health and Red Cross University College; Elisabet Rothenberg, Sahlgrenska University Hospital and Kristianstad University; Christina Skjöldebrand, Ingvar Kamprad Design Center at Lund University and Margareta Lilja, Luleå University of Technology.

It is our ambition to establish a strategic innovation program based on the agenda. You're most welcome to join us for the realisation of Age 3.0!

Abstract

The background to the agenda is the increasing proportion of senior citizens in the population, which presents both challenges and opportunities for society, business and entrepreneurship. The long-term vision is to develop an age-friendly society adapted to the changing demography. The strategy to do so is to employ research knowledge and build an innovation infrastructure to facilitate the creation and development of 'senior-citizens-centred' services and products as well as developing the societal systems and structures. The aim is to provide solutions of easily accessible goods, services and networks that are in line with the needs and demands of senior citizens.

Senior citizens are a large and as heterogeneous group as any other population segment. In Sweden the majority of senior citizens are healthy and live independent lives. In particular in very old age, there are also those who are frail and sick and who are in considerable need of care and assistance. Most important, as an increasing proportion of the population is ageing with chronic disease and/or disability, also people in earlier phases of life are facing challenges similar to those in more advanced age.

The work within the agenda has been conducted on a multidisciplinary basis to identify new interactions. The goal was to establish collaboration through a series of meetings and workshops and where ideas and innovation chains with an embedded holistic approach could be created. This goal was achieved through four workshops with some 30 organisations. Smaller meetings were also held and collaboration took place with other agendas.

Four priority areas have been identified: housing, nutrition, health and mobility. To achieve the vision, it is important to work with prevention by adopting an individual approach but from a holistic perspective, further important is to make use of research results instead of know-how. Simple, robust regulatory frameworks and structures should work to promote the independence of the individual. Welfare technology that adapts existing technology and makes it useful and accessible to the elderly would bring us closer to realising the vision. This can be achieved through collaboration!

Summary in Swedish

Bakgrunden till agendan är att andelen äldre ökar stort, det innebär både utmaningar och möjligheter för samhälle, handel och företagande. Den långsiktiga visionen är att skapa ett åldersneutralt samhälle anpassat för en demografisk förändring. Strategin är att nyttja kunskap från forskning och bygga en innovationsinfrastruktur som underlättar skapandet och utvecklandet av tjänster och produkter som utgår från individer, likväl som att utveckla de samhälleliga systemen och strukturerna. Syftet är att inom en snar framtid få fram lösningar och ett lättillgängligt utbud av varor, tjänster och nätverk anpassade till nivåer och kvaliteter som önskas av de äldre. Gruppen äldre är stor och heterogen, de flesta mår bra och lever ett självständigt liv, men det finns också de, speciellt bland dem som är mycket gamla, som är sköra och sjuka med stora hjälp- och vårdbehov. Gruppen sköra och sjuka ökar då personer med sjukdomar och olika handikapp förväntas leva längre.

Arbetet med agendan har varit multidisciplinärt för att kunna finna nya samspelseffekter. Fyra större workshops där ett 30-tal olika organisationer deltagit har hållits för att ta fram nya idéer där ansvarsfrågor inom och mellan olika innovationskedjor och ett helhetstänk är av vikt. Dessutom har samverkan skett med andra agendor och resultatspridning vid möten med teman rörande äldre.

Fyra prioriterade områden har identifierats: boende, nutrition, hälsa och mobilitet. För att nå visionen är det av vikt att arbeta preventivt med individen i fokus utifrån ett helhetsperspektiv och där man arbetar utifrån ett kunskapsbaserat perspektiv med att ta fram enkla och robusta regelverk och strukturer som gagnar individens autonomi. En satsning på välfärdsteknologi som gör befintlig teknik anpassad, lättillgänglig och användbar för den äldre för oss närmre visionen och bygger på samverkan mellan olika aktörer, såväl privata som offentliga.

1 Introduction

In Europe and in large parts of the world, the proportion of elderly people in the population is growing and Sweden is no exception. Between 2010 and 2030 it is estimated that the number of Europeans over the age of 65 will rise by almost 40 percent. It is also estimated that around 50 percent of those who are born in Europe today will live to be at least 100 years old. It can be seen in Eurostat that Sweden is a country where self-perceived health scores are highest among European senior citizens over the age of 85. Further Sweden scores, according to UN, high in the "Active Ageing Index" According to UN Secretary General Ban Ki-moon, increased life expectancy can be attributed largely to improvements in nutrition and hygiene. Viewing life in terms of life expectancy and identifying and understanding health-impacting factors help to increase our knowledge of ageing throughout life. The growing proportion of senior citizens in the population presents both challenges and opportunities for society, business and entrepreneurship. Health issues, primarily food, pharmaceuticals and hygiene, and quality of life become focal points alongside autonomy-related issues, i.e. the facilitation of an active, independent life with free and independent choices. Living a good life!

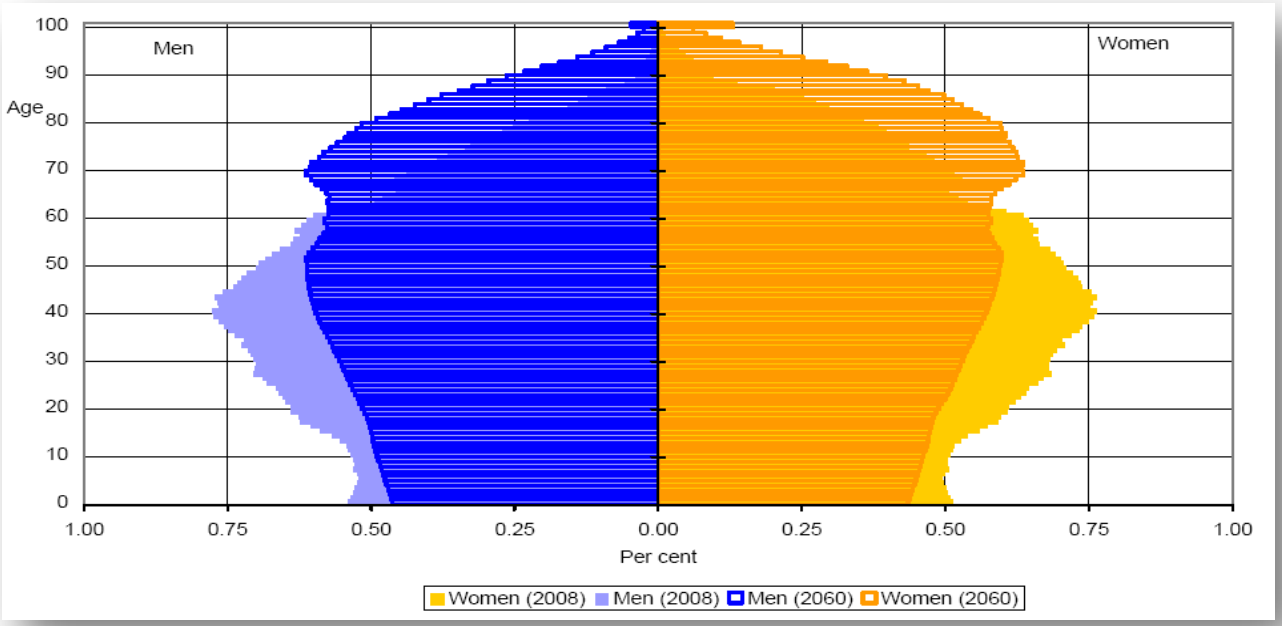


Figure 1: Population pyramids EU27, 2008, 2060 [Source: Eurostat, EUROPOP2008 convergense scenario]

Despite the flow of information and news in every form, society's common knowledge of the elderly and their behaviour, motivation and consumer patterns is generally low. Gerontology tells us that ageing is *per se* a process that is common to all individuals, results in reduced functional ability and inevitably leads to death. How quickly ageing progresses can vary from one individual to another. It is therefore important in this context not to speak about biological age, but rather categorize individuals in the four ages, where older people belong to the third or fourth age. Talking about all senior citizens makes a large and heterogeneous group. On the one hand there is the largest subgroup in which the vast majority are in good health and live independent lives belonging to the third age. On the other hand there is a considerable subgroup of frail,

sick people who are in great need of care and assistance, with very small margins in all systems and with a heightened risk of disease and disease-related malnutrition. These belong to the fourth age. Lack of knowledge leads to prejudices towards the senior citizens, preserving an idea of all seniors as poor, inactive and unproductive. In reality, the vast majority of the seniors today are a sharp contrast to these prejudices. The majority are active and interested in what life has to offer and they are enthusiastic consumers of goods and services. Many of them also have the financial means to sustain a wide and varied consumer lifestyle. This was confirmed by VINNOVA, together with the Swedish Retail Institute, in a recent report written by Daunfeldt et al. on consumer patterns among the elderly. When making purchasing decisions, social and emotional goals are very much a priority. It is thus extremely important not to treat all senior citizens in the same way but to view the elderly sector of the population as a number of very diverse subgroups with differentiated requirements, wishes and needs. A common factor among the elderly is the increase in individualistic thinking and needs. Moreover, a growing number of people at an increasingly higher age remain living in their own home, with or without help to manage day-to-day life.

Even though a vast majority is living a good life there is a time in life where the independency decreases according to age factors. In today's society there is no holistic perspective of taking care of this. Although many opportunities of aid for the senior citizen it is hard for many to navigate between these and also hard to find the services that suits the individual. Sweden was the year 2013 awarded being the best country for ageing by the organisation Help Age International. Still there are more to do concerning autonomy, a good life and adding life to years.

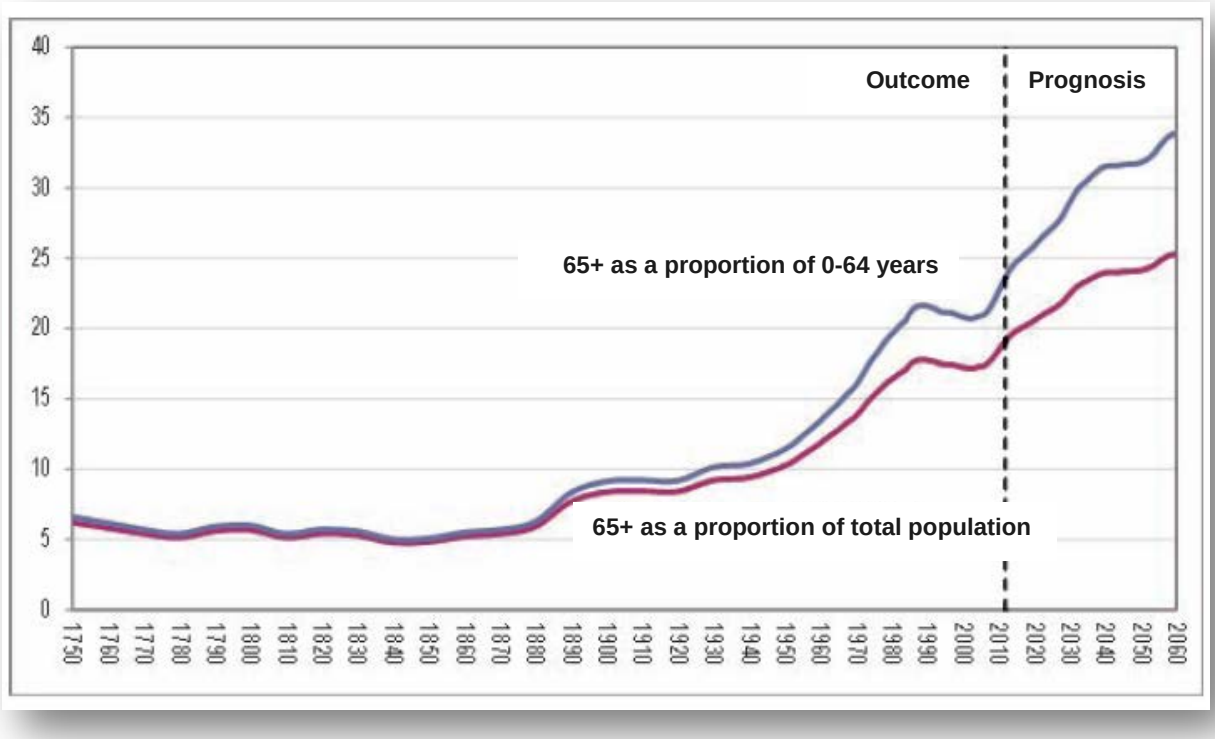


Figure 1: 65 years and older as a proportion of the population and of those 0-64 years [Source: SCB Statistics Sweden, Population projections]

Vision and strategy

The initial work of the agenda focused on a broad vision: “Society and entrepreneurship require new approaches and constellations in order to build reliable, effective, sustainable systems and societal structures, where the focus is on the health and well-being of elderly people in different social and medical contexts." Refining the agenda put forward the need of a more developed vision and a coherent mission/strategy.

Vision:
“An age-friendly society adjusted to the changing demography. Each senior citizen can live a good life, with access to services and products suitable for his or her changing needs and wishes.”

Mission/strategy:
“Employing research knowledge and building an innovation infrastructure to develop ‘senior-citizens-centred’ services and products as well as developing the societal systems and structures.”

This is entirely in line with the WHO call for local, national and global strategies to meet the challenges of an increasingly older population employing a focus on health, safety and accessibility.

Society in the future includes all generations and active ageing should be an obvious element. According to the UN, health, involvement and safety are the three cornerstones of active ageing.

2 Implementation

An interdisciplinary group with participants from industry, academia, institutes and voluntary organisations has worked for almost a year to produce a basis for a strategic research agenda for an ageing population. This took the form of workshops covering different themes, but still with the aim of a holistic perspective. It also led to an ongoing exchange of information with related agendas and other current, relevant initiatives.

2.1 Working method

In each area there are overall visions regarding future solutions that underpin the long-term vision of creating a sustainable society and a sustainable life for the older segment of the population by creating and developing an easily accessible range of goods, services and networks adapted to the needs and standards of the elderly.

An initial step in the task of moving forward with a holistic view in the creation of products, services and networks for the senior citizens was to formulate relevant knowledge and establish platforms for collaboration. This was achieved through a series of meetings and workshops. It was vitally important to discuss and resolve liability matters within and between different innovation chains and areas.

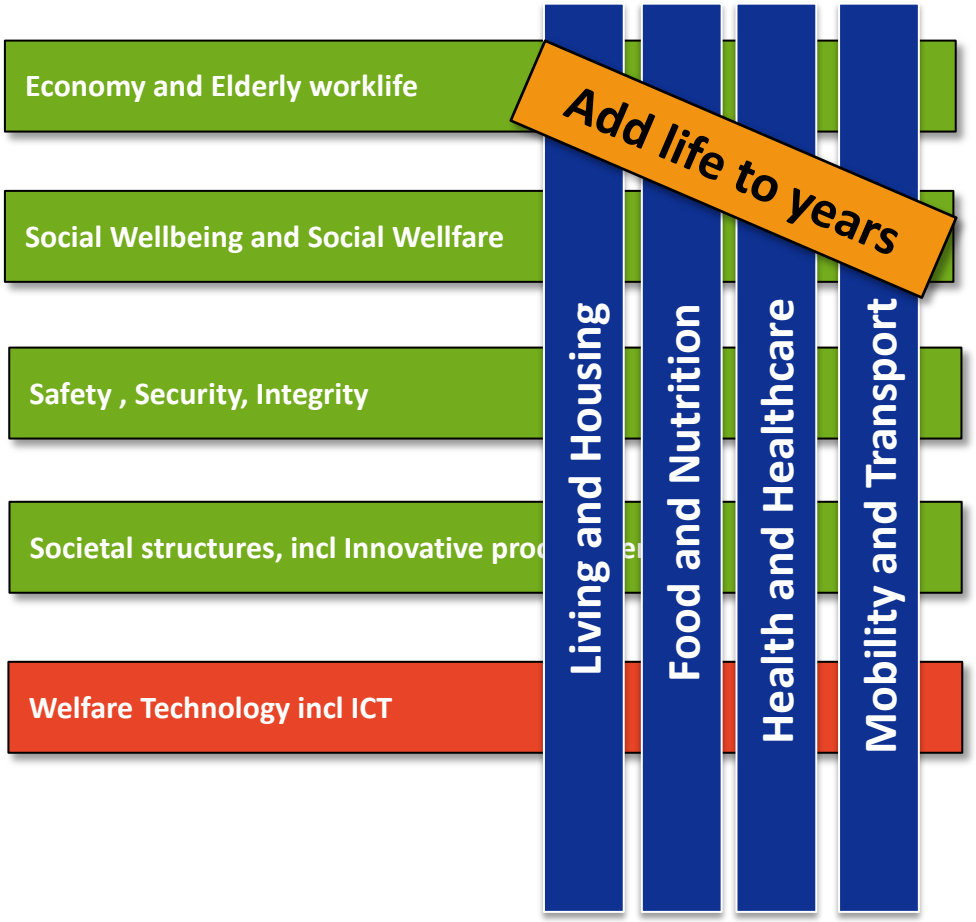
Proposed areas of collaboration for future SIOs (Strategic Innovation Areas) have been discussed as well as EUs Horizon 2020. During the course of the work, a number of collaborative initiatives were taken that led to a discussion article, participation in different meetings at which the agenda was presented, research applications, hands-on applications and collaboration between different parties.

3 Results from workshops and agenda work

Workshops and presentations have been run within the framework of the agenda by several different organisations. The workshops had mixed themes in order to get a holistic perspective and stepping outside each subject's normal boundaries according to profession and knowledge. The themes were, however, grounded in the areas: Life Science, Built Environment, Energy, Risks and Safety, ICT and Transport. The work resulted in four priority areas and further interdisciplinary tools that are commonly used within each prioritised area and which could be used as facilitators to interconnect the prioritised areas in order to get the holistic perspective from both an older individual's perspective and from a group perspective. The interdisciplinary tools are themselves large and independent disciplines. They are mentioned here as tools since each of the disciplines can be used in each of the prioritised areas, either to connect them or to be used in each single area. The prioritised areas as well as the interdisciplinary tools are described below.

The four prioritised areas are: "Living and Housing", "Food and Nutrition", "Health and Healthcare" and "Mobility and Transport".

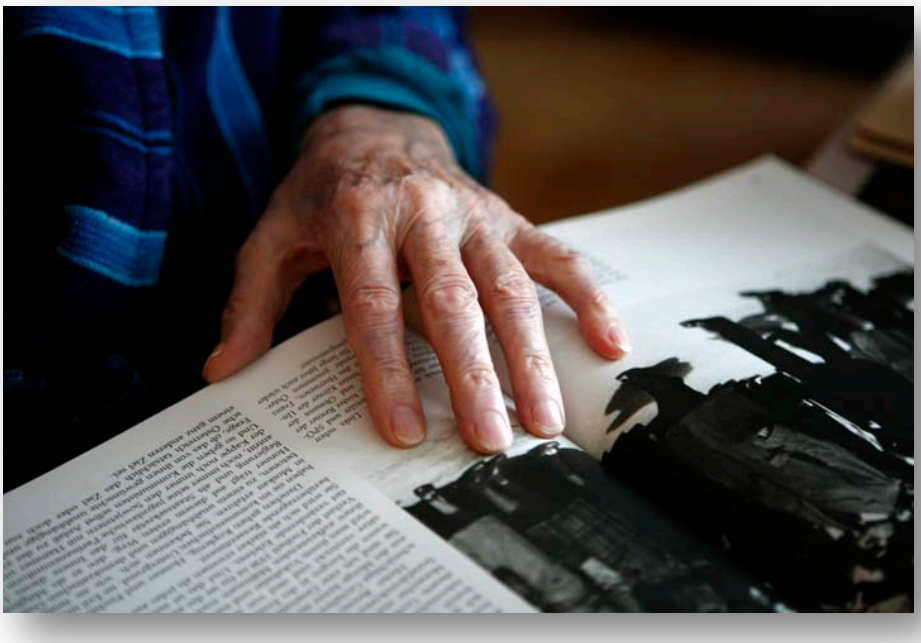
The Interdisciplinary tools are: "Economy and Elderly Worklife", "Social Wellbeing and Social Welfare", "Safety and Security", "Societal Structures, including Innovative Procurement" and "Welfare Technology including ICT".



3.1 Living and Housing

In Sweden, most senior citizens live in their own home and the majority want to continue to do so, which is in line with national policy that senior citizens should remain living at home for as long as possible. According to the Swedish Federation of Local Authorities and Regions, it is most beneficial in socio-economic terms for elderly people to remain living in their own home and to have services provided for them directly in the home. The cost for living in a residential facility is more than double compared with living in an own home. There is a decline in the number of apartments in residential facilities for the senior citizens and instead, the home help service and the home healthcare service are being expanded. The result is that a growing number of people will remain living in their own homes to an increasingly higher age even though the housing stock is far from functional. **More than half of all homes in which senior citizens live are beset with shortcomings in terms of physical accessibility.**

Recent or ongoing projects have addressed a variety of issues, including a demand among the senior citizens for **meeting places where the focus is on context, accessibility and organisation**, and how public areas can be developed **to instil a more pleasant, secure feeling and be made functional for the elderly**. **There is a large development potential** within a number of areas linked to the residential environment of the senior citizens.
E.g.: matching housing to person, simple improvements in the outdoor environment, refurbishing and renovating bathrooms and everyday technology for the elderly and their relatives. There is a development potential not only with regard to producing technical solutions but also structures and systems for social well-being, procurement, financing and quality assurance. A carefully considered, attractive design is an important factor that must not be overlooked.



The **indoor environment** in the home is extremely important for the health and well-being of the occupants. It is important that homes are designed in a way that there is a cool area to which the occupant can retreat and that there are ample green, shaded outdoor areas that do not become overly hot. On the other hand, it is important that the

temperature in the home is sufficiently high to ensure that people who are sedentary or bedridden do not freeze.

A major issue with regard to the ageing population is the **built environment**. The **accessibility** of the built environment, including homes, public buildings, outdoor environments, accessibility and also the infrastructure, must be adapted to the needs of the elderly if they are to manage day-to-day life successfully. It is important that the home environment is made attractive and pleasant, preferably with a stimulating, appealing design. Level differences, such as stairs and thresholds, heavy external doors, narrow door openings and cramped bathrooms, toilets, utility rooms and waste rooms, are obstacles that prevent people from managing their day-to-day lives successfully. A major challenge lies in the large number of **hygiene rooms and kitchens** in the existing housing stock, particularly those built as part of the 'million programme' in the 1960s and 1970s.

Key initiatives include:
Attractive and individualised social environment, house matching, outdoor environment, hygiene rooms, kitchens, everyday technology, indoor climate, accessibility, safety, etc. New as well as refurbished indoor environments are necessary in many homes. Preventive actions are of importance.

3.2 Food and Nutrition

There are many senior citizens who are suffering from **malnutrition**, the outcome of malnutrition means large implications both for the individual and for the society. High extent of suffering for the individual and extremely high costs for society. The reason and background for being malnourished is mainly diseases, but reasons also include a change in the need for nutrition, changes in the body composition such as sarcopenia (replacement of muscle fibres by fat), a reduced sense of smell and taste, dysphagia (eating and swallowing disorders) and motor problems caused by involuntary shaking and trembling due to a lack of muscle control or neurodegenerative processes.

Malnutrition leads to deterioration in a person's general physical condition, an increased risk of disease and a longer period of rehabilitation, dizziness and the risk of falling is increased. In combination with diseases lack of appetite is common.

Preventive work can take place in this area through the provision of **information, foods adapted in terms of consistency and taste and eating aids**. Being reminded that it is time to eat is an example of a simple, preventive measure. The meal situation as such is important, not only from a nutrition point of view but also in terms of **social contact and a nice environment**. Each meal should be a pleasant and enjoyable experience – highlights of the day.

Food deliverances to the homes of the older people, either as ingredients or as ready meals can be improved. For example by giving the elderly menus to choose between different meals and choose where and when to eat, for example at home or somewhere else. Also the knowledge about food and nutrition among the care takers needs to increase, as well as skills in cooking for the elderly. Tools for identification of

malnutrition are available, but not well known among care givers. The tools should further developed to be both available and easy to handle.

Sweden is well to the fore in food and **food safety, food technology and nutrition**. This is particularly the case at the interface between food and pharmaceuticals with, among other things, probiotics and prebiotics. There are companies that specialise specifically in good, nutritious, consistency-adapted food for the elderly. Health promotion and preventive actions in relation to food and meals, especially in social terms, are of importance to achieve well-being and quality of life.

Key initiatives include:
Attractive and individualised social environment, nutritious, well-tasting and attractive food, eating aids, tools for measuring malnutrition, increased knowledge etc. Preventive actions are of importance.

3.3 Health and Healthcare

A major challenge is the substantial increase in the cost of care and welfare as more people are living considerably longer. In a report from 2010, the Swedish Federation of Local Authorities and Regions estimated that taxes would need to be raised by 13 percent to maintain the current level of care and welfare in 2035. According to the OECD, considerable sums are being spent on care and burdensome, care-intensive initiatives but with very limited spending on **preventive measures**.

A great deal could be done at a modest cost, such as informing elderly people and those close to them about **health-promoting measures related to lifestyle, nutrition, sport or physical and psychological activities and assistive technology**.

Hygiene aspects are also important and being able to manage one's hygiene is a critical facet of personal integrity. A common, albeit harmless, condition is incontinence, which mainly affects women. There are already many hygiene products and aids available although there is still considerable potential for development.

Care and welfare for the elderly are currently dealt with by a range of different parties, both public and private. To enhance eldercare quality even further, and to form a **basis for procurement**, work is taking place within SIS (Swedish Standards Institute) to produce **quality standards** for eldercare and welfare.

Staff who work with the senior citizens are doing a very important job. This work needs to be upgraded and made more attractive and with a focus firmly on quality to ensure that a high standard is achieved and maintained.

Key initiatives include:
Attractive and individualised preventive and health promoting actions, information, assistive technology, increased knowledge, standards etc. Preventive actions are of importance.

3.4 Mobility and Transport

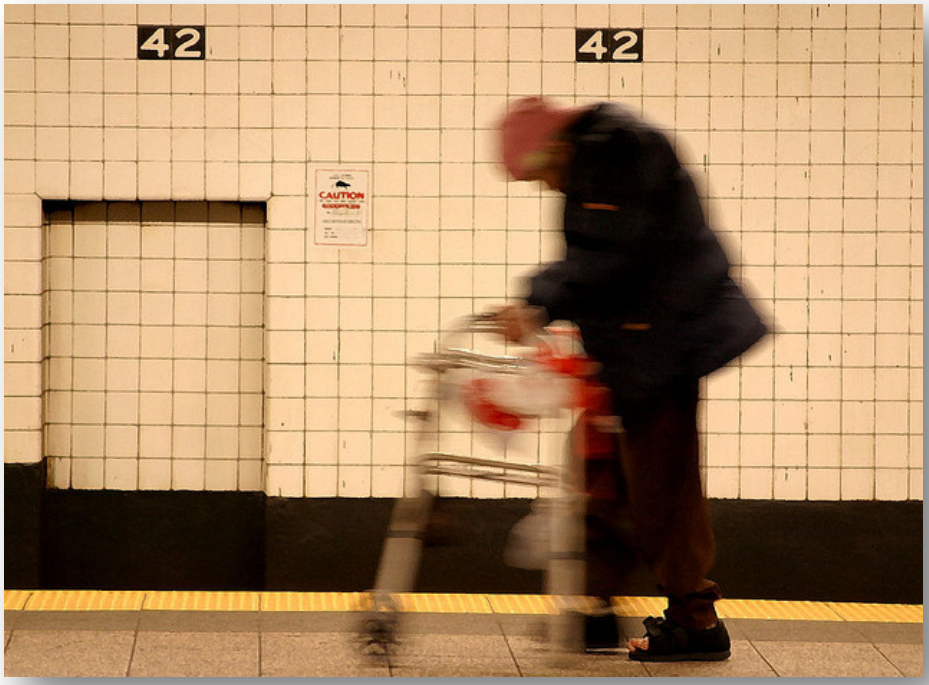
Safety and simplicity with regard to moving around in **traffic as a driver, passenger, cyclist or pedestrian** need to be highlighted. New passenger transport services that focus on individual wishes and requirements need to be examined. Goods transport is also important and the possibility of having items delivered directly to the door and perhaps help in the home are vital. The production of new, innovative solutions is an issue that has a bearing on the whole structure of society. With a constantly growing population, and where growth can in part be attributed to the population living longer, it is important that we can satisfy expectations regarding the transport of both passengers and goods for all age groups and that the system instils confidence. An initial step is understanding and accepting that more people out on the roads are elderly and that this needs to be taken into account.

Photo: Viewminder

For traffic and transport safety **new mobility solutions** – new and **self-monitoring vehicles** for example – could become a reality. Even the development of new and more individually adapted services within **passenger transport** could be part of the future and could impact on leisure activities, social events and transport of people with different types of diseases and disabilities. For people with impaired vision or who have physical disabilities, the degree to which their self-esteem would be boosted if they could drive their own vehicle subject to the same conditions as everyone else cannot be underestimated. With available technology in combination with a far-sighted infrastructure, this could be made possible. The technology is based primarily on communication between the vehicle and the surroundings. The minimum level is to offer mobility solutions to older people and people with disabilities which, regardless of the person's degree of disability or the cause, allow them to move around with the same degree of comfort and within the same time span as the rest of the population.

The use of electricity and renewable fuel is also a focal point in logistics and transport. For **goods transport, packaging** is important to safeguard the shelf life, quality and safety of products. This is important, most of all with regard to storage of food and medicines but also for delivery accuracy, accessibility and reloading between modes of

transport. As regards goods and packaging solutions, there are a number of aspects that need to be taken into account. Not just sustainability in conjunction with transport but also **size, openability and storage aspects**.



Key initiatives include:
Attractive and individualised mobility and transport solutions for drivers, passengers and goods. Packaging issues should be taken into account. Preventive actions are of importance.

3.5 Interdisciplinary Tools

The interdisciplinary tools are not only tools, but large areas in themselves. They are however interconnecting the four priority areas and can be used in all of these. Sometimes in exactly the same ways and sometimes somewhat adapted to the specific priority area. The aim is to use these interdisciplinary tools as facilitators for a holistic perspective where the elderly individual is in focus.

The interdisciplinary tools are: “Economy and Elderly Worklife”, “Social Wellbeing and Social Welfare”, “Safety and Security”, “Societal Structures, including Innovative Procurement” and “Welfare Technology inclusive ICT”

3.5.1 Economy and Elderly Worklife

The demographic transition is being considered as one of the most important challenges facing the EU, culturally, organisationally and from an economic point of view.

According to economy forecasts from Swedish government the financial burden of the ageing population will increase enormously, as the proportion of elderly is rising and the proportion of young people and people in working age is declining. The rate at which persons within worklife provide support for persons outside worklife is increasing faster than the economic growth. Tax incomes goes down, and the financing of the pension system is challenged. Also, consumption of welfare services increases as a person grows older, meaning that costs related to health and care will increase, posing a challenge both to economy and the welfare systems. Another aspect is that there will not be labour force enough to work within the area of care and related areas.

However, more recent forecasts mean that the ageing population may be regarded as an opportunity and may generate new businesses and services both by younger elderly and for elderly. People older than common retirement age in worklife is already a reality in some areas, but more can be done. By for example adjustments of work tasks and of the physical and psycho-social work environment. Tax is lower for the employer to hire persons older than 65 years old, although tax are paid as usual by the employed.

There is a strong need for development and innovations with respect to incentives and societal structures (organisation) that promotes senior citizens to take active part in the economy and in the provision of welfare services. Areas of interest include (to mention a few): service innovations, new business and organisational models, social innovations, third sector support, lifelong learning and education.

Keywords:
Economy, cost, healthcare, pension, finance, tax, worklife

3.5.2 Social Wellbeing and Social Welfare

Quality of life has many facets. Joy of life, wellbeing and happiness are important for all of us, but are not the same for everybody. Some perceive happiness from enjoying pleasures such as good bird song, good food or listen to music, while others mean that social interactions are the most important, eg spending time in good company. There are also those who rank the gaining of personal goals as the most important driving force for wellbeing and happiness. However, most of us need fellows and communities to feel good. There are too many examples of senior citizens feeling alone and isolated and without someone to share the enjoy of pleasures, these will mean nothing. Young elderly often worry about becoming older.

Kairos' future points out the most common worries to be: Totally unaware of reality, totally dependent of other people, not to be cared for, loss of dignity and loss of capacity to manage everyday life. These points show that there are potential for a number of innovations, services as well as products to increase autonomy among the growing population of senior citizens.

Regarding product innovations research has stated that products do not make people happy. However, more recent studies has shown that products in fact *can* increase happiness. Peter Desmet from Delft university means that even though products may not be source of profound happiness, they can still be designed to have a sustainable contribution to happiness.

Social innovations are of great importance to find personalised solutions within our society, it may be concepts, methods and strategies aiming to approach or solve challenges. Collaborations between different actors and organisations within the society as well as individuals and entrepreneurs are all needed in the innovation procedures.

The results can be new networks and meetings among and between different generations. There are many on-going initiatives to increase wellbeing. For example by different types of networking activities and courses, different creative initiatives like knitting, cooking, painting and music. Travels and sport activities in groups or alone, in reality or via ICT solutions. The list can be long and more can be done.

Keywords:
Well-being, isolation, activities, generations, social innovations

3.5.3 Safety and security

Ageing *per se* means a weakened immune system and reduced functional capacity, but with marked individual variation. Impaired vision, hearing, strength or balance will result in reduced capacity for the individual to deal with risks.

From a risk and safety point of view, the challenge of an ageing population is that we have a statistically significant expected rise in the number of accidents resulting from falling and slipping as well as road accidents, fires and food poisoning, as elderly people are more exposed to such risks.

As individuals, we react in different ways to the risks we are exposed to. We want to avoid accidents as undesired events but in the final analysis we make choices with regard to purchases, investments and our behaviour, which impacts on our risk exposure. How individuals handle risks depends on the individual's security preference and risk perception and the available alternatives. Generally, there is a lack of knowledge about how security preferences change with age, how the elderly perceive their level of risk exposure and how they relate to (knowledge, needs and wishes) alternative ways of handling those risks (including technical solutions).

According to Statistics Sweden, falls are the single most common type of accident that leads to death. Forecasts by Statistics Sweden due to falls will double through to 2050. Fall sensors and other types of alarm sensors are good but they can be made attractive and easy to use. Examples could be alarms in sheets, in clothes and so on. The risk of food poisoning will increase as a result of diminished sensory function and this could lead to less attention to hygiene, cleaning of surfaces and equipment and storage of

food. Apart from incidents with serious consequences, individual and seemingly less serious accidents can strongly affect and restrict the life situation for an individual.

Many accident risks can be avoided by using different forms of assistance, including anti-slip protection, strategically placed handles and walking aids. Safety and security for the elderly can also be increased by promoting greater interaction between ICT and other areas in order to produce sensors, alarms and warning systems. A broader range of products and services can improve and maintain safety among the elderly. Energy-absorbing floors in residential care facilities and in the home environment are considered to be an important means of reducing the incidence and consequences of falls. Intelligent (but not integrity-infringing) monitoring systems, such as the measurement of water use or energy use in different rooms, could be the future when identifying potential accidents, thus offering support/avoidance at an early stage. Most important to avoid risks is to develop preventive tools and strategies. This can be done in most areas, eg daily exercise both for body and brain, smart design and lightning etc.

Keywords:
Risk, safety, security, prevention, accident, food poisoning, alarm, monitoring systems, preparedness, integrity

3.5.4 Societal Structure, incl Innovative Procurement

Understanding who is responsible and who to contact in different situations is difficult for many people. This applies in particular to senior citizens who are too healthy to be considered in need of help but who cannot always manage entirely on their own. As regards the structure and systems in different areas, but perhaps mainly within care and welfare, the current procurement systems are deemed by many to be more of a hindrance than a help. It could be difficult to find one's way around a system that is based on a solution designed for many instead of being able to make a personal choice. Individual solutions and personal freedom of choice ought to be sought. Even with regard to housing issues, procurement procedures, ownership and management can sometimes be counter-productive when it comes to making life in the home simpler. In the case of procurement, adopting a holistic approach ought to be considered with a large, broad range of components and using the individual as a starting point.

There are new lines of thought at many housing companies, such as integrating different housing alternatives and housing adaptations for several different groups in society. Making different types of housing and forms of ownership available could be envisaged. There could be different degrees of service for those who wish – not just for the seniors but for all residents.

It ought to be possible to link up IT platforms for smart control of the different functions in simple, easy-to-use structures where social networks, health networks and so on can be linked. Questions regarding personal integrity are important, as is medical safety, when several systems and items of equipment are connected. The architecture of the computer system or systems that are used ought to be built in a way that they offer compatibility, availability and reliability for several systems, devices and items of equipment. The systems must be robust and multifunctional.

Technology does not resolve everything and individuals optimise based on their preferences and their scope to act. As a community we need to act within the whole prevention, preparation, response and recovery chain. However, there is a need for better structures to develop new technical solutions more quickly and to bring the solutions to market. Once again, simplicity is important to ensure the systems are clear and usable. Accessibility is vital.

Keywords:
Rules, regulations, procurement, individualisation

3.5.5 Welfare Technology including ICT

By utilising technology it is possible to free up resources and have more time to devote to the individual. Technology can and ought to be used in social contexts that make everyday life easier. However, it ought to be borne in mind that it is the technology that should be adapted to the human being and not vice versa. Technology should be seen as something that assists a person in daily life – not an obstacle. Holistic thinking in the form of different interlinked innovation chains and activities is important, as is how, in the light of confidentiality and integrity considerations. The technology can be refined and different user interfaces can be identified and developed from the individual's perspective.

There are a number of products on the market today that are being produced for senior citizens. A future with even more smart solutions and with applications related to people's living situation, health and well-being, and which can be used by the vast majority, is not far off. This includes applications for inspiration, entertainment and mental training, such as games and crosswords. Social media can be advanced even further to suit the elderly, e.g. the easy use of videophones, perhaps also in combination with other stimuli. Services such as banking and other similar services can also be developed for an easier use. Control technology for comfort in the home, e.g. temperature, ventilation, sound and light, also offers potential for development. The majority of these already exist but they can and ought to be adapted even more to the wishes and needs of the senor individual. Depending on familiarity with ICT technology, previous knowledge and possible reduced functional ability, the attraction of using different products can vary. It is important to bear in mind that future generations of elderly people will have an entirely different level of knowledge and familiarity with technology including ICT than is the case today. The technology readiness level will increase within the whole society.

Another example of a technical aid is e-home help as a complement to the traditional home help service. Communication services can be used in contact with relatives but also to create networks between the senior citizens, e.g. computer tablets for use by the elderly. With the introduction of e-home help there is a cost benefit but also a benefit for the individual. Older people who need supervision at night time could have a camera installed in the bedroom –termed 'night time peace' – so that the home help staff do not need to wake the person when they make their nightly visit. There should be a broader definition of what ought to be included as assistive technology. There are many functions in computers and smart phones that could be of benefit. The importance of technical aids having an attractive design should also be taken into account. Care and welfare can be improved through greater precision, safety and accessibility. Care and welfare can then take place at a lower cost.

Within what is known as e-health, new functions can be developed that act on a preventative level and at the same time improve care and welfare efficiency. Medical data, such as blood pressure, can be gathered in the home environment and in many cases directly by the individual. New technology can incorporate intelligent monitoring systems, such as a reminder that it is time to eat or take medication and measure health

parameters or different sensors to detect falls. Further it could be possible to answer questionnaires about well-being and health status. Again, this will allow care and welfare to be enhanced through improved accessibility and safety and then be applied to a lower cost than today.

There is a great deal of development potential for technical solutions in the home in the form of smart devices and attractive assistive technology that can make daily life easier. Examples include a carefully placed handle and lightning, easily accessible cupboards, smart locking systems, fire extinguishing systems and different alarm functions. The 'Internet of things', i.e. that many different devices can be linked and communicate with each other, is something that in the very near future ought to be possible to use in this context. It is important to be able to adapt thermal comfort to the individual. It should be easy to control and it should be possible in the future to adapt the interface personally to ensure that climate control can be handled easily. One could envisage simple displays as well as remote control and/or voice control. It could also be possible to introduce what are termed activity monitors, which continuously read electricity meters and activate an alarm if the use pattern is not 'normal'. Although in certain cases this could be regarded as an infringement of personal integrity, it could be a way of utilising the energy signature for monitoring, safety and system optimisation. It would be possible to see, for example, whether the cooker has been switched on or whether it has been switched off. With intelligent control of lighting and temperature it could be possible to adapt the indoor environment to the needs of the individual and at the same time minimise energy use.

The bathroom should have good accessibility, offer the potential to maintain a good standard of hygiene and at the same time provide protection against moisture damage. There is also the scope to incorporate completely new functions and systems into bathrooms, such as health monitoring – measuring a person's pulse or temperature using bathroom equipment for example. Bed measurement could also be envisaged to detect moisture and temperature. An increasing number of medico-technical products are expected to enter the bathroom for diagnosis, alleviation, treatment or relief for injuries or disease. These products include disposable products (e.g. incontinence protection), instruments, implants and equipment for measuring and creating images. They can also be used in combination (e.g. smart diapers). New measurement and validation methods ought to be produced for the specific 'field environment' of the bathroom.

The coexistence of all this technology is vital as it is not that simple to get everything to work. Coverage and capacity are other factors that need to be in place and be working. Sensors and smart networks could be used to discover deviations in daily behaviour patterns and to activate an alarm to indicate that something may have happened.

Outside the home, in transport and logistics, there are a number of well expanded communication systems that function in parallel, e.g. GSM, GPRS, 3G, 4G, DAB, DSRc and WLAN. In future systems it is expected that the majority can be linked and can communicate. It is expected that warning systems, control systems for cars and other modes of transport can interact and function efficiently.

An evaluation of different parameters can be made by means of simulations and measurements in actual environments as well as in multisensorial laboratories and living labs.

Keywords:
Technology readiness level, communication, e-projects, sensors, monitoring, smart networks

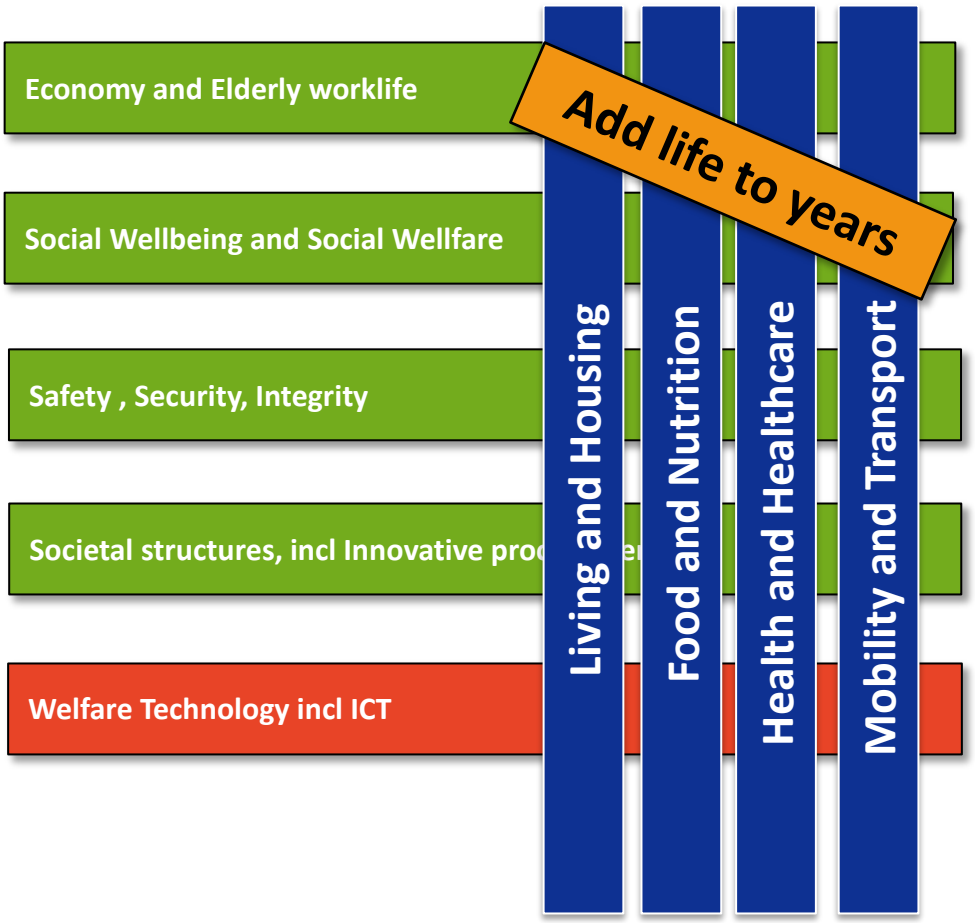
3.6 Summing up of the results

During the course of the agenda work, four areas have emerged as priority areas and which were found to be particularly important for the ageing population. These areas were:

- **Living and Housing**
- **Health and Healthcare**
- **Food and Nutrition**
- **Mobility and Transport**

Further the following interdisciplinary tools could be adapted within each prioritised area and be used as facilitators to interconnect the prioritised areas in order to get the holistic perspective from an older individual's perspective.
The Interdisciplinary tools were:

- **Economy and Elderly Worklife**
- **Social Wellbeing and Social Wellfare**
- **Safety and Security**
- **Societal Structures, including Innovative Procurement**
- **Welfare Technology inclusive ICT**



To achieve increased well-being, it has emerged that for each of the areas there also ought to be a focus on the following:

- ***The individual***
- ***Quality of life***
- ***Autonomy***
- ***Respect***
- ***Preventive activities***
- ***Holistic solutions***
- ***Individual solutions***

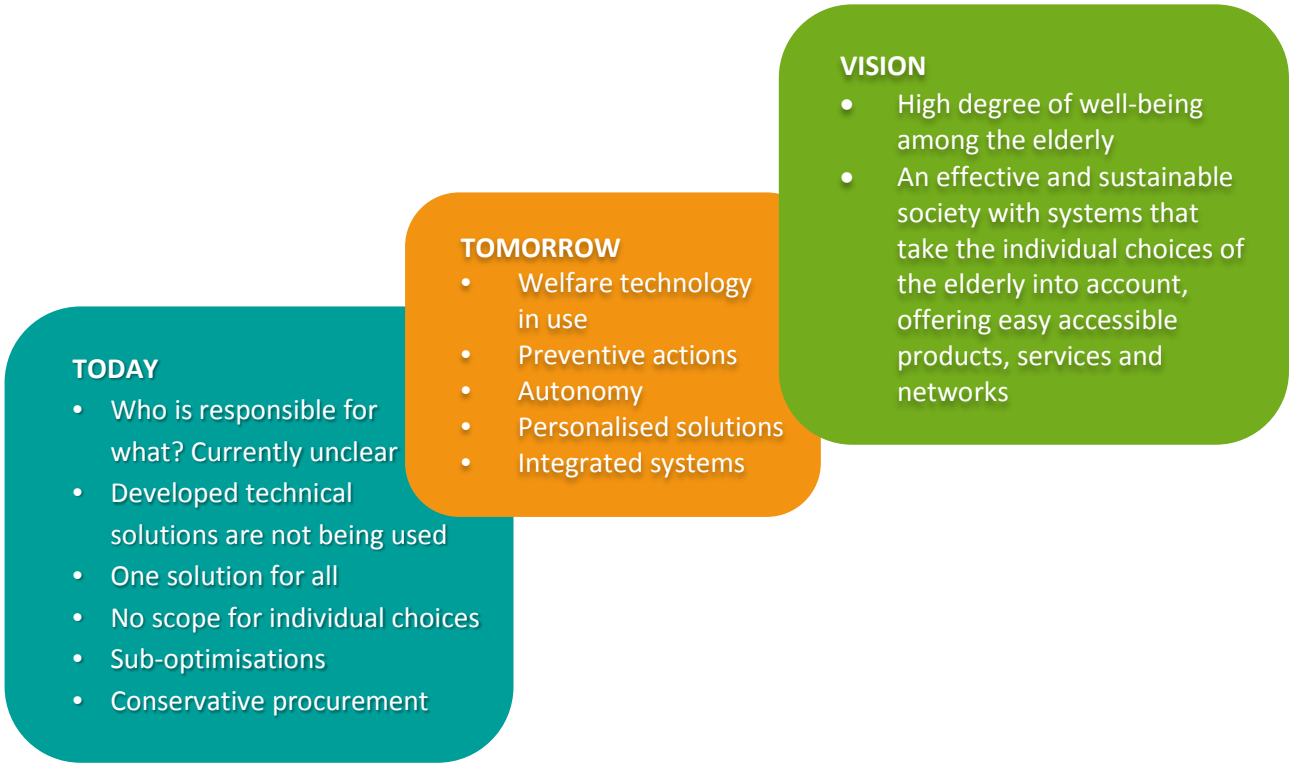
4 Concluding discussion

Based on the agenda work, we can see that within research, product development, manufacturing, the service sector and so on, there are many important applications that would be suitable for collaboration. Even if in technical terms Sweden is well to the fore in its innovations and we have a good entrepreneurial climate, particularly through a number of national research and innovation strategies designed to facilitate cooperation and interaction across industry and sectorial boundaries and between academia and business, we are still facing greater international competition. There is a great need to make research results easy available to develop innovations built on a knowledge base rather than on “know-how”. The ageing population and how to integrate all ages into an age-friendly society is a global challenge and asset that needs to be seriously addressed on, both from a national level and preferably with international collaboration.

The majority of industrial sectors feel that cooperation and interdisciplinary activities are a good way of bringing about renewal in order to compete on an international market. Even if many local authorities, counties and county councils, companies, entrepreneurs and marketers have in recent years begun to change the way they view the older generation, there are still significant gaps in understanding what older people want and how they consume products and services. Today’s knowledge is mainly built from own experience and know-how, rather than on research results. This is also the case abroad.

Relevant measurement of how products and services are perceived is a prerequisite for optimisation of systems, services and offers. A major challenge is to be able to measure in a secure, relevant way the experiences of older people, to understand the background to these experiences and on the basis of this be able to design products and systems optimally. This involves measurement of experiences as well as the physiological measurement and testing of products and services. Incorporating the individual's perspective into development projects is something that we have worked on for a long time and in Sweden this is an area in which we are generally very proficient. Consumer-based product development is an important aspect of this work if we are to produce a variety of innovations and adapt them to the individual.

There are different approaches in, and also within, different countries and a series of structures is being built up to meet, as far as possible, the social challenges presented by an increasingly older population. Cooperation between different countries can provide help and ideas on how to meet these new challenges. A step towards more international cooperation has been taken within the agenda, among other things in the form of networking within EIP (Entrepreneurship and Innovation Programme).



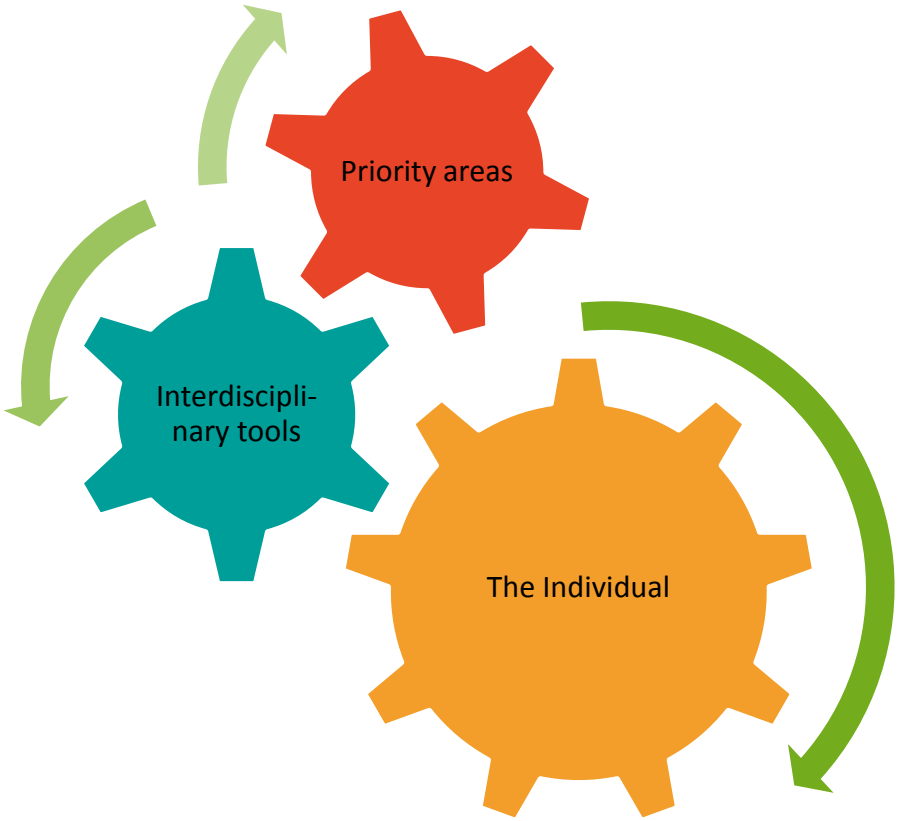
5 Proposals for future areas of research and innovation

Based on what has emerged within the different theme areas, we have identified four priority areas:

- Housing
- nutrition
- health
- mobility

By adapting the interdisciplinary tools, “Economy and Elderly Worklife”, “Social Wellbeing and Social Welfare”, “Safety and Security”, “Societal Structures, including Innovative Procurement” and “Welfare Technology inclusive ICT”, within the prioritised areas these can be used as a facilitators to interconnect these areas in order to get the holistic perspective from an older individual’s perspective.

The priority areas and interdisciplinary tools can be researched and developed either jointly or separately. However, they have in common that they need to take the point of departure from *Needs and wishes of the individual*, see figure on next page. A range of possibilities for research and development in these areas and their interfaces are proposed.



Research and development by interlinking priority areas and interdisciplinary tools with each other and with the needs and wishes of the individual.

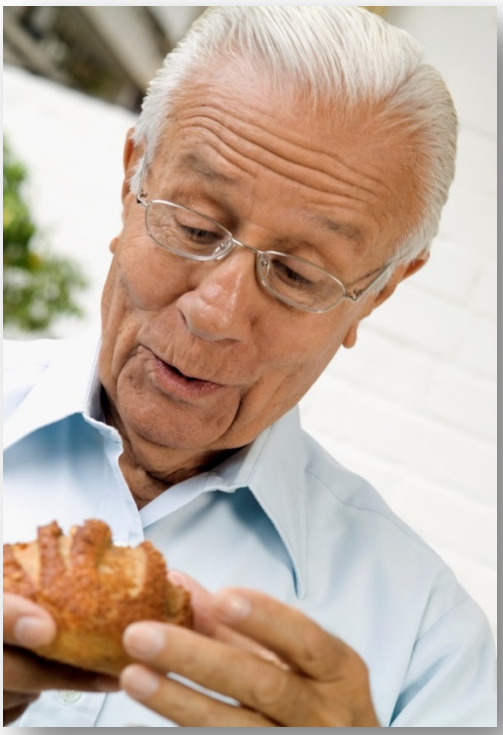
5.1 Needs and wishes of the individual

Deciding oneself, being listened to and being shown respect all have an impact on health. To be included. Physical activities and social life with good company are desirable for the vast majority of people. As are good food and being able to personally choose the time and place for a meal and its content. Feeling good is important when viewing the totality from the perspective of the individual.

For many, it is important to live in your own home whilst for others it is inconceivable. It is important to offer alternative forms of housing that the individual can choose from. The home should be functional and for many it is important for it to be designed and furnished attractively. If help is needed in the home, the individual should be able to choose what, how and when. Household chores can be a burden and there are many who realise that the current home help system is inadequate. The home should feel attractive, pleasant and secure. It should be easy to get in and out of home, to bring home goods or have it delivered. Transport of both passengers and goods for all age groups are important issues for the autonomy of the elderly.

Technology that is simple to use and which produces a distinct improvement in everyday life is desirable. In this context it is important that people who are in close contact, such as relatives and care staff, keep a check on how different types of technology are working in conjunction with updates and handling. Recognition is a factor that should not be forgotten and connecting something new to something that already exists could

be a strength. A person should feel comfortable and safe with new technology and ideally they should see the benefit of it.



5.2 How will it be achieved?

In order to proceed and come closer to realising the vision and in doing so create growth, the next step is to utilise the welfare and social technologies that are being used in order to invest in preventive measures and individual solutions in an accommodating social structure with coordinated systems.

The whole society and its citizens need to think and re-think in new ways with regard to ageing and focus on the individual. Many senior citizens want and are able to exert influence over their daily lives. With a holistic perspective that includes sustainable, reliable and effective systems and social structures we can live a good life and remain in good health for a long time. To include and integrate groups of seniors together with other groups of the society when new and innovative steps are taken will be of utterly importance in the development process.

Some general activities should be mentioned:

- **Innovation infrastructure**
  An important step when bringing solutions to a market is testing and validating. By innovation infrastructure the aim is twofold; one is providing access to different subsets of a population who can actively participate in test and validation. The other is turning senior citizens into subjects (from being objects) in the innovation process, thus involving senior citizens in the early stages of innovation.
- **Arena promoting innovation management**
  Innovations stem from cross boundary meetings. To enhance innovation input

specifically, but also the rate and speed of which innovations are further developed there is a need of organising such multidisciplinary meetings.

- **Think Tanks**
  In the development of goods, services and networks it is necessary to bring in thoughts from the whole society. This might be done in the form of workshops and getting together events where today and future are discussed among and between different generations and disciplines.
- **Portfolio of programs/projects**
  The arena and the think tanks mentioned above will just facilitate the process of managing successful projects. The projects may be sorted in a set of programs to address different challenges or deal with different areas.

Epilogue

The population pyramids are transforming. The proportion of senior citizens is increasing and the proportion of working age people is decreasing. Between 2010 and 2030 it is estimated that the number of Europeans over the age of 65 will rise by 40%, which will have huge impacts on welfare, health and financial systems. Maintaining health and independency of senior citizens is a key issue.

The Swedish society needs to address the demographic change in innovative ways in order to turn it into opportunities. The so-called silver economy entails as much new business opportunities as safeguarding welfare as we know it. This strategic agenda aims to shape an age-friendly and sustainable society, with focus on individuals.

Age well!

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