Challenges related to independent living in the Nordic capitals

Analysis for Nordic Innovation by DAMVAD in collaboration with Maja Arnestad and Jukka Teräs

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1 Executive summary: competition themes, common challenges and recommendations

The Nordic countries and the Nordic capitals face substantial challenges in providing future health and welfare services to an aging population, while at the same time coping with constrained budgets and increasing competition for labour. The answer to these challenges is a combination of increased efficiency, increased focus on value-creating services and the implementation of new welfare technologies that enable the users to become more independent. At the same time, innovative solutions have the potential to increase the quality of life for the users, making the introduction of new technologies and services a win-win scenario.

In this light, the five Nordic capital cities (Copenhagen, Helsinki Oslo, Reykjavik and Stockholm) and Nordic Innovation are organising a challenge prize competition on solutions to improve independent living for the frail, impaired elderly persons and persons with disabilities.

The aim of the challenge prize competition is to motivate the development of innovative solutions or technologies to address common challenges that will enable the frail, impaired elderly persons and persons with disabilities to live more independent lives and at the same time reduce their need for care.

To provide background knowledge for the prize competition, DAMVAD conducted an analysis across the five Nordic capitals to identify common challenges relevant to the competition. The analysis is based on desk research, qualitative interviews and an analysis of official city policies and budget publications.

This resulted in a number of common themes for the challenges and four guiding principles that we believe are important to prioritise when launching the Nordic competition to meet the challenges facing the local authorities related to the target groups as well as the needs of the users.

Based on desk research and a series of interviews with practitioners and leading representatives from the Nordic capitals, DAMVAD identified four potential prize **competition themes** that have value across the four Nordic capitals.

The four themes represents the overall results of the analysis based on the ten challenges identified through the analysis of city strategies, action plans and budgets and the ten challenges identified through the interviews. The four themes are:

- **smart housing:** how to convert existing housing into modern flexible homes and care facilities;
- **accessibility and mobility:** how to enhance mobility through the use of new technology (high tech and low tech);
- **monitoring and communication:** how to increase social inclusion and safety, while respecting the need for privacy;
- **cognitive disorders:** how to improve the independence of people with cognitive disorders to enable them to cope with everyday tasks.

The themes are all related to a general understanding in the Nordic capitals that a high number of elderly persons and persons with disabilities should be able to living in their own homes for a longer period of time.

When demanding new welfare technological solutions or services for the frail, impaired elderly persons or persons with disabilities, four **guiding principles** should be considered:

- solutions must strike a **balance between the interests of both employees and users**;

- solutions should be both **scalable and adjustable to individual needs**;
- solutions should consider a reasonable **balance between price and effect/impact**;
- solutions should, wherever possible, be **based on collaboration** between private, municipal and other relevant partners, utilising all the knowledge and expertise available.

In addition to the identified prize competition challenge themes and guiding principles, two additional **attention points** were identified: access to a **suitable labour force** and taking **preventive initiatives** related to the provision of public health and care services that can help care recipients to live independent lives for a longer period of time are central issues in the Nordic capitals and are also important areas of attention for public authorities going forward.

Lastly, a number of **recommendations relating to the design of the prize competition** were identified during the analysis:

- focus on **common but specific challenges across the Nordic capitals,** as this can highlight the potentially large cross-border market;
- focus on **technology development and development of services and processes;**
- **make information on municipal procurement plans and investments more easily available** in one place.

2 Introduction

2.1 Nordic challenge competition

The five Nordic capitals (Copenhagen, Stockholm, Reykjavik, Helsinki and Oslo) in collaboration with Nordic Innovation are organising a challenge prize competition on independent living for impaired and frail elderly persons and persons with disabilities.

The aim of the challenge prize competition is to impart knowledge of common challenges across the five capital cities to the market. The aim is to have the market come up with innovative solutions or technologies that will enable frail, impaired elderly persons and persons with disabilities to live more independent lives and reduce their need for care, while securing and improving their quality of life at the same time.

The solutions should also help the authorities providing the health and care services to overcome the challenges related to effective, sustainable and high-quality services in the light of the growing number of elderly people in the coming decades.

As background knowledge for the prize challenge, the five Nordic capitals and Nordic Innovation have commissioned DAMVAD to identify common challenges facing local authorities related to the target groups across the capitals of the five Nordic countries.

The knowledge provided by the DAMVAD study will give Nordic Innovation a better understanding of the target groups' needs and the challenges facing the public sector. This will enable Nordic Innovation to launch a prize competition that will result in new solutions (services or products) with high user value and significant market potential for new and existing companies and other service providers.

As the aim of the competition is to pass on the challenges to the market to come up with innovative solutions, the communication related to the competition should focus on companies as the main target group. This includes companies already working in the area of welfare technology as well as "new" companies with their existing core business in other sectors.

In addition, professional staff who work with the target groups at strategic or everyday level may possess sound knowledge and understanding of the needs of both the care recipients and the service providers that could enable them to come up with ideas or solutions that might be relevant to pursue.

2.2 Widening market

The high and rising level of social expenditure (see Chapter 5) and demographic trends in the Nordic capitals and the Nordic countries (see Chapter 4) indicate a strong demand for new welfare and healthcare technologies and solutions.

Combined with relatively strong export specialisation in subcategories of welfare technology (see Section 2.5), which indicates business specialisation, it can be assumed that there is a relatively dynamic, sophisticated regional Nordic market for new welfare and healthcare technologies and solutions.

A dynamic Nordic market presents interesting business opportunities for companies developing new products and solutions in itself and as a stepping stone for the European market, which is also growing (see Section 5.3).

2.3 Demographic changes pose great challenges

Developing innovative solutions to help people live more independently and reduce public costs is a relevant topic as the Nordic countries and other economically developed countries face significant challenges related to health and care services due to demographic changes (an aging population) and budget constraints at the same time.

An aging population increases some categories of expenditure, both private and public. The largest area of expenditure in many countries is now healthcare, whose cost is likely to substantially increase as populations get older.

A Eurostat forecast shows that the proportion of people over the age of 65 in the EU 27 countries will rise from 17% in 2010 to 30% in 2060.

Another analysis predicts that public expenditure for health and care will constitute 20% of GDP in most OECD countries by 2050.

Thus, there is a need for innovative services and solutions that enable more people to live more independent lives and at the same time enable the authorities to provide the services needed more efficiently. This is especially challenging for municipalities, since they are often the administrative entity responsible for providing the day-to-day services to these recipients.

Because most developed countries and major urban areas are facing the challenges inherent in this trend, this represents a substantial potential market that will increase in the future. Companies capable of developing and providing innovative services, products and solutions to help overcome the challenges will be able to utilise this potential to generate profit and growth and create jobs.

Data from Statistics Denmark shows that the turnover in welfare technology companies increased by 45% between 2004 and 2007 and that companies in the welfare technology sector in the EU 27 and the Nordic countries experienced turnover increases of around 35%. Thus, there is substantial potential for growth in the market, which is expected to increase further in the future due to demographic changes and challenges.[1]

The Nordic challenge prize competition on independent living for impaired and frail elderly persons and persons with disabilities should be seen in this light. The aim of the competition is to motivate the development of solutions or technologies that will reduce public costs and enable an increasing number of people in need of care and health services to live a more independent life (for more years), while feeling secure and experiencing improved quality of life at the same time.

2.4 Target groups vs needs and challenges

The target groups of the competition are “frail, impaired elderly persons and persons with disabilities”. This comprises a broad heterogeneous group of people with widely differing needs.

To establish a common understanding of the target groups, they were broadly defined during the project to include “frail, impaired elderly persons and persons with disabilities in need of care, who are living more or less independent lives in their own home or

[1] City of Copenhagen (2013): *Nye veje til sundhed og omsorg* [New paths to health and care].

in a care or elderly facility but who are not permanently hospitalised". The common trait of the groups is that they require some form of assistance (technology and/or personal service) to live as independent lives as possible and maintain their sense of dignity and self-determination.

However, considering that the aim of the competition is to identify common challenges across the five Nordic capitals related to this broad group of people needing different levels of assistance, we suggest that the focus of the competition should not be determined by clearly defined target groups. Instead we suggest that the competition should be focused on common challenges cutting across the Nordic capitals and the individuals making up the target groups.

2.5 Welfare technology as a major export industry

The purpose of the analysis is to show companies in the Nordic countries that there is business potential in developing new technologies and solutions which will help the capital municipalities (and others) to overcome the challenges of an increasingly aging population.

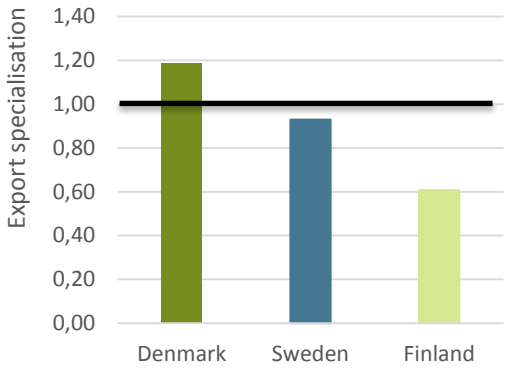
The first step, however, is to analyse whether there is an industry in the Nordic countries capable of coping with this task. This industry will be the foundation on which other companies and knowledge clusters develop.

To do this, we analysed export specialisations related to welfare technology. Export specialisation is a strong indicatory of business strengths defined by comparative advantages. The analysis of welfare technology exports from Denmark, Finland and Sweden is based on an identification of commodity codes (see a more detailed description of the method in Section 2.5.3). The advantage of this method is that it makes it possible to describe the business areas which cut across traditional sector boundaries. This is only possible concerning Denmark, Finland and Sweden (see Section 2.5.3 for further explanation), however. Norway is presented separately in Section 2.5.2, but it is not possible within the framework of this project to do this at a similar level of detail.

2.5.1 Denmark, Finland and Sweden

An analysis of the export specialisations of Denmark, Finland and Sweden, based on EU export data from the Comext database, shows that Denmark has export specialisation in welfare technologies, thus representing a Danish business strength. This is not the case in either Sweden or Finland, see Figure 2.1.

FIGURE 2.1
Welfare technology as a business strength, 2012



Source: DAMVAD, based on Comext data
Note: Export specialisation above one indicates a business strength

However, welfare technology covers both pharmaceutical drugs, assistive technology and medical technology.

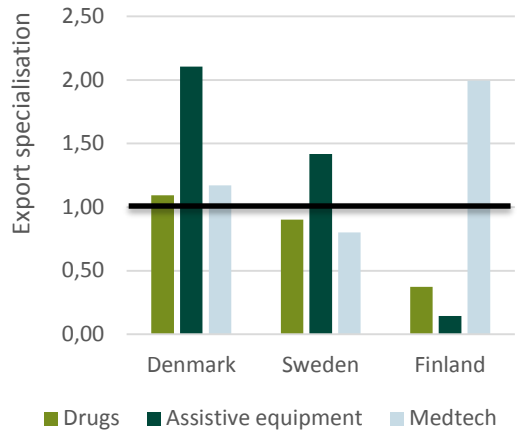
In the specific context of this analysis with its focus on helping frail and impaired elderly persons to live more independent lives, assistive technologies and

medical technology are more important than pharmaceutical drugs.

When looking at the subcategories, Sweden's export specialisation relating to assistive equipment is higher than one (indicating a business strength), while Finland's export specialisation for medical technology is higher than one. Denmark's export specialisation in all three subcategories is higher than one (see Figure 2.2).

This indicates that all three Nordic countries have well-developed industries capable of developing and marketing new welfare and healthcare related technologies to enable frail, impaired elderly persons to live independent lives.

FIGURE 2.2
Export specialisation by welfare technology subcategory, 2012



Source: DAMVAD, based on Comext data
Note: Export specialisation above one indicates a business strength

2.5.2 Norway

A 2012 analysis identifies 228 Norwegian medical technology companies specialising in medical devises, surveillance and technological equipment (Menon 2012). This indicates that Norway has a fairly well-developed welfare services industry.

This is supported by a DAMVAD analysis in 2011, showing that welfare technology exports totalled NOK 6.5 bn in 2008, or only one-third of Danish exports the same year (DAMVAD 2011) and less than both Finnish and Swedish exports. Thus, the potential remains untapped, which is reflected by the fact that the Norwegian welfare technology companies are experiencing slower growth than similar Nordic companies. The analysis also shows that they perceive the same market potential as Danish companies do, which is also reflected in the fact that welfare technology companies in Norway export significantly less than similar Danish companies.

The relative share of welfare technology exports from Norwegian companies compared to overall exports has probably declined since 2008 because of positive trends in the offshore industry in particular, but the contribution to the Norwegian economy would still be substantial, though not on par with the other Nordic countries.

2.5.3 Export analysis method

The export analysis is based on national exports of products that are identified as being part of a global market for welfare technology products and solutions. The identification of relevant products is based on work carried out by the Danish Ministry of Economic Affairs in connection with the preparation of the recent 2013 Growth Strategy (Danish Government 2013).

The export analysis was done using DAMVAD's trade database which extracts data from Eurostat's Comext database. Each product is converted in the database into an eight-digit code based on a system which follows the Combined Nomenclature (CN). The combined nomenclature was developed by Eurostat. There are around 10,000 different product codes in the system. As all EU Member States are

required to calculate their exports this way, it is possible to make a consistent comparison of exports across countries and years. However, this means that Norwegian export data is not in the database, so the figures concerning Norway are based on other sources.

The advantage of using export data based on commodity codes is that the data is high quality and also much more recent than the rest of the economic data, which means that analyses based on export data are often more relevant (timeliness).

2.6 Analysis methodology

The analysis is based on a combination of quantitative and qualitative methods.

Through desk research, relevant existing knowledge and statistical information from a number of different sources were collected to investigate levels and trends related to economic, demographic and social indicators showing the increased need for innovative care and health solutions in the future to illustrate the market potential.

In addition, the desk research is based on relevant official publications from each city provided by the cities' contact persons and identified through interviews and online searches which serve as a solid base for the analysis. The list of references can be found in Appendix A.

The common challenges of the Nordic capitals identified through the desk research and official city publications is substantiated and supplemented through qualitative interviews conducted in each city. The interviewees were relevant representatives from a broad range of municipal organisations working with public provisions aimed at the target groups at strategic and tangible levels. A total of 36 persons were interviewed in Copenhagen, Stockholm, Oslo and Helsinki. The list of interviewees can be found in Appendix B.

2.7 Nordic project group

The project was monitored by a project group consisting of representatives from Nordic Innovation and contact persons from the cities. The project group has been very helpful in providing DAMVAD with relevant information and suggestions for interviewees in each city.

3 Competition themes, common challenges and recommendations

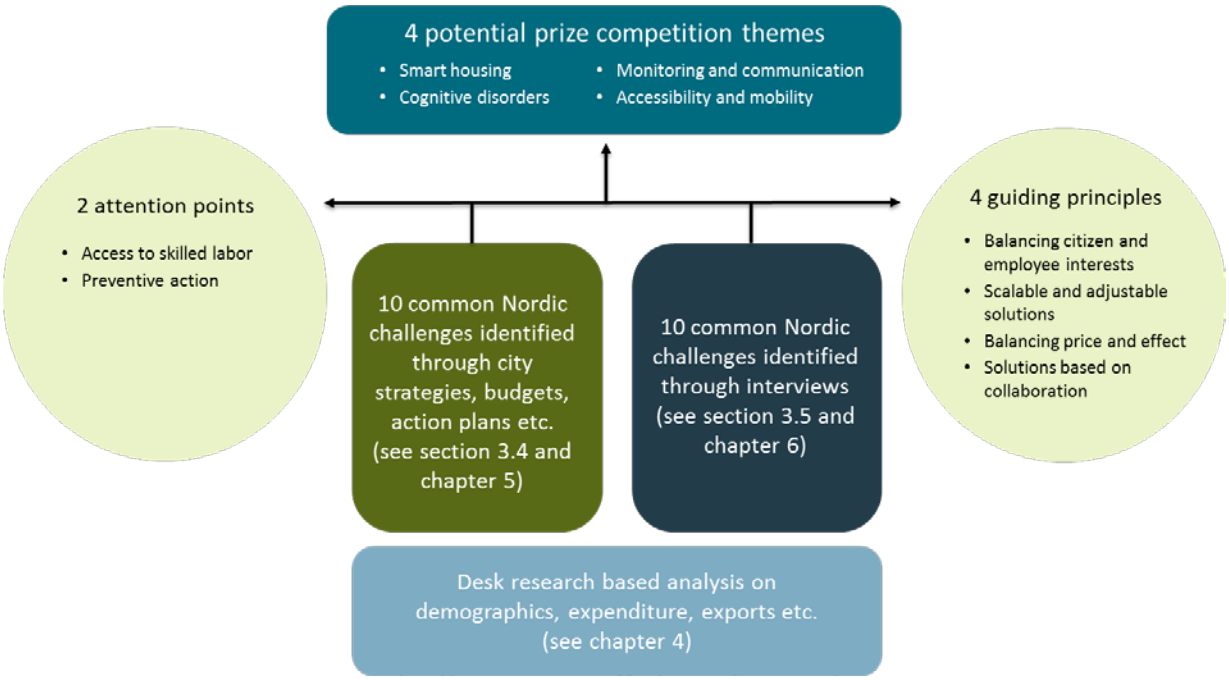
This chapter presents the synthesis and overall results of the analysis:

- four potential challenge prize competition themes;
- two attention points relating to the provision of high-quality public services in the years to come;
- four guiding principles related to the prize competition criteria;
- a summary of the ten common Nordic challenges identified through city strategies, budgets, action plans, etc. ;
- a summary of the ten common Nordic challenges identified through qualitative interviews;
- recommendations related to the design of the prize competition.

In addition to the city publications and qualitative interviews, the analysis results are based on desk research examining relevant existing knowledge and statistical information.

Figure 3.1 illustrates the correlation between the overall results and the main sources of information for the analysis. Each part will be elaborated upon in the following.

FIGURE 3.1
Illustration of the correlation between the main results and information sources of the analysis



Source: DAMVAD

3.1 Four potential prize competition themes

Based on the desk research, the official city publications from the Nordic capitals (Chapter 5) and the 24 interviews with 36 practitioners and leading representatives from the Nordic capitals (Chapter 6), it was possible to identify **four potential prize-competition themes** to represent common challenges and strategic focus areas, which have value across the Nordic capitals.

The four themes represent the main synthesis of the analysis – common central elements – from the ten challenges identified through the analysis of city strategies, action plans and budgets and the ten challenges identified through the interviews. The four themes:

- **smart housing:** how to convert existing housing into modern flexible homes and care facilities;
- **accessibility and mobility:** how to enhance mobility through the use of new technology (high tech and low tech);
- **monitoring and communication:** how to increase social inclusion and security, while respecting the need for privacy at the same time;
- **cognitive disorders:** how to improve the independence of people with cognitive disorders to enable them to cope with everyday tasks.

All of the themes are related to a general understanding in the Nordic capitals that a greater number of elderly persons and persons with disabilities should be able to extend the period of time when they remain living in their own homes.

The themes are relatively broad in relation to both the specific solutions and the target groups but are based on specific problems. This allows companies and other actors to develop novel innovative solutions which are unconstrained by strict delimitations of target groups but focus instead on common challenges which need to be addressed.

3.1.1 Smart housing

One main challenge facing the Nordic capitals is how to convert homes (and care facilities for the elderly) into suitable dwellings for frail and impaired elderly persons in need of care. Most healthcare and welfare technologies have traditionally been developed for use in nursing homes and other institutional buildings. Thus, there is an increasing need for technologies and solutions that can be adapted, installed and used in ordinary homes, often relatively small urban apartments.

These include solutions such as (automatic) bathroom equipment designed for small bathrooms, easily adjustable lifting systems designed for installation in small bedrooms to be used by both users and staff, remote controlled windows and doors, movement censors, fall censors, etc.

3.1.2 Accessibility and mobility

Another main challenge is the reduced mobility experienced by the frail, impaired elderly persons and persons with disabilities. Reduced mobility is challenging because it increases the need for assistance, reduces social contact and can lead to social exclusion.

Reduced mobility and accessibility are caused by physical and mental barriers alike.

The physical barriers are specifically challenging as regards urban accessibility (limited transportation possibilities, curbs, crossings, stairs and uneven pavements, etc.). Although the Nordic capitals are frontrunners in this field compared to other European and US cities, there is still plenty of room for improvement.

The mental barriers are based on a sense of insecurity among frail and impaired elderly persons and persons with disabilities. Questions like, “How do I get from one place to another?”, “What should I do if the bus is cancelled?”, “Is there a public toilet on the way?”, and so on. These questions may seem trivial to ordinary people but can pose real barriers to frail, impaired elderly persons and persons with disabilities. Thus, there is a need to develop solutions that help people to cope with this sort of mental barrier because they can potentially increase user mobility.

Therefore, there is a need for mobility aids such as electric bicycles, walking frames, wheelchairs, apps to help make urban spaces more accessible, etc.

3.1.3 Monitoring and communication

The primary challenge related to this barrier is how to increase the sense of security and social inclusion of frail, impaired elderly persons and persons with disabilities while respecting their need for privacy.

This theme covers two aspects of the implementation of monitoring and communication technologies.

Modern communication technologies enable frail, impaired elderly persons and persons with disabilities to maintain social relations, even if they lack the physical capacity to do so due to impaired mobility. They can maintain these relations by telephone, e-mail, etc., but often require solutions that are specifically suited for their individual needs.

At the same time, modern communication technologies can also enable frail, impaired elderly persons and persons with disabilities to communicate with care providers when they have a specific need or feel insecure. This both reduces the need for physical visits by the care provider and instils a sense of security.

Furthermore, communication technologies can be combined with monitoring technologies to monitor everything from medicine consumption, body censors measuring vital physiological data such as heart rate, movement and fall censors, digital screens, etc., which assure the user that someone will notice if something goes wrong, and that the user will receive proper assistance.

3.1.4 Cognitive disorders

An increasing number of people suffer from cognitive disorders like dementia, Alzheimer’s and other neurological conditions. To a certain extent, these disorders are age-related and also related to the fact that more people survive serious accidents, heart failure, etc., but with brain damage/impaired brain function as a consequence.

In most cases, people who suffer from these disorders are dependent on care and must be heavily monitored to protect them.

There is a large cost-saving potential in developing solutions and technologies specifically targeted for this group, which can make them less dependent on care services and increase their independence.

Solutions related to the area include specialised communication equipment, alarms and reminder systems, dementia-friendly shaped products and solutions, movement censors, aids and assistive technology in a homely environment, how to use lighting to improve the ability to perform everyday tasks, etc.

3.2 Attention points

In addition to the four potential prize-competition themes identified, there are a few attention points which emerged during the analysis that are also important to public authorities for the provision of high-quality public services in the years ahead.

Firstly, the access to **skilled labour** is key to the strategies across the Nordic capitals and in the interviews. Jobs in the social-care sector are often perceived as being low-status, low-paying jobs, which can make it is difficult to attract skilled labour. To some extent, the economic crisis has mitigated the worst consequences of this, but in the near future problems are expected to increase as the economy grows stronger while the labour force in the Nordic countries slowly diminishes.

Secondly, **preventive action** is high on the political agenda as a means to reduce future demand for health care and social services and as a way to improve the quality of life for care recipients. This specifically targets lifestyle diseases and focuses on the use of tobacco, alcohol and drugs, but also on back problems, etc., which are both a nuisance to the individual and increase the demand for care services. While the analysis has focused on innovative solutions and technologies, preventive action to help care recipients remain independent for a longer period of time is obviously an important area of attention for public authorities in the future as well.

3.3 Guiding principles

In connection with the project, DAMVAD identified four principles that could be usefully considered when launching the prize competition. The principles can help to focus and guide the competition and the solutions generated. The four guiding principles are:

- solutions should strike a balance between the interests of both employees and citizens,
- solutions should be both scalable and adjustable to the needs of the individual;
- solutions should consider striking a reasonable balance between price and effect/impact;
- solutions should (wherever possible) be based on collaboration between private and municipal and other relevant partners, and utilise all the knowledge and expertise available.

3.4 Summary of common Nordic challenges identified through city strategies

Based on city strategies, action plans and budgets from Copenhagen, Helsinki, Oslo and Stockholm, ten common strategic focus areas and challenges were identified across the Nordic capitals (see a description of the challenges in Table 3.1).

The Nordic capitals' strategic focus areas, challenges and spending related to the area are elaborated upon in chapter 5.

Political focus is important to companies that develop new technology, products, solutions and services aimed at the welfare and health sectors, as it gives an idea of the future potential market areas related to public services aimed at elderly persons and persons with disabilities.

In connection with the ten common challenges identified through the interviews, which will be presented below in section 3.5 below, it is assessed that solutions related to smart and flexible housing, mobility, communication and cognitive disorders are best suited for a challenge prize competition, as they have strategic value and demand specific solutions which can be developed by companies.

TABLE 3.1
Common Nordic strategic focus areas and challenges from city strategies, action plans, budgets, etc.

#	Focus areas and challenges	Brief description
1	Become leading users of welfare technology	The Nordic capitals aim to be leading users of welfare technology to improve the quality of life of people needing care and improve the efficiency and cost of related public services. This makes the Nordic capitals attractive markets and testing grounds for new welfare solutions. To support these aims, all of the cities have established platforms to support the collaborative development of knowledge on new welfare solutions and how to use them, based on a deep understanding of user needs.
2	Collaborate with relevant actors	The Nordic capitals focus on strengthening the cooperation with relevant actors (target group representatives, companies, staff groups, etc.) to develop innovative solutions that meet the needs of both the target groups and the municipalities (e.g. new technologies and processes.).
3	Reduce costs related to the provision of public services through innovative solutions, procurement and competition	The Nordic capitals focus on the development and implementation of innovative welfare solutions and processes as a way to reduce costs and streamline the provision of public services. As part of their ambitions, the Nordic capitals intend to open up competition on the provision of home care facilities and services wherever competition can result in better and more cost-effective services. At the same time, the capitals focus on innovative and intelligent public procurement of products and services.
4	Smart and flexible housing	There is a strong focus in the Nordic capitals on smart, flexible housing solutions aimed at users living at home (for a longer period of time) and users living in care facilities and solutions especially aimed at people with cognitive disorders. This calls for solutions that can be installed in ordinary homes.
5	Improve working environment (and create a better image)	The Nordic capitals focus on improving occupational safety and health for staff by using new solutions that help to reduce physical wear and tear and improve the mental working environment. This can help cities to cope with the challenge of retaining and attracting staff in the years ahead.
6	Support enhanced independence – stay in one's own home for a longer period of time	It is a common strategic focus for the Nordic capitals that more elderly persons and persons with disabilities will be able to stay in their own homes for a longer period of time and be able to cope with everyday tasks without public provisions. Related to this, the public (and probably also the private) demand for welfare solutions that help to accomplish this will rise.
7	Develop and deliver personalised services and a stronger sense of security	Greater emphasis on more personalised home-care services taking into consideration the varying needs of an increasingly diverse population, as well as a stronger feeling among users that the right help will be available when needed. This is includes technology such as digital memory aids, fall sensors, communication solutions, movement sensors and body sensors measuring vital physiological data.
8	Dementia and other cognitive disorders	Furthermore, there is an increasing focus on people with cognitive or memory disorders (dementia, Alzheimer's disease, brain trauma caused by accidents, etc.), as these groups are expected to increase in size due to the aging of the population and improved medical treatment.
9	Mobility and communication	Besides a well-functioning public transport systems and accessible urban planning, which provide a high level of mobility, there is also keen focus on more personalised mobility and communications solutions to help elderly persons and persons with disabilities to live as active and independent lives as possible and to reduce social exclusion and loneliness.
10	Reduce medical error	Solutions to reduce the number of errors related to the intake of medication, including digital communication and other aids especially aimed at people with reduced cognitive capacity (e.g. alarm/reminder systems, etc.).

Source: Publications from Copenhagen, Helsinki, Oslo and Stockholm related to policy and public services for frail, impaired elderly persons and persons with disabilities.
Note: The numbering does not represent a prioritisation of challenges. The challenges are listed randomly.

3.5 Summary of common Nordic challenges identified through interviews

The overall impression of the common challenges across the five cities, identified through interviews, is that there are a strong focus on how to empower vulnerable citizens to live more independent lives in the Nordic capitals. There are two overall reasons for this. One is that this will increase the quality of life for the target groups by preserving their dignity and enhancing their social inclusion. The second is that it can reduce the need for care personnel and thus ease the pressure on municipal care services.

For many users, being dependent on help to perform tasks, which ordinary people consider trivial, results in a loss of dignity. This is especially true of intimate situations like toilet visits, personal hygiene, etc. Therefore, developing technologies to enable frail, impaired elderly persons and persons with disabilities to maintain their dignity is an obvious focus area across the Nordic capitals.

The general trend of making it possible for the target groups to remain in their own homes for a longer period of time also represents a challenge to their social life as they risk becoming socially isolated. Thus, the introduction of new technology to replace care workers also represents a potential risk of reducing social contacts. This challenge can be addressed by developing technologies to enable frail impaired elderly persons and persons with disabilities to become and remain socially active and is another obvious focus area.

Based on the interviews, ten common challenges were identified across the four Nordic Capitals (see Table 3.2). For further details of the common practical challenges, see Chapter 6.

TABLE 3.2
Common Nordic challenges identified through interviews

#	Challenge	Brief description
1	Preserving dignity	A primary challenge for care services is the fact that the individual care recipient depends on help from care staff, which represents a loss of dignity.
2	Social inclusion/isolation	Many frail, impaired elderly persons feel lonely and trapped in their own home. They are unable to leave their apartment without help, and their social contact is often reduced to visits by the care worker.
3	Home vs workplace	The individual's apartment is both a home for the individual and a workplace for the care workers. This is challenging in terms of how the apartment can be arranged to accommodate the needs and wishes of both parties.
4	Monitoring: safety vs privacy	While legal frameworks protect the public from surveillance, they also inhibit the development of systems which protect the public. This includes monitoring systems, GPS tracking, etc. Such systems could benefit both the care provider and the care recipient.
5	User perception of technology: does it work	The idea of implementing the use of robots in the provision of care services is attractive, but often the technology does not live up to expectations. This both reduces the positive effect of technology and makes the care recipient sceptical about using the technology.
6	Care personnel's perception of technology	Many care workers are equally reticent in relation to new technology. They have trouble using and demonstrating the use of technology and fear losing their jobs because of new technology.
7	Attracting qualified staff	Attracting qualified staff has previously been a challenge, but the effects of the recent financial crisis have put these problems on hold for the time being. There is rising focus on the fact that, as the economy develops in the years ahead, recruitment will become an issue once again.
8	Urban accessibility	Inadequate urban accessibility is detrimental to quality of life and amplifies the negative impact of a number of other challenges, including the lack of social contact and feeling lonely.
9	Flexible dwellings: technical and legal issues	When building new dwellings, it is a challenge to do so in a way to ensure that flexibility in relation to future architectural changes and the installation of new equipment that is unknown at the time of construction, all within a tight budget and adhering to strict regulations.
10	How to handle development projects	It has been mentioned that the handling of development projects by operating entities such as home care units is challenging. In order for this to work, support functions are needed.

Source: Interviews conducted by DAMVAD and partners.
Note: The numbering does not represent a prioritisation of challenges. The challenges are listed randomly.

3.6 Recommendations for the design of the prize competition

In addition to the common challenges and competition themes presented above, a number of recommendations for the design of the prize competition were identified during the analysis. The potential prize-competition challenge themes developed in this report and presented in section 3.1. should be seen in the light of these recommendations.

During the interviews, the preliminary competition criteria from the tender material were presented to the interviewees, and they were asked whether they considered them to be the right criteria and if they had any recommendations for how to focus the competition.

Based on this and information from the city strategies and desk research, the following recommendations are deemed important to keep in mind when designing the prize competition.

Firstly, the aim (independent living and increased quality of life) and target groups (elderly persons and persons with disabilities) are broadly defined in the preliminary challenge formulation (see the tender documents). The challenge prize competition and the possibility of having innovative new solutions and/or services developed would probably be strengthened if focus were brought to bear on common but specific challenges across the Nordic capitals. From a business perspective, a potentially large cross-border market is interesting, and the more precisely the challenges are described, the easier it will be for companies to assess whether the competition themes relate to their field of services or (development of) technologies and whether they should invest the time and money needed to participate.

Secondly, the prize competition should not only focus on technology development but also keenly on the development of services and processes – both as focus areas in themselves but also in relation to product development.

A more general recommendation is to make information on municipal procurement plans and investments more easily available in one place to the business community and other relevant parties. Policy strategies can help companies to get an idea of the future direction of municipal priorities, but these priorities are often too vague for companies to be willing to invest the time and money needed to develop new solutions.

It takes a lot of effort to get an overview of municipal priorities and actual investment plans, as these are often scattered across a number of publications and documents stemming from different administrative departments, each with their own remits. And even if a company tries to get this overview, the specific future investments are often not large enough to make it worthwhile to launch an innovation process to come up with new solutions, because the procurement proposal is dispersed across a number of administrative entities and cannot be combined. A suggestion for each municipality is to have an overview of all planned future investments gathered in one place (i.e. specific amounts and demands, but not procurement portals, not policy declarations, and not statements of intent).

4 Increased demand for public provisions will create a substantial market potential

As mentioned in the introduction, the Nordic countries and many other economically-developed countries face significant challenges related to health and care services due to demographic changes (aging of the population) and face budget constraints at the same time.

Therefore, innovative public services, solutions and products are needed to enable more people to live more independent lives and at the same time enable the authorities to provide the services needed more efficiently.

In this chapter, we examine the expected increase in the need for services and how this demand will lead to a growing market for new solutions. We also examine how this will create substantial market potential in the Nordic countries and other European countries.

4.1 Dependency ratio

The dependency ratio can be used as an indicator of potential social-support requirements resulting from demographic changes in population age structures.

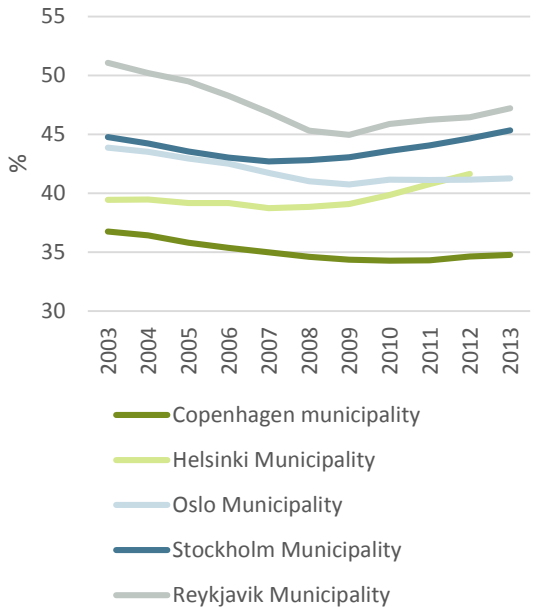
The dependency ratio relates the group of the population most likely to be economically dependent (net consumers) to the population group most likely to be economically active (net producers), and shows broad trends in social-support needs.

A high dependency ratio indicates that the economically active population and the overall economy face a greater burden of supporting and providing the social services needed by children and older people who are often economically dependent.

Thus, the dependency ratio does not in itself indicate the level of dependency on social services, but given that there is a positive correlation between age and healthcare spending,[2] developments in the dependency ratio in effect also indicate developments in the level of costs incurred on society by demographic changes.

Figure 4.1 shows the dependency ratio for the five Nordic capitals over the past decade. Until around 2008 or 2009, all five cities experienced a falling dependency ratio, indicating an increase in the relative number of people becoming net producers.

FIGURE 4.1
Dependency ratio, %



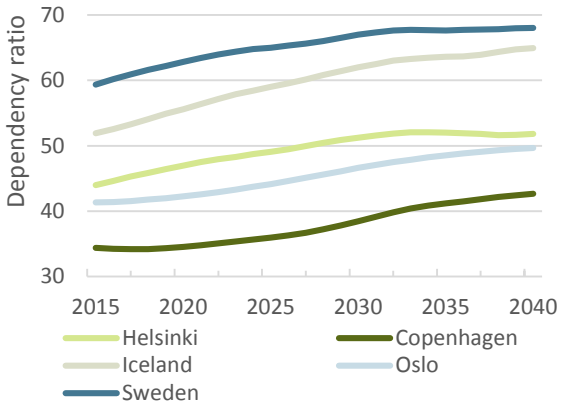
Source: Statistics Denmark, Statistics Finland, Statistics Norway, Statistics Sweden, Reykjavik Yearbook.
Note: Dependency ratio = ((number of people aged 0–14 and those aged 65 and over)/number of people aged 15–64) * 100.

[2] Jean P. Drouin, Viktor Hediger, and Nicolaus Henke (2008): *"Health care costs: A market-based view"*, The McKinsey Quarterly, Health Care, September 2008.

After around 2009–2010, the picture changes, and Figure 4.2 shows how the dependency ratio is expected to increase towards 2040, indicating that relatively more people will be needing social support which will put pressure on public provisions.

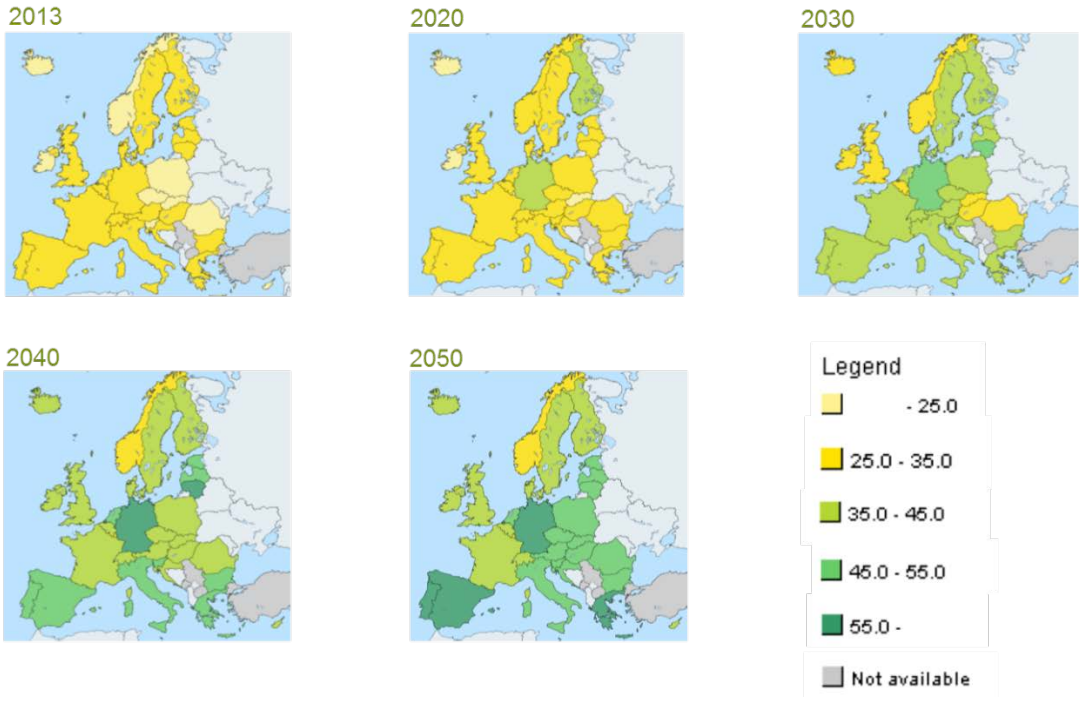
The same trend can be seen throughout the EU, (see Figure 4.3). The rising dependency ratio underlines the need to develop new and effective ways to provide social services and solutions.

FIGURE 4.2
Projected dependency ratios



Source: DAMVAD, based on data provided by Statistics Finland, Statistics Denmark, Statistics Iceland, Statistics Norway and Statistics Sweden
Note: Data for Stockholm and Reykjavik have not been identified. Thus, they are represented by national data.

FIGURE 4.3
Projected old-age dependency ratio from 2013 to 2050



Source: DAMVAD, based on Eurostat.
Note: Dependency ratio = people aged 65 and over as a percentage of the number of persons aged 15–64*100.

The implication of this, is that the market demand for social and healthcare services must be expected to rise in the years ahead, and that there will be an enormous market potential for companies capable of developing and delivering solutions which can help authorities to provide more efficient social services to an aging population.

4.2 Nordic countries are attractive markets for care and welfare solutions

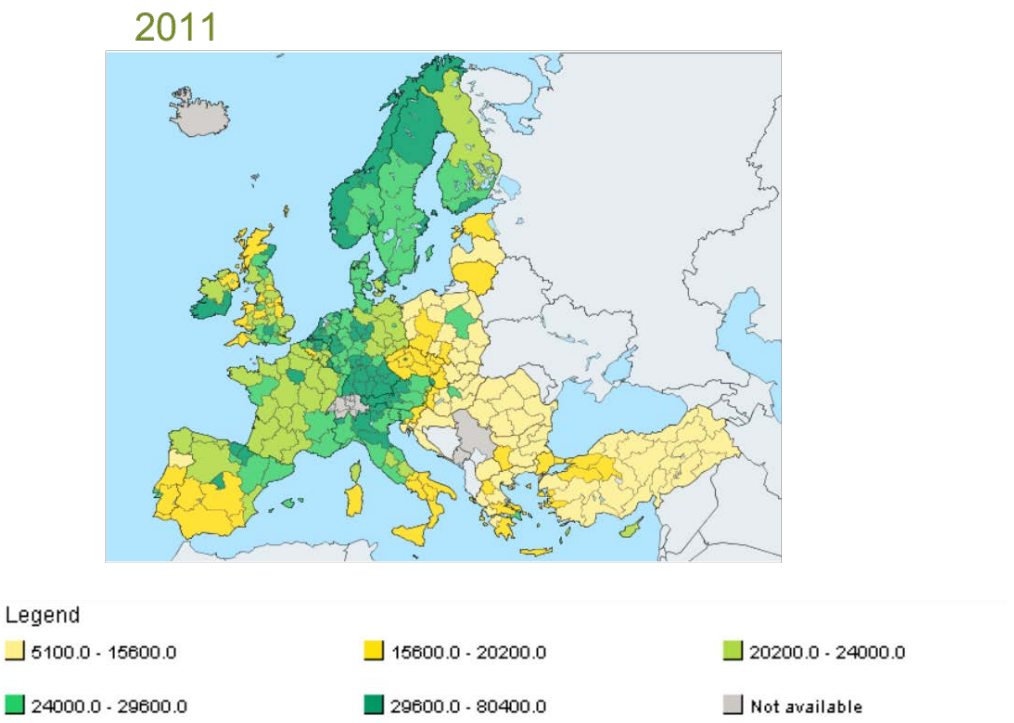
In this section, we look at the economic performance of the Nordic countries and capital regions compared to other European countries and major urban regions.

These figures are interesting because they depict the wealth of the countries, urban regions and population in general, and thus indicate purchasing power and market potential.

As Figure 4.4 shows, the Nordic countries and the capital regions have a high level of GDP compared to most European countries, which makes the Nordic countries and capital regions interesting markets for companies.

At the same time, the Nordic capitals (and countries) have a relatively high level of public expenditure for social and health provision (see Section 5.5).

FIGURE 4.4
Regional per capita GDP (EUR, PPS)

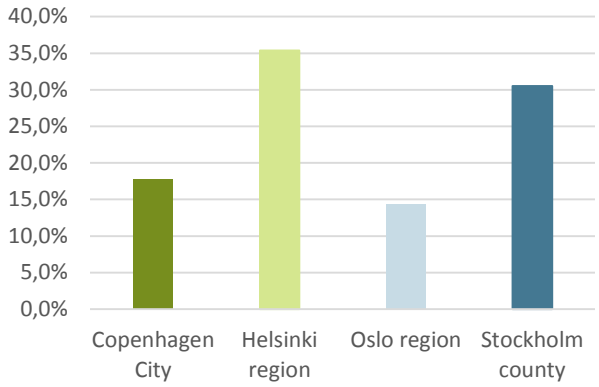


Source: DAMVAD, based on Eurostat.
Note: Purchasing Power Standard (PPS) eliminates the effect of price level differences across countries.

This means that companies capable of developing solutions to meet Nordic cross-border needs in areas of political focus where there is a willingness to invest will have an opportunity to access markets with great potential for profit, growth and job creation.

This is true not only of the Nordic countries as a whole but also of the capitals by themselves, as they account for 15–35% of the countries' total GDP (see Figure 4.5).

FIGURE 4.5
Regional GDP relative to national GDP, %



Source: DAMVAD, based on data from Statistics Denmark, Statistics Finland, Statistics Norway and Statistics Sweden.
Note: Regional statistics are not available for Reykjavik.

5 Common Nordic challenges identified through city strategies and action plans

This chapter focus on the common strategic goals and challenges related to public services aimed at the target groups. The goals and challenges are derived from policy strategies, action plans, specific initiatives, investment and procurement in Copenhagen, Helsinki, Oslo and Stockholm.

The chapter has three main parts. Section 5.1 summarises the common strategic focus areas and challenges identified in the following city-specific sections. The section condenses the analysis findings in this chapter based on the information in Section 5.2, where the main initiatives, challenges and social expenditure in each Nordic capital are presented. Section 5.3 compares social expenditure in the Nordic countries to social expenditure in other European countries.

5.1 Common strategic focus areas and challenges

This section presents a brief overview of common strategic focus areas and challenges across the Nordic capitals related to the provision of public service for frail, impaired elderly persons and persons with disabilities.

The section is based on desk research and background material from the cities' contact persons. By analysing the material, ten common strategic focus areas and challenges were identified across the Nordic cities (see brief descriptions in Table 5.1 below and a more detailed description of the challenges in Table 3.1).

TABLE 5.1
Common strategic focus areas and challenges

#	Focus areas and challenges
1	Become leading users of welfare technology
2	Collaborate with relevant actors
3	Reduce costs related to the provision of public services through innovative solutions, procurement and competition
4	Provide smart and flexible housing
5	Improve occupational health and safety (and create a better image)
6	Support improved independence – stay at home longer
7	Develop and provide personalised services and a stronger sense of security
8	Dementia and other cognitive disorders
9	Mobility and communication
10	Reducing medical errors

Source: Publications from Copenhagen, Helsinki, Oslo and Stockholm related to policy and public services for frail, impaired elderly persons and persons with disabilities.
Note: The numbering does not represent a prioritisation of challenges. The challenges are listed randomly.

5.2 City strategies and social expenditure

Based on desk research and background material from the cities' contact persons, this section gives an **overview** of strategic policy goals, social expenditure and procurement plans of Copenhagen, Helsinki, Oslo and Stockholm related to the provision of public service for frail, impaired elderly persons and persons with disabilities. The section focuses on the main initiatives and challenges of each city.

For companies developing new technology, products, solutions and services aimed at the welfare and health sectors, the level of public spending is an important measure, as it gives an idea of the potential market size related to public services aimed at elderly people and people with disabilities. Therefore, we have tried to identify specific procurement

plans and budgets for each city. This turned out to be a difficult task, but we have included the initiatives and budgets we could find.

Various factors put pressure on the provision of public procurement in the Nordic capitals.

Firstly, as in many other economically developed countries, Copenhagen, Helsinki, Oslo and Stockholm are challenged by an aging population in the future. Each city's projected population trend is illustrated.

At the same time, a growing segment of the population needs rehabilitation and other health-related, care and social services due to a number of factors including an increase in the number of people suffering from traumatic brain injury, Chronic Obstructive Pulmonary Disease (COPD), dementia, etc.

Thirdly, people with disabilities live longer, a growing number of people are diagnosed with disabilities, and the needs of this group are becoming increasingly complex.

All of these trends put pressure on the provision of public services and emphasise the need for new solutions to help people live more independent lives for a longer period of time, and at the same time increase the efficiency of the provision of public services.

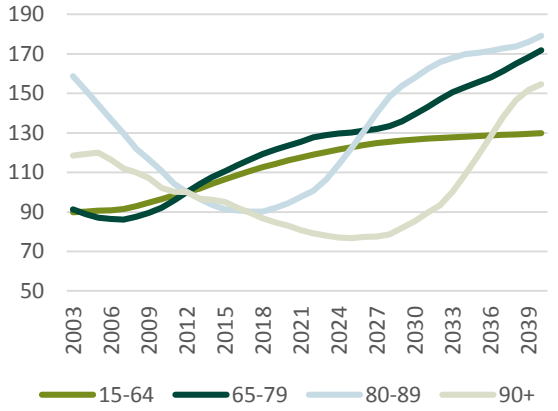
5.2.1 Copenhagen[3]

In Copenhagen, the Health and Care Administration has overall responsibility for the policy and for public services related to **frail, impaired elderly persons** above the age of 65.

The Social Services Administration is responsible for the policy and for public services related to **people with disabilities** (and many other people in need of social services) below the age of 65.

Figure 5.1 shows that Copenhagen faces an aging population leading up to 2040, as the group of elderly people is expected increase relative to the group of people of typical working age (15–64 yrs).

FIGURE 5.1
Population in age groups (projected 2014–2040), index 2012 = 100, **City of Copenhagen**



Source: DAMVAD, based on Statistics Denmark.

Strategic focus

Copenhagen gives strong policy focus to developing new welfare technology as a way to achieve more and better health and care services for its inhabitants.

[3] This chapter is mainly based on the following publications: City of Copenhagen, Social Services Administration (2013): *Sund Vækst – Nye veje til sundhed og omsorg*; City of Copenhagen, Social Services Administration (2011): *Aktiv og Tryg hele livet – Et reformprogram for ældrepleje og sundhed i Københavns Kommune*; City of Copenhagen (year not available): *Københavns Kommunes Handicappolitik – Målsætninger og principper 2011-2017. City of Copenhagen* (year not available): Social Services Administration, Plan for Persons with Disabilities; City of Copenhagen (2014): *Handleplan for Velfærdsteknologi på det social område*.

To achieve the policy aims of strengthening the public health and care services through the use of welfare technology, a wide range of strategies and actions plans has been developed. These focus on solutions within a wide range of policy areas, including initiatives aimed at frail, impaired elderly persons and persons with disabilities.

Copenhagen aims to become a leader in the development of welfare solutions and believes that the public demand for new solutions aimed at the 130,000 recipients in need of services will also create growth and jobs leading up to 2025.

This is to be achieved through new partnerships with individuals, employees, companies, unions and research institutions in Denmark and abroad. The policy plans will set the course for Copenhagen's future investments in welfare technology that will be concretised yearly in the investment catalogues related to the four welfare technological strategic guidelines set for 2025.[4]

- Copenhagen will be a **leader in the use and dissemination of welfare technology**;
- through **welfare technology, equal opportunity to lead a healthy and active life** will be achieved;
- elderly people and people with illnesses or in need of rehabilitation will receive more **public support for self-support**.
- Increased care for people with **advanced illness and the weakest group** of senior citizens.

Related specifically to **senior citizens,** the main policy objectives relevant to this analysis are to strengthen the sense of community, **improve independence** by feeling capable of managing a larger number of everyday tasks without help and strengthen the **sense of security** by knowing that the right help will be available when it is needed. These objectives are concretised through a number of goals to be achieved in 2015, e.g.:

- 50% **fewer elderly feel lonely;**
- a number of welfare technological solutions have been implemented to help elderly people **remain independent for a longer period of time;**
- Frail elderly people will move into senior care facilities earlier, **reducing the share of elderly receiving more than 12 hours of home care weekly;**
- **reduction in the number of medication errors.**

Related to the increased use of welfare technology, Copenhagen aims to build a new care centre which integrates new solutions with energy-efficient technologies to develop and test new technologies. Other welfare-technology solutions in focus are **hygienic toilet solutions**, **new eating aids**, **automatic bathing solutions**, **digital screen solutions related to the provision of meals**, **electric bicycles**, **lifts** to help employees and **talk-generators** to help read the fine print on medicine labels, etc.

Concerning the group of persons with **disabilities,** there is a clear priority at policy and administrative levels that investments in welfare technology are important to helping to achieve better lives and public services. There are three goals related to an increased use of welfare technology leading up to 2020:

[4] None of these investment catalogues has yet been made public.

- **improved quality of life for persons with disabilities:** increased independence, improved security, better health and strengthened social relations;
- **improved working environment for personnel:** e.g. reduced physical wear and tear and improved mental environment;
- **more efficient use of resources:** to increase productivity within the existing financial framework.

Based on these goals, five focus areas will be prioritised regarding future initiatives and funding related to people with disabilities:

- **welfare technology in homes and housing;**
- **strong innovative implementation of welfare technology within administration and services;**
- **strengthened cooperation with relevant actors and intelligent public demand** for solutions;
- focus on **scalable solutions;**
- **online help and support.**

Within these areas, concrete new initiatives will be financed through existing budgets, while some will require additional funding to be found in budget negotiations or from external sources in the years ahead. New initiatives with potential for an increased use of welfare technology aimed at persons with disabilities include:

- **welfare technology embedded in homes and care facilities** (lifts, communication, lighting, sound, etc.);
- **support and help through the use of apps**;
- **new assistive technology/aids,** testing and implementation;
- **digital message boards and money handling;**
- how to use the city (**urban accessibility**);
- **involvement of user resources** in the development of technology.

Social expenditure

According to Copenhagen's 2013 annual financial statement, the service cost related to the Health and Care Administration amounted to around EUR 560 m, while the capital cost was EUR 6.1 m.

The Social Services Administration had service costs of around EUR 700 m, EUR 200 m of which were related to persons with disabilities, while the capital costs were almost EUR 8 m.

According to Copenhagen's 2025 plan "Nye veje til vækst og omsorg" (New paths to growth and care) the city is spending more than EUR 21 m on assistive equipment and technology each year.

It is difficult to compare the development of social expenditure over time, as administrative responsibilities change between administrative units and these units change their names and structure. Therefore, Figure 5.2 illustrates the development of social expenditure in the City of Copenhagen in 2007 and 2012, based on information from Statistics Denmark and the Ministry of Economic Affairs and the Interior. The figure shows that social expenditure increased over the period.

Social expenditure is expected to increase in the future due to the demographic changes shown above, with more people living longer, more people needing care for more years, etc.

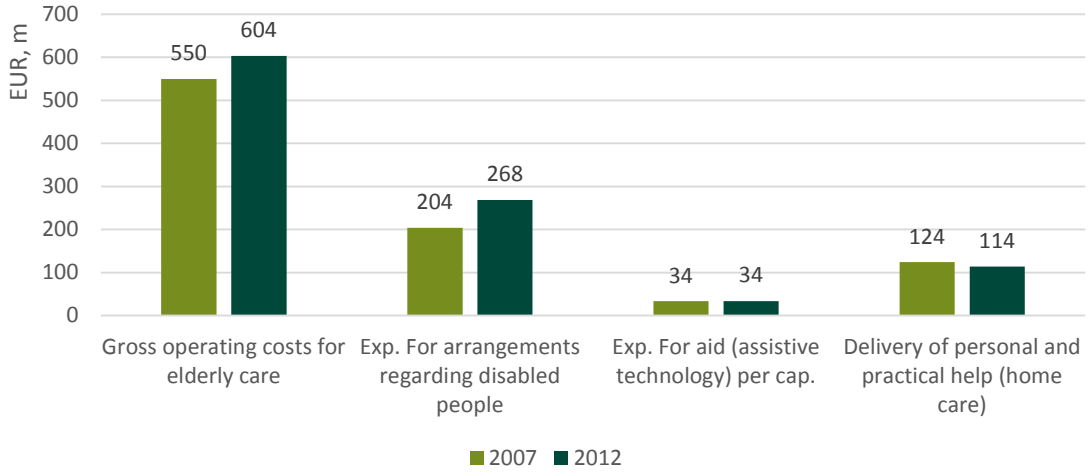
Procurement plans

Copenhagen will use smart procurement as a means to develop new welfare solutions. Therefore each year, three or four challenges will be published on the city's procurement portal, supplemented by an ideas catalogue illustrating the municipal challenges. This is an invitation for the business community and partners in other sectors to come up with new solutions in cooperation with the administration.

In addition, the parties behind the municipal budget for 2014 have agreed to boost actions aimed at the most disadvantaged groups of people and the elderly in the years ahead.

For instance, people with COPD, diabetes or cardiovascular disease will have a **tele-health-solution** adapted to their needs, which will provide improved everyday security before 2018. Also 300 care centre "**smart homes**" for elderly people will be built before 2018 and an "ideas clinic" for supporting and testing new ideas and solutions has already been established.

FIGURE 5.2
Social expenditure, City of Copenhagen, 2007 and 2012



Source: DAMVAD, based on Statistics Denmark and Ministry for Economic Affairs and the Interior.

Table 5.2 shows Copenhagen's relevant procurement and investment plans related to frail, impaired elderly persons and persons with disabilities.

TABLE 5.2
Relevant procurement and investment plans in Copenhagen, EUR m

Procurement area	EUR m
Modernisation of care centres, including installation of new technology	440
Assistive equipment and technology	21 (yearly)
Framework contract concerning orthopaedic footwear	4.9 (4 years)
Framework contract concerning personal and practical assistance for people living in their own home	16.1 (yearly for two years)
Impact-based procurement for solutions to improve independence and mobility for elderly people	0.8 (2014-2015)
Testing/purchasing of new technology	2
Implementation of technological solutions to support safe medical use	0.5 (2014-2015)
Renovation of rehabilitation facilities	0.1 (2014)

Source: DAMVAD
Note: The table includes existing procurement and investment plans related to frail, impaired elderly people and people with disabilities. Operating expenses such as wage costs are not included.

The City of Copenhagen believes that its investments will create a new market for welfare solutions in the future.

The total market size for services and solutions related to frail, impaired elderly persons and persons with disabilities in Copenhagen (and the other Nordic capitals) is difficult to estimate. However, a 2012 survey of welfare technology companies in the Capital Region of Denmark showed that there is a market of around EUR 2.4 bn related to welfare technology in the region. This market is expected to increase by an additional EUR 300 m by 2017. It is expected to increase even more in the future as the population ages (see Figure 5.1) and as the demand for services becomes more complex.

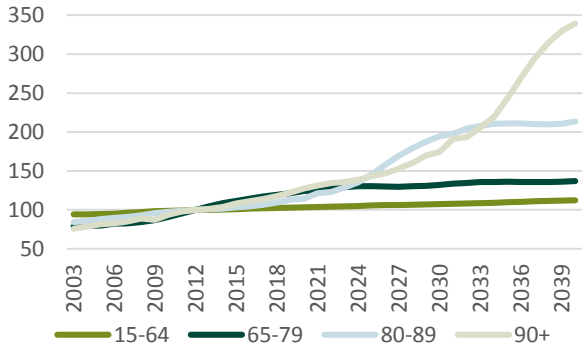
5.2.2 Helsinki

Strategic focus

The strategic focus of the Helsinki strategy for 2013–2016 is on ensuring that a larger proportion of elderly persons and persons with disabilities **remain in their own homes**. In the 2014 budget, the City of Helsinki predicts that the percentage of persons above the age of 75 who remain in their own home will increase from 90% in 2013 to 94% in 2016. In addition, greater emphasis will be put on providing the right services at the right place, indicating that the City of Helsinki is focusing on **more personalised service**. As part of this, the city's strategy focuses on **improving home-care services,** taking account of the varying needs of an increasingly diverse population (Helsinki City Budget, 2014).

The group of elderly persons 65 years and above is expected to increase more than the group of people aged 15–64 (working population) in the years leading up to 2040, see Figure 5.3.

FIGURE 5.3
Population by age group (projected 2014–2040), index 2012 = 100, **City of Helsinki**



Source: Statistics Finland, Sotkanet

As part of improving the services provided, **productivity in the provision of services should also be improved**. This will be done by implementing new IT systems and generally focusing on organisational streamlining.

These priorities should be seen in the light of both an increase in population of Helsinki and an increase in the average age. The group of elderly above the age of 75 who require the most care doubled over the previous year (Helsinki City Budget, 2014). This contributed **to rising costs** related to both wages and procurement of services in the social services and healthcare department.

The 2014 budget indicates that Helsinki will spend EUR 110 m on services related to the elderly and an additional EUR 70 m on services related to persons with disabilities in 2014. The budget highlights the importance of a **well-functioning market for private service** contractors and the fact that there must be room for both small and medium sized service providers along with the bigger service companies.

Further, there is an increasing focus on people with **memory disorders** (dementia, Alzheimer's disease, etc.) (Helsinki Strategy Programme 2013–2016). This group will invariably grow concurrent with an increase in the number of elderly people with largely age-related disorders.

In cooperation with other Finnish cities, Helsinki participated in a series of projects focusing on e.g. pre-commercial procurement (Project Silver) and care managing/personal budgeting (Project Käpi). This indicates a political and administrative focus on different elements of the municipal value chain from **innovative procurement to innovative demand**.

Project Silver

The pre-commercial procurement (PCP) process is to be introduced to Finland for the first time. Project Silver aims to demonstrate how public services can be rejuvenated by procuring R&D services and innovative solutions.
The objective of Project SILVER is to establish, and execute a PCP process suitable for the conditions of EU Member States. The project intends to culminate in a wide implementation of the developed process.

The public purchaser starts the pre-commercial procurement process by launching an invitation to tender that identifies the need or problem to be solved. Potential providers offer their solution to the need at hand in a three-phased competition. After evaluation, the most promising ideas are developed into well-defined prototypes. The two or three best prototypes are tested and compared in real-life situations involving the end-users. The result of the PCP process is a tested prototype.

Focus on elderly care

The PCP process is to be tested in five countries. The first goal is to increase the quality of life for the elderly by supporting independent living. The second goal is to provide home care more effectively. The pilot involves procuring R&D for technology or robotics supporting independent living.

Project Silver is four-year project financed with funding from the European Commission under the Seventh Framework Programme for research and technological development (FP7). The project started in January 2012.

SILVER includes nine partners in Denmark, Finland, the Netherlands, Sweden and the United Kingdom. Finnish partners are Aalto University, Forum Virium Helsinki, City of Oulu and City of Vantaa.

Source: http://www.forumvirium.fi/

The overall implications of the strategy for the 2013–2016 and the 2014 budgets are that the City of Helsinki is **open to private service providers** and clearly focuses on the increasing needs of the focus group (frail, impaired elderly persons and persons with disabilities), especially related to the challenge of a growing and aging population. This will result in a rising demand for technologies and services to support independent living for frail impaired elderly persons and persons with disabilities.

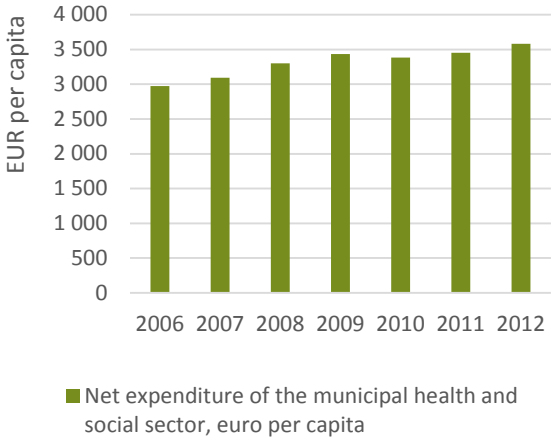
The strategy focuses on how the system must respect the individual as a person, not a patient. The system was established to serve the individual and must act accordingly to preserve personal dignity.

Social expenditure

According to the Finnish National Institute for Health and Welfare, the City of Helsinki's net expenditure related to healthcare and social services rose from EUR 2.1 bn in 2007 to EUR 2.5 bn in 2012 (see Figure 5.4).

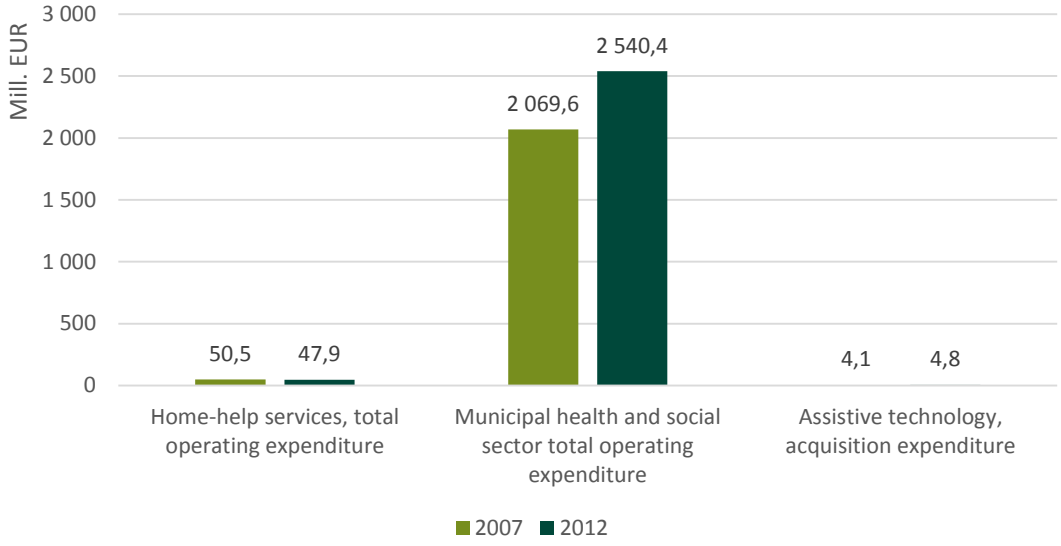
This rise in total costs is associated with a rise in per capita costs, from EUR 3,000 in 2006 to EUR 3,600 in 2012 (see Figure 5.5), and as such represents additional expenses for the city budget.

FIGURE 5.5
Municipal healthcare and social spending per capita, 2006–2012



Source: SOTKAnet Statistics and Indicator Bank, 2005–2013

FIGURE 5.4
Social expenditure 2007 and 2012, **Helsinki Municipality**



Source: SOTKANET, National Institute for Health and Welfare

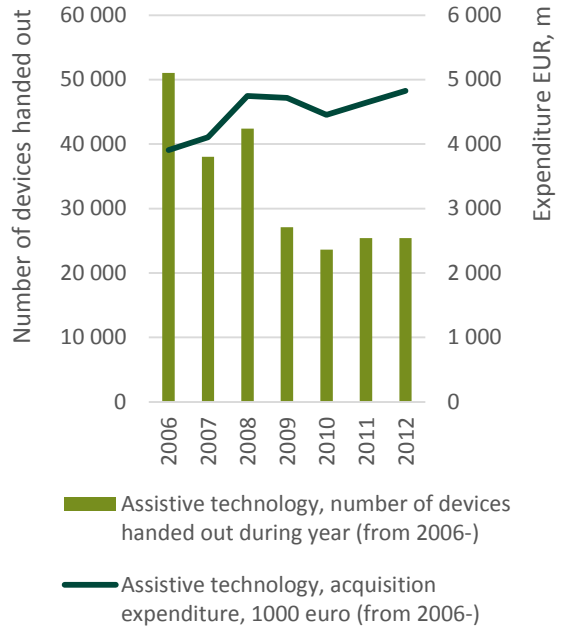
Procurement

The City of Helsinki is one of Finland's largest buyers of products and services. The city's procurement of products and services from the private sector exceeds EUR 1 bn per year.

As part of its strategic focus, Helsinki strives to be a smart procurer and a good partner to businesses. Helsinki urges businesses that provide novel solutions to approach the city.

In 2007, the city invested EUR 4.1 m in assistive technology. This rose to EUR 4.8 m in 2012, representing a 20% increase over the five-year period (see Figure 5.6).

FIGURE 5.6
Procurement of assistive technology



Source: SOTKAnet Statistics and Indicator Bank, 2005–2013

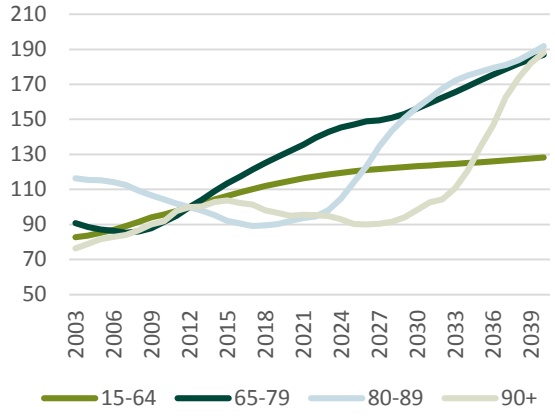
Interestingly, as investment in assistive technologies rose, the number of devices issued declined. This indicates that new technologies and assistive devices are more sophisticated and thus more expensive, but could also indicate that assistive technologies are issued more strategically than has previously been the case.

5.2.3 Oslo[5]

In Oslo, the Department of Health has overall responsibility for the policy and public services related to frail, impaired elderly persons and persons with disabilities.

Like the other Nordic capitals, Oslo is facing an aging population and this is expected to put pressure on public provisions in the years to come (see Figure 5.7).

FIGURE 5.7
Population by age group (projected 2014–2040), index 2012 = 100, **City of Oslo**



Source: Statistics Norway

Strategic focus

Oslo is currently working to develop a new overall policy for the provision of care to the elderly. This is done through the "Seniormeldingen" (senior announcement) where all individuals, communities, organisations, companies, etc., are invited to contribute to the development of the policy by sending in their ideas and opinions. "Seniormeldingen" includes a number of themes, such as **active aging**, **new forms of housing**, **innovative care services** and **increased use of welfare technology**. A political decision on the new policy is expected in the spring of 2014.

The existing policy priorities for Oslo related to the target groups of this study are laid out in a number of publications, e.g. the strategy plan "Oslo mot 2030", "Det politiske grunnlag for et byråd utgått av Høyre, Ventre og Kristeligt Folkeparti 2011" and "Handlingsplan for personer med funksjonsnedsettelser" (being updated in the spring of 2014).

These publications describe the challenges and the strategic policy focus related to the future public provisions for frail, impaired elderly persons and persons with disabilities.

Oslo aims to become a **leader in terms of quality care provided to senior citizens**. As part of this ambition, Oslo gives policy priority to enabling elderly persons to **remain in their own homes and live independent lives for as long as possible** by being able to freely choose their home-care services and through increased use of welfare technology. There is also political focus on the use of new welfare solutions as a way to achieve **better rehabilitation** for senior citizens.

To achieve these goals, Oslo provides a wide range of different public-service solutions. For instance, "Trygghetspakker" (security packages), which combine selected technological solutions and public care services that together will **increase the sense of security, safety and independence** of **people in need of care and who are still living in their own home**. The initiative started out as a collabora-

[5] This chapter is mainly based on the following publications: Oslo Kommune (2013): *Strategisk plan 2013-2016*; Oslo Kommune (2008): *Oslo mot 2025*; Oslo Kommune (2014 draft) *Oslo mot 2030;* Høyre, Ventre og Kristeligt Folkeparti (2011) *Det politiske grunnlag for et byråd*; Oslo Kommune (2012): *Handlingsplan for personer med funksjonsnedsettelser*; Oslo Kommune, Helseetaten (2014): *Årsberetning 2013*.

tion between Oslo's city districts to identify challenges and needs. The next step was to engage in an **open dialogue with the companies** providing the products and services to describe the solutions needed and to develop strategies on how to develop new solutions that meet the needs but which are not already on the market and how to adjust existing solutions. Trygghetspakker include technological solutions such as various **digital memory aids**, **fall sensors**, **communication solutions**, **movement sensors** to control lighting in private homes and **body sensors measuring vital physiological data**.

Oslo is also involved in a number of **test projects** concerning the development of welfare technology aimed at the care sector. Among these are the projects Omsorg+ and eSenior (development and testing of **smart housing**) focusing on ways to improve the quality of life and security for elderly people and people in need of care while they are still living in their own homes or at a care facility.

Oslo has even developed its own **testing bed and showroom for welfare solutions** aimed at people with cognitive reduction or dementia called "Almas Hus" (see the box below).

Almas Hus

The objective of Almas Hus is to build up a knowledge centre and stay up to date on the latest developments in welfare solutions aimed at people with cognitive reduction or dementia. New welfare solutions are tested at Almas Hus to find out how they can help to improve everyday life for people living in a care institution or still living in their own home.
Almas Hus also functions as a showroom where professional and private visitors can see and try out different welfare solutions to find out which one meets their specific needs, in collaboration with staff from Geriatric Resource Centre or National Competence Centre for Aging and Health.

Some of the topics in focus at Almas Hus are:

- new welfare solutions aimed at the target group of people with cognitive reduction and dementia;
- dementia-friendly shaping of ;products and solutions;
- aids and assistive technology in a homely environment;
- knowledge on simple planning and implementation;
- how to use lighting to improve the ability to perform everyday tasks.

In 2013, Almas Hus had more than 1,200 visitors to see and try out demonstrations of welfare technology.

Source: www.helseetaten.oslo.kommune.no; City of Oslo, Department of Health (2014): Annual Report *2013*.

Another area of political focus is the increasing number of people suffering from **dementia**. This represents a growing challenge, and this group of people and the social services related to the area require better and more efficient solutions.

The implementation of policy related to persons with disabilities is mainly attended to by the Council for Disabled (Rådet for funksjonshemmede). The overall ambition is for all **persons with disabilities to live free, independent lives**. This means that persons with disabilities must be offered **suitable housing**, **jobs**, **free choice of care** services and a **well-functioning public transport** system ensuring a high level of **mobility**.

"Handlingsplan for personer med funksjonsnedsettelser" is the concretisation of the policy through 48 initiatives within seven areas:

- improved knowledge of persons with disabilities among public employees, companies and in society;
- **rehabilitation** and habilitation: preserving the ability to continue living an active life;
- **work and employment:** meaningful and adapted employment to be part of society;

- **housing:** a range of different housing options and the adjustment of one's own home must be offered to meet their needs;
- **individual planning:** the planning of public services by involvement of the recipient to ensure quality and independence;
- transport: accessibility to **public transport and communication;**
- volunteering: framework conditions facilitating a **strong and active volunteer sector.**

The action plan is an extension of previous years' policy plans and underlines the Oslo City Council's ambition to keep improving the living and working conditions for persons with disabilities to be followed up on by Oslo's fifteen city districts.

In 2013, the Department of Health started the project "Hverdagsrehabilitering" to develop a model for rehabilitation within the care services to make it possible for people to **remain longer in their own homes and to become more independent**. The project started in the fall of 2013 as a pilot project in two city districts and focused on skills, information, collaboration, work practices, organisation and documentation.

Social expenditure

According to the 2013 financial statement of the City of Oslo, the city expenditure for goods and services related to the public provision of health services, social services and services for the elderly exceeds EUR 500 m.

In the 2013 annual report of the Department of Health (page 18), these services are itemised at around EUR 140 m, including EUR 72 m used to purchase services and products related to public provision of services.

Figure 5.8 illustrates the social expenditure in 2007 and 2011 based on information from Statistics Norway. This shows that the social expenditure increased in the period. This is expected to increase even further in the future due to demographic changes shown earlier with more people living longer, more people needing care for more years, etc.

Procurement plans

As part of the ambition to develop the public service provision, Oslo will also **increase open competition** on the provision of home-care facilities and services whenever competition can result in better services. This will improve the market opportunities and the potential for companies to offer efficient high-quality service solutions.

It is difficult, however, to identify and compile an overview of the specific procurement plans related to the provision of services and welfare technology for the target groups in the City of Oslo. A search on the Norwegian portal for public procurement (www.doffin.no) mainly show public procurement related to the purchase of assistive technology and other welfare products at government-level organisations. For instance, lifting systems and related services, support bars, hygiene aids and related services are all purchased by the Norwegian Labour and Welfare Service.

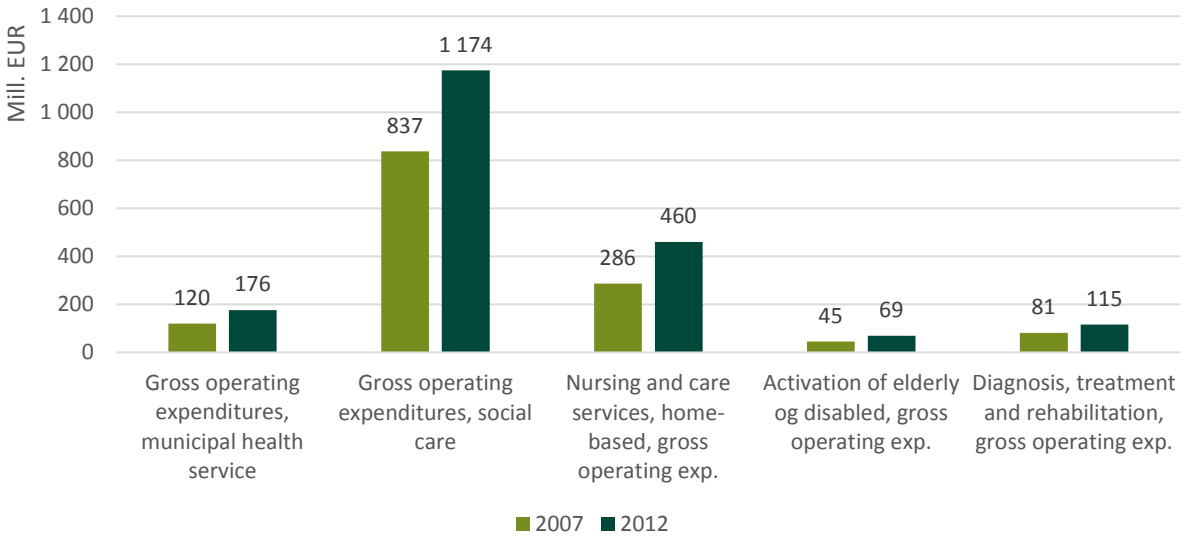
We identified a few specific procurements by the City of Oslo Municipality related to the frail, impaired elderly persons and persons with disabilities, which are shown in table 5.3.

TABLE 5.3
Relevant procurement and investment plans in Oslo, EUR, m

Procurement area	EUR, m
Smart house platform and basis welfare technology package, Omsorg+	0,5 (2014)
40 wheelchairs, 40 walking frames, 40 roller tables	- (2014)
Short term stay at institution for medical treatment and rehabilitation in Spain	0,3 (4 years)
Acquisition of Tryghettspakker	-
Digital safety alarms for individuals living in their own homes	- (2 years)

Source: DAMVAD based on www.doffin.no
Note: The table includes existing procurement and investment plans related to the frail, impaired elderly persons and persons with disabilities. Operating expenses such as wage costs are not included.

FIGURE 5.8
Social expenditure, **City of Oslo**, 2007 and 2011



Source: DAMVAD, based on data provided by Statistics Norway.

5.2.4 Stockholm

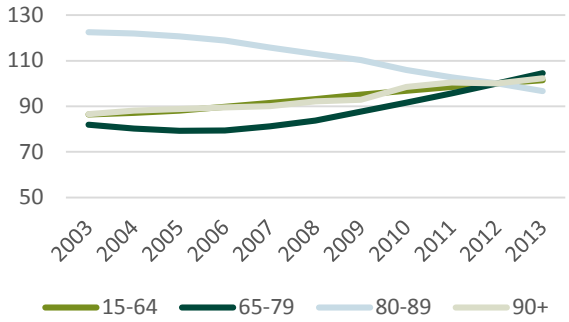
Strategic focus

The strategic focus in Stockholm is that frail, impaired elderly persons and persons with disabilities should have as much **freedom of choice as possible concerning the provision of welfare services**. The introduction of a freedom-of-choice system has resulted in 80% of services for the elderly being provided by private companies, whereas previously this was primarily a municipal task. In addition, the city focuses on giving frail, impaired elderly persons the opportunity to **remain for a longer period of time in their own home** instead of providing them with housing in a care facility (Stockholm City budget for 2014).

A consulting firm prepared forecast trends for the city specifying the number of dependent elderly in the years ahead. The forecast envisages three scenarios based on the expected trends relating to population, public health and other factors which have a positive or negative impact on the demand for care services. The overall conclusion of this is that the cost per user will gradually decline, but, given the expected rise in the number of users, the total cost will increase by 20–70% depending on which of the three scenarios is realised.

Figure 5.9 shows the trend for age groups from 2003 to 2013. As in Copenhagen, Oslo and Helsinki, we see higher growth in elderly population groups than in the traditional working-age group.

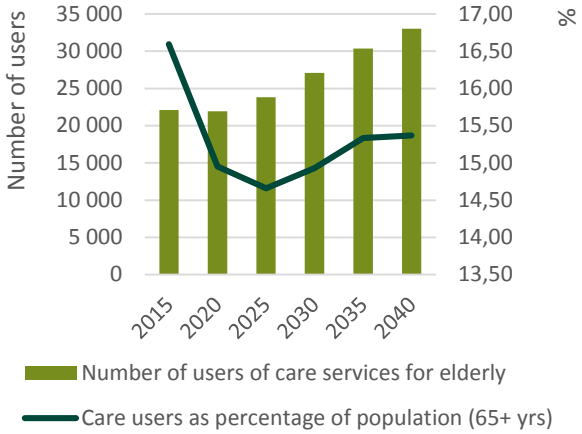
FIGURE 5.9
Population by age group, index 2012 = 100, **City of Stockholm**



Source: Statistics Sweden
Note: Population projections not available for the City of Stockholm.

However, this should be seen in the light of a population increase at the same time, as Figure 5.9 shows. Seen as a percentage of the elderly population above the age of 65, the share of elderly in need of care services is predicted to fall from 16.5% in 2015 to 15.5% in 2040 (see Figure 5.10).

FIGURE 5.10
Projection in the need for care services for the elderly from 2013 to 2040



Source: SWECO (2013): "Framskrivning av äldreomsorgsbehovet perioden 2013–2040".

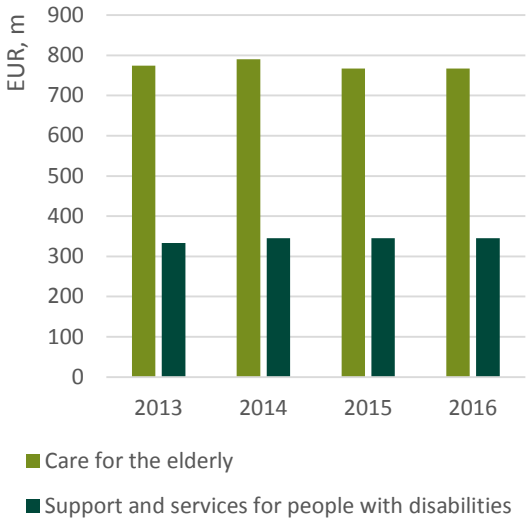
New healthcare and welfare technology will help to accommodate the rising demand and reduce the associated costs. In its strategies, the municipality states that it will follow the development of new technology while working to **make new technology available to potential care recipients**. In these efforts, the municipality draws on the work carried out by the Swedish Institute of Assistive Technology, a governmental programme helping to spread innovative healthcare and welfare technology aids such as simple mobile phones, medicine reminders (for the elderly and frail suffering from dementia), ICT systems, etc.

As of 1 May 2014, parts of the Swedish Institute of Assistive Technology (SIAT) and the Swedish Agency for Disability Policy Co-ordination (Handisam) merged into a new government agency: the Swedish Agency for Participation. How the City of Stockholm will use this new agency remains to be seen.

Finally, Stockholm perceives **age-related disorders, such as dementia**, **Alzheimer's,** etc., to pose a particular challenge in the years ahead as a result of an increasing number of elderly people. Among other things, this will result in rising costs associated with providing **housing for people with dementia**.

The overall implication of the strategic focus and 2014 budget is that there will be an increase in the municipal demand for services and products related to the provision of care for frail, impaired elderly persons and persons with disabilities, with particular emphasis on **technologies and services that allow people to remain in their own homes for as long as desirable**. As Figure 5.11 shows, there is a slight increase in the budget from 2013 to 2014, while the budgets for 2015 and 2016 are expected to be on a par with 2014.

FIGURE 5.11
Proposed budget for 2014 and expectations for 2015 and 2016, Stockholm



Source: Stockholm (2013): "Förslag till budget 2014 och plan för 2015 och 2016".
Note: Currency converted using May 2014 exchange rate (8.97).

Furthermore, there will be a particular rise in the demand for services and products tailored to people suffering from age-related disorders.

Social expenditure

It is difficult to estimate total social expenditure due to a lack of data and varying definitions and delineations of the area in focus. However, the gross costs related to the care of elderly persons and persons with disabilities indicate the level of cost and cost trends. From 2008 to 2009, costs fell slightly, but by 2012 gross costs had risen markedly (see Figure 5.12).

The numbers in Figure 5.12 further show that a substantial part of the cost reduction from 2008 to 2009 is attributable to a significant reduction in costs related to elderly persons and persons with disabilities living in their own home.

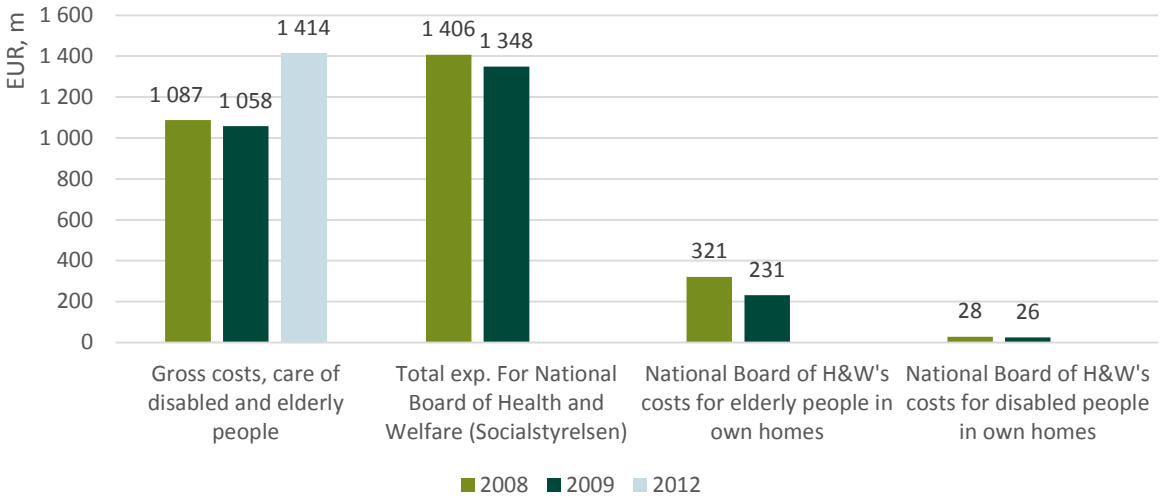
Social expenditure is expected to increase in the future due to demographic changes shown above with more people living longer, more people needing care for more years, etc.

Looking at 2012–2013. the cost per hour of service provided to elderly people without special needs rose from EUR 35.7 (SEK 320) to EUR 37.1 (SEK 333) (Stockholms stads årsredovisning 2013). This is a 4% increase and is significantly higher than the inflation rate which for 2012 to 2013 was around 0%. This indicates rising costs associated with the provision of welfare services.

Procurement

It has not been possible to identify specific procurement plans for the City of Stockholm in this area. However, as the box on the next page below shows, the city is focused on supporting the development and implementation of new assistive technologies through procurement.

FIGURE 5.12
Social expenditure, **City of Stockholm**, 2008, 2009 and 2012



Source: DAMVAD based on data provided by Statistics Sweden, National Board of Health and Welfare.

National Display apartments

The Swedish Institute of Assistive Technology (as of May 2014, the Swedish Agency for Participation) and Micasa Fastigheter (Micasa Fastigheter, which manages the City of Stockholm's care homes, is a subsidiary of Stockholm Stadshus AB and is owned by the City of Stockholm) are running a joint project on housing for the future. Together, they have created two display apartments for persons with disabilities. One focuses on a person living at home, and the other on a person living in a care environment.

The display apartments provide visitors with inspiration and knowledge that can contribute to the development of current and future homes for assisted living.

The ambition of the project is to showcase cutting-edge solutions and technological developments, while providing facilities for training and special presentations.

Source: http://www.micasa.se/

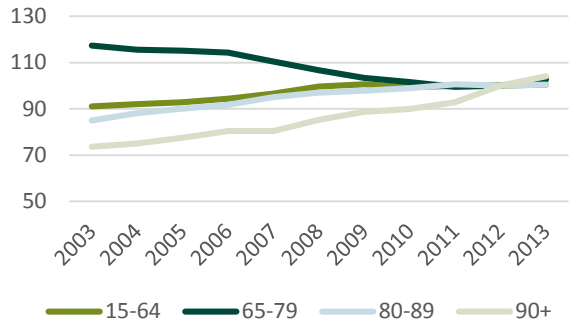
Vinnova (Sweden's governmental Innovation Agency) also promotes innovative public procurement.

5.2.5 Reykjavik

This section consists of figures showing Reykjavik's and Iceland's population projections gathered through publicly accessible information sources (in English), as it was not possible to access city publications, etc., during the project.

Figure 5.13 shows the trends for four population groups from 2003 to 2013, focusing on the working age group and the group of elderly persons whose need for public service will generally increase the older they become. The figure shows a turning point around 2012.

FIGURE 5.13
Population by age groups, index 2012 = 100, **Reykjavik Municipality**

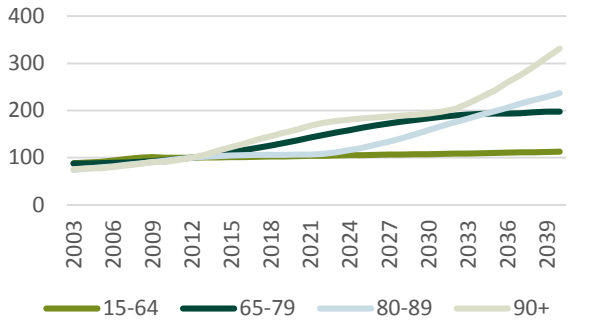


Source: Statistics Iceland
Note: Population projections not available for Reykjavik Municipality.

Figure 5.14 shows the population projection for Iceland as a whole until 2039, as we did not find valid statistics for Reykjavik alone (almost 40% of the total population of Iceland lives in Reykjavik).

The numbers are similar to those of Sweden, Copenhagen, Oslo and Helsinki. There is a higher increase in the elderly population than in the working age group, but in Iceland the increase of the working-age group is expected to be slightly less than the other Nordic capitals, which could amplify the challenges of an aging population even more.

FIGURE 5.14
Population by age groups (projected 2014–2040), index 2012 = 100, **Iceland**



Source: Statistics Iceland
Note: Population projections are not available for Reykjavik Municipality. Therefore the numbers for Iceland are illustrated instead.

5.3 Social expenditure related to old age and disability in Europe

In this chapter, we examine the level of social expenditure related to elderly persons and persons with disabilities across Europe.

The main purpose is to show that throughout Europe, the per capita level of social expenditure is making the development of new welfare solutions an attractive market with high profit and growth potential for companies (see Figure 5.15). The top part of the figure shows the level of expenditure related to social benefits for disability while the lower part of the figure shows the level of expenditure related to old age.

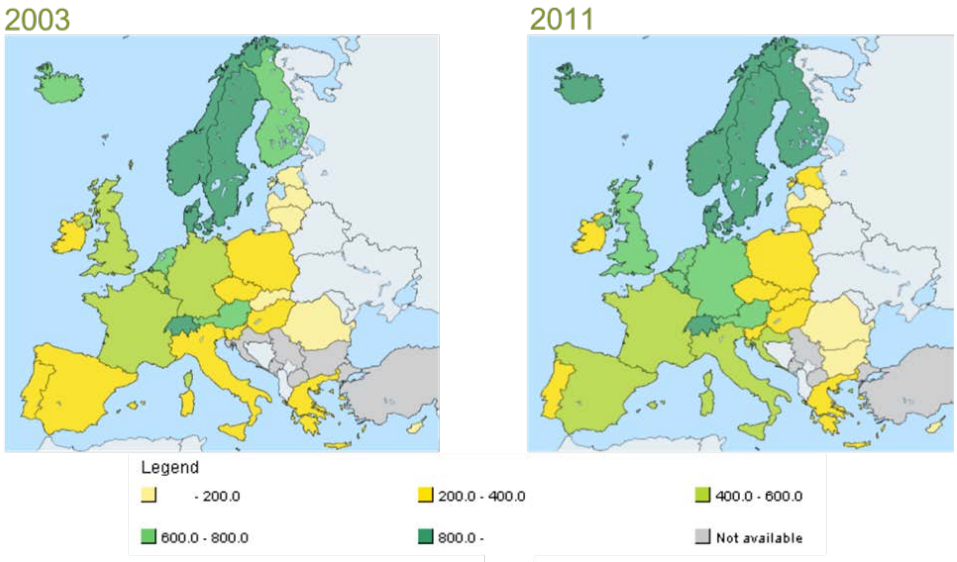
The figure also show that the Nordic countries have relative high levels of per capita social expenditure related to elderly persons and persons with disabilities compared to most European countries. This underlines the fact that the Nordic countries are attractive markets for the development of welfare solutions.

At the same time, as shown in the chapters above, there is substantial political focus on the development and acquisition of innovative welfare solutions aimed at frail, impaired elderly persons and persons with disabilities to improve the quality of life and reduce public costs. This also makes the Nordic countries attractive testing grounds for new solutions.

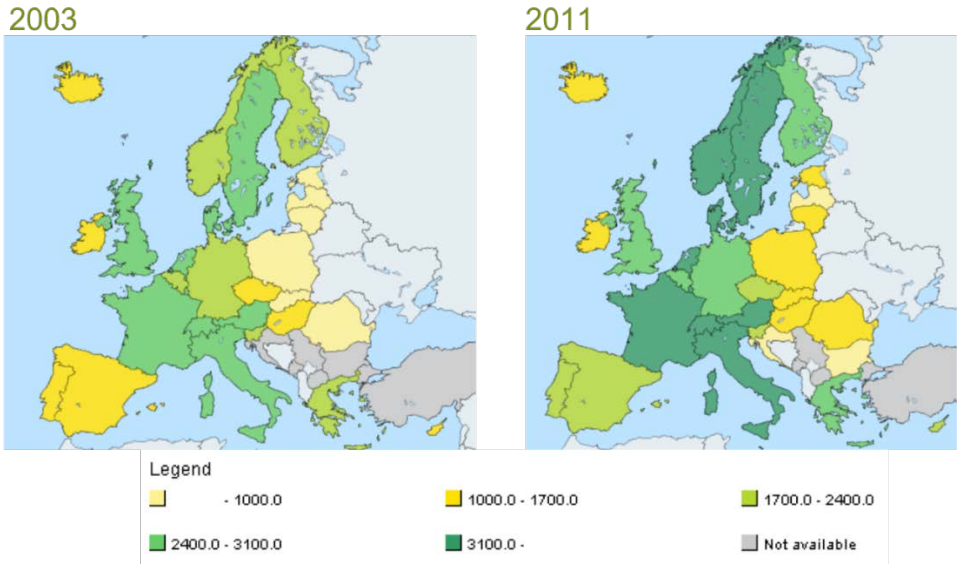
As the demand for effective solutions capable of reducing the public costs related to the provision of services is expected to increase across Europe in the coming years, companies that are capable of developing and providing flexible, efficient solutions can potentially distribute successful products and services across Europe after having proved their worth on the Nordic market.

FIGURE 5.15

Per capita expenditure on social benefits for **disability,** 2003 and 2011 (EUR, PPS)



Per capita expenditure on social benefits for **the elderly**, 2003 and 2011 (EUR, PPS)



Source: DAMVAD, based on EUROSTAT.

Note: Social benefits consist of transfers, in cash or in kind, by social protection schemes to households and individuals to relieve them of the burden of a defined set of risks or needs. Purchasing Power Standard (PPS) eliminates the effect of price level differences across countries.

6 Common Nordic challenges identified through interviews

6.1 Introduction

As part of this analysis, a series of qualitative interviews were conducted by DAMVAD and partners: 24 interviews were conducted with a total of 37 individuals possessing great insight into and practical experience of the provision of municipal care. The interviewees represent the [four] Nordic Capitals (see Appendix Y for a complete list of interviewees).

The interviewees were identified by the members of the Nordic Innovation working group, which helped to set up the interviews. The interviews were conducted on site and based on an interview guide developed by DAMVAD. Additional interviews with relevant interviewees identified through interviews were conducted on site or by telephone.

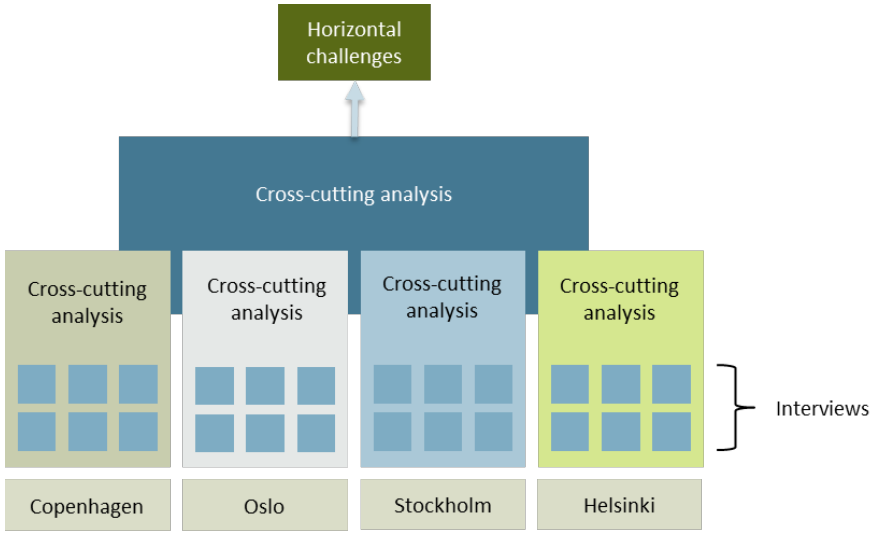
The primary purpose of the interviews was to identify the main challenges facing the Nordic capitals in relation to accommodating the needs of the target groups.

In addition to asking direct questions about the challenges, the interviews focused on topics such as collaboration with private actors, the use of technology, future policy and future procurement. The purpose of this was to identify challenges that are not necessarily perceived as such by the interviewee.

A summary of each interview was made for internal use and a cross-cutting analysis of the interviews in the respective cities was made. On top of this, there was a cross-cutting analysis of the interview survey across the four capital cities. This analysis is the foundation for identifying the common practical challenges (see Figure 6.1 for an overview of the analytical process).

On basis of interview analyses, it was possible to identify a list of common practical challenges, which across cities and administrative units seem to rep-

FIGURE 6.1
Analytical process



Source: DAMVAD, 2014

resent the most fundamental challenges to the continuing provision of efficient, high-quality care services (see Table 6.1).

The challenges identified through interviews with practitioners in the Nordic capitals are described as common practical challenges.

TABLE 6.1
Common practical challenges

#	Focus areas and challenges
1	Preserving dignity
2	Social inclusion/isolation
3	Home vs workplace
4	Monitoring: safety vs privacy
5	User perception of technology
6	Care personnel perception of technology
7	Attracting qualified staff
8	Urban accessibility
9	Flexible dwellings: technical and legal issues
10	How to handle development project

Source: Interviews conducted by DAMVAD and partners.
Note: The numbering does not represent a prioritization of challenges. For a more detailed table, see Section 3.

6.2 Challenges

In the section below, the ten main challenges presented in Table 4.1 are elaborated on and illustrated using practical examples from the [four] Nordic capital cities.

The overall impression of the challenges is that across the board there is keen focus on challenges concerning how to preserve dignity and how to enhance social inclusion.

For the many people who depend on help to perform what normally functioning people consider trivial tasks, this dependence results in a loss of dignity. This feeling is exacerbated by intimate situations such as toilet visits, personal hygiene, etc. Thus, developing technologies which enable frail, impaired elderly persons and persons with disabilities to preserve their dignity is an obvious focus area.

The general trend of making it possible for frail, impaired elderly persons and persons with disabilities to remain in their own home also has negative secondary effects as it challenges their social life. For one thing, the introduction of new technology which reduces the number of visits by care workers will also have the potential to reduce their often minimal social contact. According to interviewees, this is challenging to the implementation of new technologies and generates a demand for technologies and solutions which enable frail, impaired elderly persons and persons with disabilities to become and remain socially active.

In addition to the dedicated welfare technologies, which are the focus of this report, it has been highlighted during the interviews that there is a need for the development of more everyday technologies which enable frail, impaired elderly persons and persons with disabilities to safely cook food, use the radio and television, use the coffeemaker, etc. These types of technology are perhaps especially desired by those with cognitive impairment.

The ten identified challenges are presented in unprioritised order, i.e. they are equally important.

6.2.1 Preserving dignity

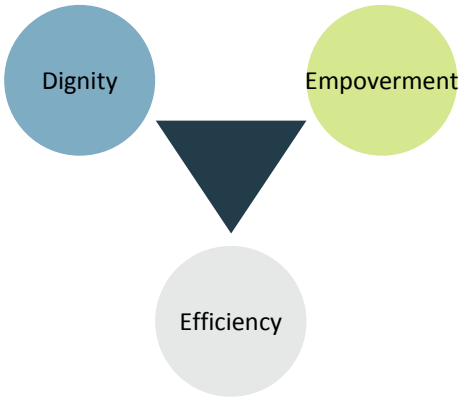
One of the primary challenges to care services is the fact that the individual care recipient depends on help from care personnel in intimate situations and in situations which normally functioning persons have no trouble dealing with. This potentially represents a loss of dignity and results in care recipients

being reluctant to request help, which could otherwise improve their quality of life.

However, it is a difficult area to address because dignity is to some extent a question of individual perception. What one person finds as being undignified, another might not.

Figure 6.2 illustrates that the design and implementation of new technologies needs to consider a series of issues relating to dignity, efficiency and empowerment while acknowledging that this balance is individual. There is no contradiction between dignity, empowerment and efficiency, but it can be reasonably argued that the provision and implementation of new technologies needs to strike a balance between these three issues.

FIGURE 6.2
Balancing dignity, empowerment and efficiency



Source: DAMVAD, 2014

As the figure above illustrates, the implementation of new technology needs to consider issues relating to dignity, efficiency and empowerment. In the space between these considerations, it is possible to design and implement the right mix of assistive technologies and personal care.

An example of a technology that strikes the above-mentioned balance concerning these issues is washing toilets (see the box below). The perception of washing toilets is individual, however.

Washing toilets

Washing toilets enable the user to use the toilet, wash and dry without help from care workers.

Washing toilets are an example of a technology which empowers the individual to handle an intimate situation and thus preserve dignity while at the same time being efficient because it frees up resources for other tasks.

The City of Copenhagen has had excellent experiences from installing these toilets and they are well received by users who appreciate being able to deal with these intimate situations themselves.

In addition, studies from the Danish National Board of Social Services show that people who need help to get to the toilet use this service 4 or 5 times a day. Thus, there is a substantial efficiency potential in reducing the need for assistance by installing washing toilets.

However, the national board also concludes that the installation of washing toilets does not result in efficiency gains in every instance, but depends on the specific situation.
Source: Interviews and www.socialstyrelsen.dk

6.2.2 Social inclusion/isolation

Many frail and impaired elderly persons and persons with disabilities find that they become increasingly lonely as their mobility weakens. This represents a big challenge since, in addition to the general quality of life, loneliness is associated with a higher frequency of sickness and depression.

This is supported by a Danish study by DaneAge (a non-profit, direct membership organisation with 650,000 members) which shows that family relations are the most important source of happiness (DaneAge, 2010).

For many frail and impaired elderly persons and persons with disabilities, the fact that it is no longer easy for them to leave their apartment means that their social life slowly decreases. They become more dependent on the social contact they get from the care worker visits. In extreme cases, care workers represent their primary social contact.

At the same time, many frail and impaired elderly persons and persons with disabilities are incapable of using new means of communication like mobile phones, social media, Skype, etc. In many ways they are disconnected from trends that they could potentially benefit from and enjoy.

This is challenging in terms of physical accessibility in the urban landscape and developing new ways of social contact.

6.2.3 Home vs workplace

There is a delicate balance between the apartment or house of a frail and impaired elderly person being a home, on the one hand, and being a workplace for municipal care staff, on the other. Individuals can rightly feel that when the municipality dictates which equipment should be installed and how furniture should be arranged, this interferes with their right to decide over their own home. Conversely, it is also challenging to ensure that municipal care workers have good working conditions when performing services for frail impaired elderly people. They must not jeopardise their own wellbeing to give assistance to others.

An example highlighted is the lighting in the apartments. There is typically a subdued, cosy lighting in the homes of the frail impaired elderly persons, but this lighting is insufficient for performing the service tasks. Good lighting is required for tasks such as treating wounds, hygiene and general cleaning.

Thus, the challenge is to strike a balance between considerations of various user needs and requirements. An example of how this can be done is by using LED lighting technology, which makes it possible to increase or decrease brightness and colour. This could be further developed to give frail impaired elderly persons light therapy.

Luminex intelligent lighting technology

The company Luminex develops intelligent lighting solutions for hospitals. The light is intelligent in the sense that it adapts to the different work areas and functions. When a specific function is performed in a room, the lighting is automatically adjusted – not only in the specific room but also in relevant ancillary rooms such as medicine rooms, storage areas, hallways, etc. This potentially has a positive effect on the working environment and on the quality of the work performed. At the same time, the use of intelligent lighting supports the well-being of patients. The intelligent light resembles daylight cycles and supports the circadian rhythm of the patients.

It is the objective of intelligent lighting to support the quality of patients' care pathways, while improving the patient's experiences of this. The intelligent lighting systems are based on the integration of computers and LED technology.

Source: www.luminex.dk

Lighting technology is just one example. There is a general need for new care technologies to be designed in ways that consider that they will not be used on hospitals or an institutional setting, but in a private home.

6.2.4 Monitoring: safety vs privacy

Monitoring generally has a negative ring to it. The fear of "big brother" has resulted in rather strict regulation in this area. The purpose of this regulation is to ensure that monitoring and surveillance are kept

within the limits of the law, pursue a legitimate aim and are necessary and proportionate to the needs.

However, for many frail, impaired elderly persons, new monitoring and surveillance technologies and solutions represent an opportunity to create a safe everyday environment in which they feel secure. In many ways, this is not possible due to various regulations intended to protect the public.

Furthermore, this issue is complicated because the monitoring of frail, impaired elderly persons in effect also means that care workers are monitored.

Thus, there is an imbalance between the interests of private life and the opportunities these new technologies create for many people.

Several times during the interviews a main challenge was identified: the fact that many frail, impaired elderly persons feel unsafe in their own home. A common concern among frail, impaired elderly persons is that if they fall, it may take a long time for someone to find out and provide help.

Interviewees mentioned several times that new surveillance and monitoring systems could help frail, impaired elderly persons to feel safer in their everyday lives. These systems could include sensors which detect when a person falls; when someone fails to take his/her prescribed medication; or when a demented elderly person leaves home alone. This could also include call systems, which allow the elderly person to ask questions of caregivers via a videophone, or it could be technologies which otherwise alert care-service providers when something is wrong.

These technologies are particularly relevant for people with dementia, but could also provide otherwise cognitively well-functioning frail and impaired elderly persons with a sense of security, because they know that someone will notice if they fall in their home and that help will be provided.

In continuation of this, several interviewees also pointed out that the way in which information is processed also poses a challenge. If no one reacts to the information, it is worthless. The information must be collected, processed, analysed and brought into play in order to be valuable. Specifically, increased surveillance and monitoring with new digital surveillance and monitoring technology such as video and sensors requires a reassessment of operations and management.

Finally, in reference to this, it must be emphasised, that new monitoring solutions needs to consider the rights of care workers and be proportionate to the specific needs of each elderly person.

6.2.5 User perception of technology

The perceived usefulness and ease of use and user acceptance of new technology are interlinked. In order for the implementation and subsequent use of technology to be successful, it is important to address various issues relating to human and technology interaction which affect user perception of this interaction.

New welfare technology is widely perceived among users as a help and a source of increased quality of life. However, there is also a group of users who have difficulty using new technology, who feel alienated by it and who experience that the technology does not work for them.

For the benefit of this group, it is important that care service providers recognise that not all solutions meet the needs of all people and the introduction of new technology should consider the technological capacity of the user.

It has been mentioned several times that there is an inherent problem in the fact that users do not have more opportunity to try out new technology before it is permanently implemented. It is often the case that the technology must be referred to them before they can get it, but then they in turn also have to keep it.

One municipality had a bad experience of purchasing eating robots which on paper and in pilot trials seemed to be a good solution, but in practice they turned out not to work. Users experienced many problems with the robots, and what was intended as an aid ended up being the opposite. Now the robots are stored in a warehouse, and user perception of new technologies has suffered. This example illustrates how the way in which new technology is introduced affects its successful use.

Unsuccessful implementation of one technology can damage the future perception of new technology by frail impaired elderly persons and reduce their willingness to try out new solutions. Perception becomes a key element in the rollout of new technology.

6.2.6 Care workers' perception of technology

It has been mentioned during interviews that the use and introduction of new technologies is challenging to many care workers, both because they have to learn how to use it, but equally important because it challenges their work and at least changes their work processes.

Most care-service processes are designed to be efficient and reliable in order for care workers to cope with emergencies or acute care situations. This helps to avoid distractions from the core tasks of treating and caring for frail, impaired elderly persons. In this respect, change is obviously difficult, and often met with a degree of scepticism.

At administrative level, the use of new technology is often seen as a way of reducing costs and meeting budget cuts. For care personnel, new solutions are often seen as a way to reduce staff or make the care service more efficient, reducing the time left over for personal care and interaction with the frail or impaired elderly person in need of care. To many care workers, this is the core of care service: they want to spend time with the people (talking, etc.).

Thus, the first part of the challenge is how to ensure that users understand the use of new technology. In this respect it is a problem that much of the new health and welfare technology is developed by engineers and not necessarily based on studies of the everyday lives of users, their needs or their ability to handle new technologies. Users therefore often experience that they find it difficult to "understand" the technology and how it can help their work and not threaten their employment. This applies to small practical details like developing manuals that can be understood by everyone, e.g. by using visual explanations, and this is true in the actual development of new technology. Technology tailored to specific tasks and with simple user interfaces is often easier to adopt. In this respect, smartphones and tablets are often mentioned as good examples because it is possible to develop apps, which can be adapted to specific uses and situations and are thus are intuitively easy to understand and use.

The second part of the challenge is to implement the technology in a way that ensures it will be perceived as helping care workers in their daily work, and not the beginning of their work being taken over by robots. It has been mentioned during the interviews that new technology is frequently introduced ad hoc and not as part of a carefully laid plan for individual recipients and care workers. This intensifies the feeling of insecurity among care workers.

The third part of the challenge is to design the user interface for new technology so it can be used by care personnel, users and relatives.

6.2.7 Attracting qualified staff

Attracting qualified staff was previously a challenge, but the effects of the recent financial crisis temporarily put these problems on hold. However, there is a rising awareness on the fact that in years ahead, recruiting will once again become an issue as the economy recovers.

This is further enhanced by the implementation of new technologies because it increases the need for skilled labour who, in addition to providing care services, have the cognitive capacity to understand, use and communicate the use of this technology. This to some extent presupposes that on average prospective care workers have a higher level of formal education and experience than is the case today.

This is challenging since care-sector jobs are generally perceived as low-status and low-paying.

6.2.8 Urban accessibility

Despite the fact that the Nordic capitals, in comparison with most other major cities, are pioneering in terms of accessibility, it was often highlighted by interviewees that accessibility remains a challenge for many frail, impaired elderly persons. This applies to both the actual accessibility and covers both large and small things like the absence of lifts, automated doors, high curbs, etc., but it also concerns a lack of knowledge about accessibility. If frail, impaired elderly persons or persons with disabilities want to go somewhere they are not used to going, they cannot automatically assume that this will be possible. For many of them, this means that they stay at home or inside their regular comfort zone.

Smart Urban Mobility

In cooperation with the Autonomous University of Barcelona, a Spanish software company has developed an app "OnTheBus" that guides the user to a given destination using different means of public transport: bus, tram, subway. The app uses real-time route calculation, and the app supports on-the-go route creation and modification.

The app is designed to be used by anyone following the universal design/design-for-all principles; it includes a specialised interface for the visually impaired and elderly, ensuring user friendliness and ease of use. The app incorporates various pre-set profiles to enable users with disabilities to access all functionalities.

Source: www.onthebus-project.com

The lack of accessibility in the urban landscape limits individual freedom of movement, and as a result frail, impaired elderly persons and persons with disabilities are more dependent on help from the municipal health service, which shrinks the comfort zones of frail, impaired elderly persons and persons with disabilities. This is detrimental to their quality of life and amplifies the negative impact of a number of other challenges, including the lack of social contact and loneliness.

6.2.9 Flexible dwellings: technical and legal issues

When building new housing for frail, impaired elderly persons and persons with disabilities, time is a challenge. The building process is long. It often take several years from the planning phase until construction is complete. This means that the technological solutions available when the building is finished were unknown at the time of planning. Consequently, the technology installed in buildings is in many cases obsolete before or shortly after it is commissioned. The cost of upgrading and rebuilding is often substantial.

There is a widespread desire to have the option of constructing more flexible buildings which allows them to be easily adapted and equipped with modern technology. This will make it is easier to utilise the available technology and adapt the use of technology to individual needs so the users can live a more independent life.

However, this entails a number of legal, administrative and practical challenges that must be dealt with before this is possible. Insofar as the legal and administrative challenges are concerned, a number of construction rules in the Nordic countries apply to housing intended for frail impaired elderly persons and persons with disabilities, which makes it expensive and difficult to build this type of housing. This is exemplified in Denmark where all buildings used for assisted living facilities and similar must meet the same fire-safety levels as hospitals (category 6). This limits the possibility of new solutions, gives the buildings an "institutional" atmosphere, and makes it difficult to establish a homey atmosphere.

As to the practical challenges, it is difficult to predict which technologies will be needed and available in the future. This implies that there may be a need to develop design concepts which are more focused on making buildings flexible in order to be able to continue to adapt them, than on the installation of specific technologies. This can be done by building movable walls, accessible installation shafts, ample electrical installations, etc. It also implies that there is a need develop more amenities that can easily be retrofitted and adapted to existing dwellings and homes (an example of such technology mentioned during the interviews is the Norwegian Bano bathroom concept, see box below).

Bano bathroom concept

The purpose of Bano's bathroom concept is to make the users more independent, while optimising the working environment of care workers.

The working environment is optimised for employees, as users can perform more tasks themselves. This helps to reduce the number of heavy lifts. The concept is designed in accordance with Labour Inspection Standards.

Furthermore Bano is designed to be implemented in existing buildings.

Source: www.bano.no og www.aarhus.dk

6.2.10 Handling implementation projects

The final challenge identified is not one that was significantly addressed during the interviews, but many interviewees hinted that implementation capacity is often not strong enough in operating entities such as home-care units. This is challenging to the introduction of new technologies.

In order for this to work, there is a need for support functions that can assist in developing implementation projects and in the implementation of new technology. Implementation guides and toolkits can accompany new technologies, as well as training for the staff responsible for implementing the new technologies.

One potential area is in the communication between frail, impaired elderly persons and persons with disabilities, on the one hand, and the municipalities, on the other. The user group may perceive that the technology is being forced on them and that they do not have the option of refusing it. This can potentially make the user group reluctant about the implementation and use of new technology.

The implementation of new technology will often be more successful if based on dialogue about needs

and opportunities and if users feel that they are being given the technology as a means for living a more independent life, not because the municipality wants to streamline and save resources.

In this respect, it is important to keep in mind that many frail, impaired elderly persons and persons with disabilities lead difficult lives and are comfortable in their regular routines. Therefore, changing these routines is in itself a potential source of anxiety.

7 Appendices

7.1 Appendix A: References

7.1.1 Literature and reports

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7.1.2 Online sources

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http://uusi.sotkanet.fi (National Institute for Health and Welfare Finland)

7.2 Appendix B: Interviewees

Below is a list of the 36 persons interviewed during the project. The larger number of persons in Copenhagen is explained by the fact that is was possible to arrange interviews with multiple participants.

	Organisation	Name	Title
Copenhagen	Sundhedsforvaltningen (SUF), Center for Omsorg	Marie Nygaard	Specialkonsulent
	SUF, Boligsekretariatet	Per Christensen	Leder af Boligsekretariatet
	SUF	Hannah Hjort	Sygeplejefaglig konsulent
	SUF, Center for Omsorg	Mette Becker	Visitator til plejeboliger
	SUF, Lokalområdekontor Indre By/Østerbro, mail:	Anne Arvel	Leder af myndighedsteamet (visitation til hjemmepleje)
	SUF, Hjælpemiddelcentret	Birgitte Østergaard	Centerchef
	Socialforvaltningen, Handicapcenteret	Karin Høgsberg	Afdelingsleder Handicapcenter København
	SOF, Kontoret for byggeri og kontrakter	Katrine Madsen	Fuldmægtig
	SOF, Kontoret for byggeri og kontrakter	Lars Østergaard	Kontorchef
	SOF, Drifts- og Udviklingskontoret for Handicap	Tine Østergaard	Fuldmægtig
	SOF, Hjemmeplejevisitation	Maria Mantzorou Smith	Kons. Visitationsfaglig leder
	SOF, Hjemmepleje Drift og udvikling	Søren Schielder	Drift og udviklingschef Hjemmeplejen
	Project “Lev vel” – Vaeksthus Copenhagen	Gunhild Sander Garsdal	Projektchef
	OKF, KK	Nille With Barrientos	Head of Section
	SUF, KK – Program for Sundhed	Lene Vibjerg	Specialkonsulent
	SOF, KK - Enheden for Velfærdsteknologi, Kontoret for Byggeri og Kontrakt	Dorthe Solgaard Petersen	Projektchef
Stockholm	Äldreförvaltningen	Eva Frunk Lind	Förvaltningschef
	Äldreförvaltningen	Raili Karlsson	Avdelningschef, Avdelningen för upphandling och utveckling

	Enskede-Årsta-Vantör Stadsdelsförvaltning	Leif Kananen	Avdelningschef, Egenregi, äldreomsorg, funktionsnedsättning och socialpsykiatri
	Bromma Stadsdelsförvaltning	Anders Broberg	Verksamhetsområdeschef, Äldreomsorg
	Socialförvaltningen	Fredrik Jurdell	Avdelningschef, Avdelningen för stadsövergripande sociala frågor
	Socialförvaltningen	Riitta-Leena Karlsson	Funktionshinderombudsman
Oslo	Oslo Kommune	Endre Sandvik	Kommunaldirektør
	Oslo Kommune, Byrådsavdelingen for eldre og sosiale tjenester	Unni Hembre	Fagsjef
	Oslo Kommune, Bydel Alna	Marit S. Monsen	Leder bestillerkontoret
	Oslo Kommune, Bydel Vestre Aker	Monica Enge Eriksen	Enhetsleder bestiller
	Oslo Kommune, bydel St. Hanshaugen	Mads Herfindal Haakonsen	Fysioterapeut/prosjektleder velferdsteknologi
	Almas Hus ved Geriatrisk ressurssenter	Sigrid Aketun	
	Helseetaten	Morten Torgersen	
Helsinki	Hospital, Rehabilitation, Care	Juha Jolkkonen	Division Director
	Northern Service Area	Anna-Liisa Lyytinen	Director
	Southern Service Area	Arja Peiponen	Director
	Economic department	Kimmo Heinonen	
	Economic department	Marja-Leena Vaittinen	
	Forum Virium	Roope Ritvos	Development Director
	Finnish Health Technology Association	Terhi Kajaste	Managing Director

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