Digital Health Care and Social Care

Regional development impacts
in the Nordic countries

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Stockholm, Sweden, 2020

Preface

This report is part of the Nordic project 'Health care and care through distance-spanning technologies' (Vård och omsorg på distans), initiated under the Swedish Presidency of the Nordic Council of Ministers in 2018.

Both digitalisation in general, and digitalisation in health care and social care in particular, are high on the political agenda across all the Nordic countries – which all have special strategies for eHealth. However, those ambitious goals, the pace of development for digitalisation in health care and social care has been slower than in many other sectors. The aim of this project on health care and care with distance-spanning solutions has been to encourage improvements through benchmarking and learning from best practice across the Nordic Region.

The aim of the report is threefold: to delve into the potential benefits of digitalisation in health care and social care, to explore its effects on regional development, and to take a more in-depth look at the obstacles to implementing digitalisation in health care and social care. The results of our study illustrate the significant potential of digitalisation in health care and social care – for example, in relation to improved quality and accessibility in both health care provision and social care services. But the report also illustrates the way in

which a number of obstacles (such as legislative, technical or organisational difficulties) are hampering this development. In addition, the report points to the need for comprehensive and systematic studies examining the economic and regional development impacts of digitalisation in health care and social care.

The overall effect of digitalisation in health care and social care is expected to be found not only in the development of the two sectors themselves, but also in its wider implications for health and wellbeing, and for the development of regions across the Nordic territory. Rural and remote areas, in particular, are expected to benefit from greater accessibility to welfare services. This should also contribute to the attractiveness of those areas, and to their long-term development. This project was initiated and funded by the the Nordic Committee of Seniors Officials for Social and Health Affaires. Nordic Atlantic Co-operation (NORA) has contributed with funding for conducting fieldstudies in Faroe Islands and Greenland.

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Summary

Health care and social care are not only important aspects of the Nordic welfare state model. The development of those sectors also has an important impact on the regional development and sustainability (economically, socially and environmentally) in the Nordic Region. The use of digital solutions in both sectors is increasing across all the Nordic countries. However, in relation to the ambitious goals set out in national digitalisation and eHealth strategies, digitalisation in health care and social care can be seen to have been developing at a relatively moderate pace.

This research is part of the Health care and care with distance-spanning solutions project initiated and funded by the Nordic Council of Ministers. The aim of this research has been to explore the effects and potential benefits to regional development, and to address the various obstacles facing digitalisation in health care and social care throughout the Region.

In addition to literature reviews of the different health care systems, digitalisation in the health care and social care sectors and how these link to regional development, case studies have been conducted in one region and municipality in each of the Nordic Region's five states (Sweden, Norway, Denmark, Finland and Iceland) and in two of the self-governing territories (the Faroe Islands and Greenland). These case studies include interviews with senior management, project leaders and health care and social care workers. An accessibility analysis has also been conducted with a view to understanding how access to health care and social care can be improved by digital solutions in these sectors.

The case study results point to the effects and potentials of digitalisation in health care and social care across four different areas. These relate to quality (for example, improving health care through shared data); efficiency (for instance, re-

ducing costs through less need for transportation); inclusion (for example by facilitated dialogue between patients and health care professionals), and accessibility (such as the improved accessibility of health care through video consultations with medical doctors). The impact of digitalisation in health care and social care on regional development was found in relation to all three dimensions of sustainability – economic, social and environmental. Important obstacles to implementing digital solutions in health care and social care were found to be in the areas of leadership, management and legislation. But important technical, economic and cultural barriers were also discovered, and these clearly need to be addressed.

The accessibility of health care facilities across the regions studied varies, depending both upon the spatial distribution of the populations and on the organisation of health care and social care services in the individual regions. In the course of this research, we have found many examples of the way digital solutions can increase flexibility and improve quality in the provision of health care and social care services. This is especially beneficial for the development of welfare services in rural and remote areas.

However, the case studies also illustrate the difficulties involved in disentangling observed and realised results and effects from potential future opportunities and risks. This points to the need for more comprehensive and systematic studies on the economic effects of digitalisation in health care and social care, as well as its other regional development impacts. Digitalisation in health care and social care has significant potential not only for enhancing health and wellbeing across the Nordic Region, but also for boosting regional development and contributing to economic, social and environmental sustainability.

Sammanfattning

Vård och omsorg är inte bara viktiga aspekter av den Nordiska välfärdsmodellen. Utvecklingen inom vård och omsorg har stor betydelse för den regionala utvecklingen och för utvecklingen mot ett ekonomiskt, socialt och miljömässigt hållbar samhälle i Norden. I alla Nordiska länder ökar användningen av digitala lösningar i hälso- och sjukvård och social omsorg.

I förhållande till de ambitiösa mål som fastställts i nationella digitaliseringsstrategier och strategier för eHälsa, har dock digitaliseringen inom vård och omsorg utvecklats i relativt måttlig takt.

Denna forskningsstudie är en del av projektet Vård och omsorg på distans (Health care and care with distance-spanning solutions) som initierats och finansierats av Nordiska ministerrådet. Syftet har varit att undersöka vilka effekter och potentiella möjligheter digitala lösningar inom vård och omsorg har för regional utveckling i Norden, samt att identifiera vilka hinder som finns då det gäller digitalisering inom vård och omsorg.

Utöver litteraturstudier av de olika nordiska hälso- och sjukvårdssystemen, digitalisering inom vård och omsorgssektorn samt hur denna kopplar till regional utveckling, har fallstudier genomförts i en region och kommun i vart och ett av de nordiska länderna (Sverige, Norge, Danmark, Finland och Island) samt i två av de självstyrande områdena (Färöarna och Grönland). Fallstudierna omfattar intervjuer med personer på ledningsnivå, projektledare och personal inom vård och omsorg. En tillgänglighetsanalys har också genomförts i syfte att förstå hur tillgängligheten till vård och omsorg kan förbättras genom användning av digitala lösningar.

Fallstudieresultaten pekar på effekter och potentiella möjligheter med digitalisering inom vård och omsorg inom fyra olika områden. Dessa avser

kvalitet (till exempel att förbättra vården genom delade data); effektivitet (till exempel reducering av kostnader genom minskat behov av transporter); deltagande (till exempel genom att underlätta dialogen mellan patienter och vårdpersonal), och tillgänglighet (såsom förbättrad tillgång till hälso- och sjukvård genom videokonsultationer med läkare). Studien visar att digitalisering inom vård och omsorg har en påverkan på regional hållbar utveckling i förhållande till alla tre dimensioner – ekonomiskt, socialt och miljömässigt. Betydelsefulla hinder för att implementera digitala lösningar i vård och omsorg återfinns inom områdena ledning och styrning samt lagstiftning, men det finns även tekniska, ekonomiska och kulturella hinder som behöver tas itu med.

Tillgängligheten till vårdinrättningar i de undersökta regionerna varierar, både beroende av befolkningens rumsliga fördelning och av hur hälso- och sjukvården och de sociala omsorgstjänsterna organiserats i de enskilda regionerna. Under detta forskningsprojekt, har vi funnit många exempel på hur digitala lösningar kan öka flexibiliteten och öka kvaliteten i de tjänster som tillhandahålls inom vård och omsorg. Detta är särskilt fördelaktigt för utvecklingen av välfärdstjänster på landsbygden och mer avlägsna områden. Men fallstudierna illustrerar också de svårigheter det innebär att skilja observerade och realiserade resultat och effekter, från potentiella framtida möjligheter och risker.

Detta pekar på behovet av fler övergripande och systematiska studier av de ekonomiska effekterna av digitalisering inom vård och omsorg, liksom dess övriga regionala utvecklingseffekter. Digitalisering inom vård och omsorg har en betydande potential inte bara för att främja hälsa och välbefinnande i hela Norden, men också för att stärka den regionala utvecklingen och bidra till ekonomisk, social och miljömässig hållbarhet.

1. Introduction

Digitalisation of services is a global trend across many countries and sectors, different types of services, in the private and public sectors, and across different levels of government. The digitalisation trend is often referred to as ubiquitous, since it takes place across all areas of society and with large implications for both economy and governance (Randall & Berlina, 2019).

Digital services are very diverse. They range from big data and customer management services, to e-government, remote monitoring of utilities (such as energy consumption), distance monitoring of patients, remote education, treatment via video, and advanced telemedicine (such as remote surgery). Many of these services are provided by government, and often by local and regional governments. This is especially true for the Nordic countries, where local and regional governments have vast responsibilities for providing welfare services to their citizens. Digitalisation of services provided by the public sector is often labelled as e-government, and many municipalities at the forefront of offering such provision to the citizens are labelled smart cities (e.g. Trencher & Karvonen, 2017).

From a global perspective, digital technologies in health care and social care are heavily promoted and expected to contribute to the United Nations' Agenda 2030 for Sustainable Development. For example, they can assist with Sustainable Development Goals (SDG) number 3: Good Health and Wellbeing, and number 11: Sustainable Cities and Communities. In 2018 the member states of the World Health Organisation (WHO) adopted a resolution on Digital Health, in which they recognised and promoted increased prioritisation, evaluation and up-scaling of digital technologies – in order to advance the health aims of the SDGs and of universal health coverage generally (WHO, 2018).

Over the last decade the health care sector has benefitted from new discoveries in life sciences which, through digitalisation (such as the use of big data and digital tools) have produced numerous enablers for improved health among citizens. Examples include genomics (which has enabled personalised treatments for patients),

big data, and trend monitoring (which facilitates research into diseases and treatments, and helps to identify and respond to epidemics and disease outbreaks). Health monitoring through wearables facilitates the collection of personalised real-time data. Meanwhile, customer feedback to support improvements in health care and social care has been facilitated through a variety of digitalisation processes. Thanks to telemedicine, access to health care professionals can be improved in remote areas, and travel time and associated costs can be cut (Blix & Levay, 2018).

In public debate, the most common motivating factors for implementing digital services in health care and social care are improved quality and increased accessibility to health care services, as well as the possibility of making economic savings at a time when the Nordic population is growing older – which, it is assumed, will increase the demand for health and welfare services (Statens offentliga utredningar, 2019a, Sveriges kommuner och regioner, 2020a). For example, the Swedish Association of Local Authorities and Regions (SKR) estimates a shortage of 500,000 skilled people in the welfare sector by 2026 (Sveriges kommuner och regioner, 2019a), and in 2019 the Swedish Finance Ministry estimated a shortage of financial resources amounting to SEK90 billion in the welfare sector by 2026 (Swedish Government, 2019a).

In this context there is however a widespread recognition that the digitalisation process in health care and social care has been a much slower process than in other sectors, such as banking and commerce. That means there is unrealised potential in these areas. The outbreak of the Covid-19 pandemic has naturally spurred digitalisation in health care and social care sector, but this has come at a fast and disruptive pace. For example, the use of digital health care services in Sweden increased ten-fold during the first few months of 2020 (Sveriges kommuner och regioner, 2020b), while in Norway e-consultations increased by 1,000% between February and March (Direktoratet for e-helse, 2020). In a long run, the increased use of digital solutions during the Covid-19 pandemic can be expected to have significant impli-

cations for the development of digitalisation in health care and social care.

This study is part of the "Health care and social care with distance-spanning solutions" project (Vård och omsorg på distans, VOPD) initiated under Swedish chairmanship in 2018, and funded by the Nordic Council of Ministers. The aim of this

study is to explore digitalisation in health care and social care from a regional perspective, and to investigate its impact on a regional scale and within regional development. What are the regional development effects of digitalisation in health care and social care? What are the obstacles, and what are the potentials?

2. Digitalisation in health care and social care across the Nordic countries

In order to understand what role digitalisation in health care and social care has within specific regions, and on regional development in the Nordics, we need to gain a brief overview of health and the health care systems across the Nordic countries.

2.1 Health in the Nordic countries

In an international perspective the Nordic countries are performing very well as regards health and wellbeing (e.g. IHME, 2018, OECD, 2019a). Life expectancy at birth is an indicator which is often used for measuring the overall health and wellbeing in a country. For example, this indicator is used as a proxy for health in the United Nations Human development report health index (UNDP, 2020). Good access to quality health services is seen as one important condition for increased life expectancy,

together with factors such as an increased living standard, an improved lifestyle and a better education.

In 2018, life expectancy in Iceland (82.9 years), Norway (82.8) and Sweden (82.6) were among the highest in Europe and the world, with Finland (81.8) and Denmark (81) slightly behind.

All the Nordic countries are regarded as welfare states, with well-advanced welfare systems based on the principles of universality and the public funding of services. However, despite the many commonalities among the Nordic countries, there are also important differences as regards the organisation of health care and social care systems between, but also within, the different countries (Vårdanalyt, 2017).

Although it is a challenging task to compare

Figure 2.1. Data source: Eurostat. Note: Nordic countries identified in light blue.

health care systems, international comparisons are conducted on a regular basis by the WHO, the OECD and Health Consumer Powerhouse (HCP), for example. The comparison difficulties relate mainly to the fact that countries have different systems for organising and financing health care, which also includes the distribution between different types of care and services within the system, and different forms of employment for those employed in the health care sector (Sveriges kommuner och regioner, 2018). Despite difficulties related to finding comparable data and the complexities of the health care systems referred to above, international comparisons are made in order to assess efficiency (i.e. where results are analysed in relation to economic costs), and to examine processes within the health care systems (i.e. in what way health care systems live up to their patients' expectations of service quality, accessibility, safety and inclusion).

One attempt to measure and compare the quality and accessibility of the health care systems is made in the *Health Access and Quality Index* developed from the data in the global burden of diseases, injuries and risk factors study from 2016. (GBD 2016 Healthcare Access and Quality Collaborators, 2018). This index is based on 32

causes of death which should be avoidable if there is access to sufficiently high-quality health care. The index has been created for 195 countries, and values vary from 97 in Iceland to 19 in the Central African Republic. In this index all Nordic countries feature among the top 20 in the world – with Iceland in first place, followed by Norway (2), Finland (6), Sweden (8) and Denmark (17).

According to the study that the index is based on, there is a correlation between high index value and high health care spending per capita, although this relationship was weaker for low-to-middle income countries (GBD 2016 Healthcare Access and Quality Collaborators, 2018). According to data from the OECD's *Health at a Glance* report, all Nordic countries do indeed have health care expenditures above the OECD average. Even so, per capita expenditures are substantially lower than in the USA. Another way of measuring cost is to compare them with total GDP. On this measure the Nordic countries are also above the OECD average, apart from Iceland, which is just below. However, it is important to bear in mind that shifts in this indicator may equally well be an indication of the rise and fall of GDP, and hence may not tell us very much about developments in health care.

Another important factor in assessing the

Figure 2.2. Data source: *GBD 2016 Healthcare Access and Quality Collaborators (2018)*. Note: Nordic countries indicated in light blue. Top 20 countries, plus USA and China.

Current expenditure on health, per capita, US\$ (PPP) in 2018

Figure 2.3. Data source: OECD. Note: Nordic countries indicated in light blue.

quality of health care is waiting times. Significant waiting times indicate that the demand for health care is higher than the supply. This is something that has become evident during the Covid-19 pandemic, during which many planned surgeries have been cancelled or post-phoned. In 2018, the lowest waiting times in the OECD area levels could be found in Denmark, the Netherlands, Italy and Hun-

gary, while the highest could be found in Estonia, Poland and Chile. (OECD, 2020a). Table 2.1 shows median waiting time for seven elective surgeries, and indicates large variations in waiting times between the Nordic countries. The longest waiting times are found in Norway, while the lowest are found in Denmark (over the OECD average for six out of the seven elective surgeries), for example.

Table 2.1. Median waiting times for selected elective surgery (days), 2018.

	Cataract surgery	Hip replacement	Knee replacement	Hysterectomy	Prostatectomy	Coronary bypass	Coronary angioplasty
Denmark	36	35	44	23	36	10	15
Finland	97	77	99	55	39	15	23
Norway	132	123	152	118	105	62	43
Sweden	51	75	90	32	45	7	n/a
OECD average	92	113	189	56	51	24	29

Data source: OECD (2020a). Note: No data for Iceland.

2.2 The health care systems in Nordic countries

The health care systems in Nordic countries are fairly decentralised. This means that responsibility for primary and secondary care is located at regional or local levels, receiving its mandate from central government and/or regional and local government, depending upon the legislative framework of the country in question. The legislative framework for health care and social policy is laid down by the different parliaments. Health care in Iceland, Norway and Denmark can be characterised as semi-decentralised – a situation in which national authorities have a strong role in relation to health care services provided at regional and/or local levels. In comparison, Sweden and Finland have more decentralised health care systems, meaning that regional councils in Sweden and the municipalities in Finland hold the major responsibility for health care. In the Faroe Islands, Åland and Greenland, health care is mainly a government responsibility, with similarities to the semi-decentralised systems.

Elderly care, including both home care services and homes for the elderly, are primarily a municipal task across all Nordic countries (Rostgaard *et al.*, 2015). A common characteristic of Nordic countries is that health care and social care is publicly funded to a great extent – although patient fees, private funding and insurance-based solutions are also to be found. Private providers of health care, especially in elderly care, can also be found throughout the Nordic countries, although those too are publicly funded to a large extent (Rostgaard *et al.*, 2015).

2.3 What is digitalisation in health care and social care?

Digitalisation in health care and social care is frequently labelled as eHealth. The term eHealth was coined in 1999, to describe the use of electronic communication and information technology in the health sector (Schreiweis *et al.*, 2019). Numerous eHealth services have emerged since then, and with them many accompanying definitions. This has resulted in a lack of clarity regarding what is to be included within the concept. A study dating from 2017 found that most definitions could be framed into three domains: using eHealth technologies to monitor, track, and inform; using digital technologies to enable health communication among practitioners and between health professionals, patients and users; and collecting, managing and using health data (Shaw *et al.*, 2017).

The WHO refers to digital health, with eHealth as a sub-definition: *"Digital health, or the use of digital technologies for health, has become a salient field of practice for employing routine and innovative forms of information and communications technology (ICT) to address health needs"* (WHO, 2019a, p.1). The term 'digital health' is therefore used as an umbrella term to encompass eHealth, but also to denote emerging areas such as big data, genomics and Artificial Intelligence (AI).

Digital technologies are considered to have an important role in improving public health. Already in 2016, 58% of WHO member countries had an eHealth strategy, and within the WHO Global Strategy on Digital Health 2020–2024, digital technologies are seen as an enabler for sustainable health systems and universal health coverage

Table 2.2. Health care systems in the Nordic countries.

	Semi-decentralised health care system	Decentralised health care system
Sweden		x
Norway	x	
Denmark	x	
Finland		x
Iceland	x	
Faroe Islands	x	
Åland	x	
Greenland	x	

Author's elaboration based on European Observatory on Health Systems and Policy (2020)

(WHO, 2020a). Also the European Commission refers to digital health as follows: *"Digital health and care refers to tools and services that use information and communication technologies (ICTs) to improve prevention, diagnosis, treatment, monitoring and management of health and lifestyle. Digital health and care has the potential to innovate and improve access to care, quality of care, and to increase the overall efficiency of the health sector."* (European Commission, 2020).

The European Commission's work on digital health is framed against the background of an ageing population, chronic diseases putting pressure on health budgets, inequality as regards quality and access to health care services, and a shortage of health care professionals. The Commission's work relies on three pillars: securing data access and sharing (for example e-prescriptions and patient summaries), connecting and sharing health data for research, faster diagnosis and improved health, and strengthening citizen empowerment and individual care through digital services.

To embrace all the different kinds of digital solutions and tools that are used in health care and social care across the Nordic regions and municipalities, and in order to reflect the terminology used in the Nordic context, we will use the terms digitalisation in health care and social care and eHealth interchangeably in this study. This includes not only welfare technologies and technological devices, but also digital services and digital infrastructure/systems. In addition, we understand digitalisation in health care and social care to involve all areas and levels of the health care and social care systems.

2.4 Digitalisation in health care and social care in the Nordic countries

All Nordic countries have high ambitions with regard to digitalisation in health care and social care, which is reflected in policies and strategies to enhance and facilitate the use of digital solutions in health care and social care.

"Sweden will be best in the world at using the opportunities offered by digitalisation and eHealth, to make it easier for people to achieve good and equal health and welfare, and to develop and strengthen their own resources for increased independence and participation in the life of society." (Sweden, Vision ehälsa 2025)

"In order to achieve health policy goals relating to better quality, increased patient safety and improved use of skills and resources, it is necessary to adopt the possibilities of digital technology in a better way. E-health solutions challenge existing ways of working, mindset and culture in the health care and care sector. A focus on change management will therefore be crucial for a successful digitalisation." (Norway, Nasjonal e-helsestrategi 2017–2022)

The citations above are illustrations of the importance Nordic countries give to digitalisation in health care and social care.

Apart from empowering and activating citizens, these strategies point towards key strategic areas, such as making the digital interface the preferred channel for interacting with the health care system; improving health care services; making services more integrated, available, usable and user friendly; improving eHealth literacy, and reaping economic benefits from these improvements.

The Nordic eHealth group has been assessing eHealth across the Nordic countries since 2013. In the final report of the eHealth Research Network (2017), they point to an increased emphasis on governance, to the involvement of different stakeholders as part of the different health care systems, and to an increased end-user perspective for both health care professionals and citizens. (Hyppönen et al., 2017)

All countries have implemented national online platforms where citizens can seek health care information and guidance. These are sundhed.dk in Denmark, 1177.se in Sweden, helsenorge.no in Norway, kanta.fi in Finland and heilsuvera.is in Iceland. The aim of these platforms is to provide evidence-based information written by authorised health care professionals for citizens. This is a valuable service, and a way to guide the citizens towards good quality health information on the Internet. Apart from gaining access to good health information and health care providers, individuals can also access their own patient data and make appointments. However, the exact type of services offered varies among national platforms. With the outbreak of the Covid-19 pandemic the use of digital communication within health care has increased (e.g. Direktoratet for ehelse, 2020).

The use of these platforms and services connects to digital determinants, in which access to the Internet and ownership and use of a smart

Table 2.3.: eHealth strategies and responsible national authorities for eHealth across the Nordic countries.

Country/ Selfgoverning Territory	Responsible authority	Strategy
Sverige	Ehälsomyndigheten	Vision for eHealth 2025. (Government and Swedish association of local authorities and regions.) https://www.ehalsomyndigheten.se/om-e-halsa/vision-e-halsa-2025/
Norway	Direktoratet for e-helse	National eHealth Strategy 2017-2022. https://ehelse.no/strategi/nasjonal-e-helsestrategi-og-handlingsplan-2017-2022
Denmark	Ministry of Health	A Coherent and Trustworthy Health Network for All: Digital Health Strategy 2018-2022. http://www.sum.dk/Sundhedsprofessionelle/Digitalisering/Sundheds-it.aspx
Finland	Social- och hälsovård-sministeriet	Information to support wellbeing and service renewal – eHealth and eSocial strategy 2020. (Information som stöd för välfärden och de reformerade tjänsterna. Utnyttja social- och hälsovårdsinformationen- strategi fram till 2020.) https://stm.fi/sv/artikeln/-/asset_publisher/sosiaali-ja-terveyden-huollon-tiedonhallinta
Iceland	Directorate of Health	National eHealth Strategy 2016-2020.
Åland	Landskapsregeringen	Vision Åland 2.0: Easier and safer. (Vision Åland 2.0: Enklare och tryggare.)
Faroe Islands	Ministry of Finance	The National Digitalisation Programme of the Faroe Islands (2015). https://www.talgildu.fo/english/english/
Greenland	Ministry of Finance	National digitalisation strategy 2018-2021 "The digital community"

phone, tablet or computer are prerequisites for digital participation.

Regarding digital accessibility, Nordic countries are performing well in general, including in the use of computer and mobile technology. In the Digital Economy and Society Index (DESI) 2019 – the ranking which includes indicators on connectivity, human capital, use of Internet services, integration of digital technology and digital public services – Finland, Sweden and Denmark are top performers (DESI, 2019).

However, more in-depth studies show an urban-rural divide in terms of access to fixed broadband. Here rural municipalities are lagging behind compared with their urban counterparts. When the urban-rural divide is taken into consideration, Nordic countries actually perform rather poorly in a European context. Finland, Sweden and Norway all score below the EU average in terms of the gap between rural and urban areas – specifically in re-

lation to access to Next Generation Broadband, where the widest gaps between urban and rural areas are to be found in Sweden and Finland (Randall, Vestergård and Meijer, 2020).

Map 2.1 illustrates the percentage of households without access to fixed broadband at a download speed of 30Mbps in 2018. Basic broadband is often referred to in terms of 30 Mbps, whereas speeds of 30-100 Mbps are referred to as fast broadband, and above 100 Mbps as ultra-fast broadband. The aim of all Nordic countries is to achieve fixed broadband with a download speed of 100 Mbps during the period 2020-2025 (Randall *et al.*, 2020).

To access information, use social media and perform basic services on the Internet, 30 Mbps is usually sufficient for a private individual. However, the advent of the Internet of Things (IoT) – which means more applications, devices and services being connected to the Internet – and with most

Map 2.1. Households without access to fixed broadband at a download speed of 30Mbps in 2018, and average percentage of households within each municipality type.

Table 2.4. Categories and examples of distance-spanning solutions, Nordic Welfare Center (2019).

Category	Examples
Remote treatment	Telemedicine, treatment and advice through online tools and self-treatment.
Remote monitoring	Sensors, cameras, reminders and data collection.
Remote meetings	Meetings, both between health care professionals and between citizens, patients and health care professionals.
New digital solutions	Innovations and new solutions relating to infrastructure for digital services and new service models.

households consist of more than one person and several devices, 100 Mbps is usually recommended. For the provision of advanced health care and hospital care, even higher speeds (such as 5G), and systems with high reliability and redundancy, are undoubtedly required.

Within digitalisation in health care and social care or eHealth, there are many different services and applications in use – including telemedicine, telecare, eHealth, mHealth, telehealth, e-prescriptions, and digital health. Within the *Health care and care through distance-spanning solutions* project of the Nordic Council of Ministers', the term 'distance-spanning solutions' is used to stress the spatial dimension of the digital solutions applied in health care and social care. To offer an overview of different types of distance-spanning-solutions, these may be divided into four categories: remote treatment, remote monitoring, remote meetings, and new digital solutions in health care and social care (Table 2.4). These four categories are an attempt to create a structured overview of different digital solutions on offer. However, several solutions have overlapping features and could be presented under two or more of the specified categories. For example, a solution may contain both a remote meeting, monitoring and treatment at the same time, as well as making use of a new digital solution. Indeed, a fifth category could well be added to this list – namely, digital communication – in order to highlight digital applications supporting the four other categories previously.

2.5 How does digitalisation in health care and social care relate to regional development?

The topic of digitalisation in health care and social care has been widely studied over the past decades. This has resulted in an abundance of research literature from a multitude of perspectives and disciplines – including medicine and nursing studies, engineering and technology studies, and the social sciences (such as management and public administration, sociology, anthropology and organisational studies, as well as economic and human geography) to mention but a few. Research literature on digitalisation in health care and social care is to a large extent framed within studies of medical research of treatment and health effects within different diagnoses, patient experience, and effects of digitalisation on the health care system. However, according to Socialstyrelsen, among others, there appears to be a shortage of more comprehensive and systematic studies (Socialstyrelsen, 2018b).

To break down and clarify how digitalisation in health care and social care relate to regional development, research literature has been explored to uncover what issues and types of regional development effects and potential s previous studies have identified and discussed.

Apart from medical studies on health effects, the potential effects of digital solutions emphasised in literature include increased accessibility to health care and social care services, more efficient use of resources, higher quality of health care and social care services, improved health care outcomes, improved communication and sharing of information, lowered costs and avoided expenditures (Schreiweis et al., 2019). Increased accessibility by the use of distance-spanning digital solutions can also result in reduced travel time

(Blix and Jeansson 2018, Poder *et al.* 2015) and can grant access to specialised health care professionals and thereby add to a higher quality of care especially in rural regions (Kuoskoukis & Botsaris 2017; Blix & Jeansson 2018). In prolongation this can add to increased equality in quality and access to services between urban and rural areas (Poder *et al.* 2015; Molén & Holmner 2016). Other potential effects are empowerment, increased patient satisfaction and higher quality of life (e.g. Koch 2012; Lupton 2013).

That digitalisation in health care and social care has consequences for citizens, patients and for those working in the health care sector is quite understandable, but how does digitalisation in health care and social care influence regional development?

The regional scale is interesting to study for several reasons. Regions and municipalities play a crucial role in economic growth, innovation and attractiveness, as well as contributing to wellbeing through the provision of welfare services. In addition, labour markets and commuting areas usually take shape among the population within a regional scale. However, the disparities may vary a good deal in terms of income, jobs and education, for example. These are all factors influencing health and wellbeing (OECD, Regions and Cities at Glance, 2018).

Regions is an ambiguous concept that most commonly refers to a spatial scale – the territorial unit between the national level and the local level. However, we can also find regions with other spatial scales defined by culture, environmental catchment areas or what are termed ‘economic mega regions’. In this study we focus on regions in the first sense, i.e. at the level under national government administration and above local government administrative level – which in means NUTS 3 level in Sweden, Finland and Norway, and NUTS 2 level in Denmark and for health care regions in Iceland.

The Nordic countries are unitary states with a tradition of strong local government, whereas regional government is generally rather weak. In all these countries there is a regional administrative tier of government at the regional level. However, there are important differences with regard to constitution and responsibilities between countries. In addition, national reforms in several Nordic countries (Denmark, Sweden and Norway) have changed relationships between the different tiers of government. All three countries have

Table 2.5.

Country	Responsible for regional development
Sweden	Region (Regional council)
Norway	Fylkeskommune (Regional council)
Denmark	Region (Regional council)
Finland	Maakunta/Landskapsförbund (Regional council)
Iceland	Kommunförbund (Association of local authorities)

seen mergers into larger regions over the past few decades – most recently in Norway, which underwent substantial reform in 2020. The nature of the changes is different, too. In Sweden and Norway, the regions have been assigned with more responsibilities, whereas in Denmark the role of the regions has been reduced.

Despite the fact that Nordic regions are weak from a constitutional perspective, these areas hold the responsibility for regional development in all Nordic countries. In the self-governing areas of Åland, the Faroe Islands and Greenland, it is national governments which hold this responsibility.

The responsibility for regional development entails a corresponding responsibility for elaboration of a development plan or strategy, which usually covers different dimensions relating to economic, social and environmental development. This comprehensive way of framing regional development also corresponds to the global UN Agenda 2030 Sustainable Development Goals, which contains 17 global goals embracing the three dimensions of economic sustainability, social sustainability and environmental sustainability. We could hence expect to find both regional economic development effects, social development effects and environmental development effects of digitalisation in health care and social care.

Economic regional development effects

As regards economic consequences of digitalisation in health care and social care, the most common points raised in the literature review are time saving potentials, and improvements in accessibility and availability. Scandinavian research suggests cost-saving advantages for implementing a digital health care model for primary care in Sweden (Ekman, 2018). In elderly care, the economic potential of introducing digital services is estimated to make a contribution to savings of up to 50% in Swedish municipalities, with metropolitan areas

having the largest potential for savings (Forzati & Mattson 2014).

Although positive effects are carried forward, there are also studies pointing to increasing costs and a lower quality of care when implementing digital health care, however (Witt Udsen *et al.*, 2017). For example, studies from US show that although patients benefit from increased accessibility and decreased travel time, health care spending was increasing in parallel (Ashwood *et al.*, 2017; Russo *et al.*, 2016).

Despite frequent references to an expectation of economic benefits in implementing digital solutions in health care and social care, Blix & Jeanson (2018) point towards a shortage of comprehensive studies regarding its economic consequences. However, there are several studies following up on barriers with regard to the adoption of eHealth and other digital solutions across the health care sector. In a systematic study of previous research and experience in relation to such barriers, and factors facilitating the adoption of eHealth, Schreiweis *et al.* (2019) found that the most common obstacles were limited exposure to/knowledge of eHealth (e.g. poor digital health literacy), lack of necessary devices, problems with financing eHealth solutions, cognition, security, motivation, accessibility, unsuitable services/ a design not fitting the user's needs, confidentiality, a misfit with organisational structures, missing incentives and added workload. The most common facilitators were ease of use, improved communications, motivation, integration with care, the involvement of all relevant stakeholders, the availability of resources, and user-friendliness (Schreiweis *et al.*, 2019)

Exploring implementation of eHealth among health care professionals in Sweden, Jarva (2019) builds upon the Unified Theory of Acceptance and Use of Technology (UTAUT) model. This includes a number of relevant factors: expectations regarding performance and effort, social influence, and facilitating conditions such as driving forces and gender, age, experience and voluntariness of use influencing both behavioural intention and behaviour-in-use. Jarva (2019) found that despite a significantly high level of digital competence among health care professionals, attitudes towards eHealth still varied. A British study based on the same model showed a strong correlation between voluntariness and expectations of the amount of

effort involved. Voluntariness and social influence also predicted user intentions significantly (Ljubic *et al.*, 2020).

Regarding lessons learned from the implementation of eHealth in primary care in the Netherlands, Swinkels *et al.*, (2018) point to interaction and collaboration between four groups of stakeholders: patients, health care professionals, Small and Medium Enterprises (SMEs), and health care policy makers – all of whom are needed in order to move from single pilot projects into large-scale implementation. One of the conclusions from this study was that motivations and rationales for engagement also vary among those different stakeholder groups. Garman-Johnsen *et al.* (2020) point to how the involvement of employees in co-design processes (for example through enterprise-based social media/web 2.0) could contribute positively to the development of digitalisation in health care services – not least with regard to the Nordic model, where strong participation among employees has contributed positively to enhancing productivity and innovation. A systematic review of health care professionals' capability in digitalisation identified the following key competences: knowledge, digital skills to provide good patient care in combination with social and communication skills and understanding of ethical considerations regarding patient care. Motivation and willingness were identified as important, too, as well as collegiality and access to organisational support (Konttila *et al.*, 2019).

Social regional development effects

The most obvious social development effects and potential at regional level perhaps lies in realised (and anticipated) improvements in health and quality of life. As mentioned earlier, these health effects of eHealth are explored in an abundance of research literature regarding different diagnoses and treatments and will not be explored in further depth here. Although positive effects can be seen for many patients and diagnoses, there are also studies pointing to the need for careful discernment when implementing digital solutions (Greenhalgh *et al.*, 2020).

However, other social aspects can also be found in research literature, such as issues regarding equality and spatial justice highlighted by Poder *et al.* (2015) among others. Poder *et al.* (2015) point towards reduced travel distances, whereby

health care professionals can provide consistent and quality health care services regardless of the geographical location. This is an advantage not least for people living in rural and remote regions. Lupton (2013), on the other hand, has a more critical stance towards the promised beneficial effects of telehealth, especially from a patient point-of-view.

Barriers and enablers in this context are connected to the two overarching themes of connectivity and inclusion (Salemink *et al.*, 2017). Connectivity means access to digital infrastructure, while inclusion means the possession of skills and knowledge to utilise digital solutions and the corresponding ability to participate in digital society and to receive the benefits that digital solutions offer.

The inclusion aspect highlights the fact that even though people are digitally connected, this is not necessarily equivalent to people actually gaining from digital solutions, because they might not know how to interact properly with such solutions. The possession of digital skills and competences is significant for citizens as well as for health care professionals (Konttila *et al.*, 2019). Within the literature, the concept of a digital divide is used in referring to digital inequalities, such as the ones that exist between older and younger people (McDonogh, 2016; Näverlo *et al.*, 2016; Lupton, 2013), as well as between developed and developing countries, urban and rural areas – or, indeed, gender inequalities with regard to digital opportunities (OECD, 2020). We also need to talk about a “double digital divide”, firstly when we find inequalities regarding access to digital infrastructure, and secondly in relation to digital skills specifically.

This aspect of inclusion also relates to patient empowerment, which has been considered a central concern when introducing digital technologies in health care. It means that patients are perceived as moving from passive receivers to active participants in their own care (Lupton, 2013). This involves practices like self-monitoring. It has spurred further debates about the relationship

between patient and provider, the patient's role and responsibility for his or her own treatment, and data ownership (Koch 2012; Erikainen *et al.*, 2019). In order to realise the full potential of digital solutions in health care, it is essential to focus on how actual humans (both providers and users) relate to, and experience, the transition across all three dimensions: utility, usability and social acceptance (Poder *et al.*, 2015).

Connectivity and inclusion are hence important factors in realising potentials of digitalisation in health care and social care. According to the OECD, it is necessary to create digital equal opportunities, widespread digital literacy, and strong digital security (OECD, 2019), and the World Health Organisation refers to the “digital determinants of health” which includes ICT literacy, access to equipment and good broadband access (WHO, 2019).

Environmental regional development effects

In the research literature, environmental effects of eHealth are raised less than other regional development effects. However, environmental effects and potentials are acknowledged as positive when these can increase accessibility and reduce travelling for both patients and health care workers (Poder *et al.*, 2015; Molén & Holmner, 2016; Schreweis *et al.*, 2019).

All-in-all, the effects and potentials of digitalisation in health care and social care emphasised here assist the overall objective of securing a sustainable health care and social care system for those living in Nordic countries, based on the principle of universality and regardless of geographical location. It is important to note that these developments are taking place against the background of an ageing population, a shrinking proportion of the population making up the work force, and an increase in chronic illnesses and multimorbidity – factors which most certainly put pressure on the ability of systems in economic terms, and in terms of securing a high quality of health care for all.

3. Aim, theoretical framework and methods

This study is part of a larger project, “Health care and care with distance-spanning solutions” (Vård och omsorg på distans, VOPD), initiated and funded by the Nordic Council of Ministers. Nordregio is responsible for a work package aimed at exploring how digital solutions in health care and social care impact on regional development.

3.1 Aim of the study and definitions

The aim of this study is to explore how the digitalisation of health care and social care impacts on regional development. Within the Nordregio project, the following three research questions have been posed:

1. What are the regional development effects of implementing digital solutions in health care and social care?
2. What are the obstacles to implementing digital solutions in health care and social care?
3. What are the potentials of implementing digital solutions in health care and social care from a regional development perspective?

Within the Health care and care with distance-spanning solutions project (Vård och omsorg på distans, VOPD) the overall health care sector is included, while elderly care is examined in the social care sector. In a Nordic context social care usually includes also for example child care and care of disabled. In this research we use the term health care and social care. It is however important to bear in mind, that within social care only elderly care has been explored.

3.2 Theoretical framework

At the core of this research is an ongoing process of digital transformation. Digitalisation is, in itself, a transformation which influences, and is influenced by, norms, rules and behaviour. It is also an interactive process which engages both institutions and specific actors. In order to analyse regional development effects, obstacles and the potentials of digitalisation in health care and social care, we

depart from a institutional framework of theory which put institutions at the centre of the analysis.

There are many different definitions of what an institution is (e.g. Hodgson, 2006; Peters, 2005). However, the most common definition is that of economist and Nobel laureate Douglass North: “*Institutions are the rules of the game in a society or, more formally, are those humanly devised constraints that shape human interaction*” (North, 1990, p.3). These rules may both be formal and informal. Theories of institutional theory have similarities with structuration theory, which focuses on structures and the interaction between actors and structures (Giddens, 1984). The convenience of using institutional theory lies in its ability to break institutions down into smaller units, so that those formal and informal rules can be studied. Historical institutionalism is now a common approach when studying a specific phenomenon in time and place. It is also frequently used in studies concerning planning and regional development processes (Healey, 1997).

Whereas some research into institutional theory focuses on the theoretical aspects of what an institution is, or the different kinds of institutions in different fields, other research has chosen to focus on institutional change per se. That is, how does institutional change come about, e.g. changes in formal and informal rules. Also, what are both the drivers and the hindering factors for institutional change? In this context of institutional change, the Williamson (2000) framework highlights institutions at different levels and in different timeframes. This framework, elaborated by Lundgren (2017), can notably be used as a way of understanding and analysing the formal and informal rules which shape behaviour with regard to the digitalisation of services in the health and social sector.

The first institutional level is where we find informal institutions, customs, traditions, norms and rules which are anchored in a culture. These change very slowly, at a pace of around 100 to 1,000 years. At the second level, we find the insti-

Institutional levels		Time frame of change
Level 1: Institutional embeddedness / Culture		100–1,000 years
Level 2: Institutional environment / Government		10–100 years
Level 3: Governance / Policy		1–10 years
Level 4: Resource allocation / Practice		Continuous

Figure 3.1. Institutional framework within which regional development effects take place. Based on Williamson (2000), elaborated by Lundgren (2017).

tutional environment, government structures, and the formal rules of the game, which also change rather slowly, between 10 and 100 years. At the third level, we find governance, policy and the way the game plays out. The pace of change here is between one and ten years. Finally, at the fourth institutional level, we find daily resource allocation, priorities and practices.

In using this framework, we will be able to analyse and understand how mechanisms related to effects of, potentials from and obstacles to digital transformation in health care and social care are framed into different institutional levels and time frames.

3.3 Methods and limitations

The research approach in this study is abductive and reflexive, i.e. allowing theory and empirical observations to interact with a reflexive mindset in order to improve understanding of a phenomenon (Alvesson & Skoldberg, 2009). As set out in the introduction, digitalisation implies a widespread transformation of society which is expected to have significant, wider consequences. In this study we focus on the impact of digitalisation in health care and social care for regional development. In order to respond to the research questions above, we have conducted a series of case studies – one case study in each of the Nordic countries, one in the Faroe Islands and one in Greenland.

Case studies are an established method for conducting explorative studies and for gaining in-depth knowledge about a phenomenon or phenomena (Yin, 2014). All five regions and self-governing territories selected are rural and remote areas – because it is in rural and remote areas that distance-spanning digital technology is expected to have the greatest potential benefit for improving the quality and accessibility of health care services (Nordic Welfare Centre, 2019).

The selection of case study regions and one municipality within each case study region was based on previous knowledge of regions working on the implementation of digital solutions aimed at overcoming large distances. The selection of case study regions was done in dialogue with the steering group for this project. The case study regions all display similarities – i.e. they were all expected to be active in implementing digital distance-spanning solutions, and they were all rural and remote regions. However, these regions also comprise significant differences, because they are all part of different national institutional frameworks which may in turn feature different traditions and norms, different legislation, different forms of governance, and different practices.

In order to investigate the case study regions, both quantitative and qualitative methods have been employed:

- Desk studies of research literature and documentation relating to digitalisation in health care and social care in the different countries and regions.
- Data analysis and analysis of accessibility to health care facilities in the regions studied, and of accessibility to elderly care in the municipalities
- Field-trips and interviews in the case study regions and municipalities. A contact person in each of these regions assisted in identifying interviewees representing senior level management with responsibility for digitalisation in health care and social care, interviewees with an operational perspective (for example a head of division or a project manager responsible for implementing digital solutions), and interviewees representing the health care professions (for example doctors, nurses, home care staff and health care administrators). This study does not include interviews with users or patients – with the exception of Den-

Map 3.1. Case study regions and municipalities.

mark, where a couple of users were interviewed. There is a strong motive for using mixed methods since triangulation and complementary methods would be expected to strengthen the results of the research.

With regard to the complexity of the health care systems, the many actors involved and the reasonably early stage that digitalisation in health care and social care is in, it has not been possible to do a study to quantitatively measure regional development effects, potentials, and obstacles, also arising from the limited time and resources allocated to the project. Research literature gives us a hand in discussing to what extent data can be

found to conduct such an analysis across all countries (Blix & Jeanson, 2018; Vårdanalys, 2017).

However, by using triangulation and including research literature, documentation, field studies and interviews in case study regions, and also by analysing data concerning the accessibility of health care services, we are able qualitatively to assess and discuss regional development effects, potentials and obstacles to digitalisation in health care and social care from a regional development perspective.

In the conclusions of this study, we will also be able to point to specific research gaps and the potential for future research.

4. Digital health care and social care: Case studies

Source. Ágúst Bogason

4.1 Digital health care and social care in Sogn of Fjordane, Norway

Authors: Louise Ormstrup Vestergård
and Anna Lundgren

For the Norwegian case study, the region of Sogn og Fjordane and Luster municipality were selected. In total, 18 interviews and group interviews were conducted, involving a total of 26 people.

Total population 2019	109,774
Population change 2009-2019	3.1%
Life expectancy at birth	Females 84.7 Males 80.6

Public sector share of gross value added 2018*

Number of hospital beds per 100,000 in 2017*

Household access to fixed broadband at 100 Mbps*	65%
Passenger cars per 1.000 inhabitants*	483

*Sources: ¹NSI, ²National telecom agencies, ³OECD

The health care and social care system in Norway

The Norwegian health system has been described as semi-decentralised (Saunes, Karanikolos & Sagan, 2020). The responsibility for health care and social care is divided between the state, the regional health authorities and municipalities. The county's role in providing health care is limited.

The Ministry of Health is responsible for regulation and supervision of the health care system, and it constitutes the political decision-making body. Responsibility for secondary health care services is located at state level and is organised in four regional health authorities (RHA) under the aegis of the Ministry of Health. Secondary care includes hospitals, mental health care, rehabilitation, and substance abuse treatment. The four RHAs are Northern Norway RHA, Central Norway RHA, Western Norway RHA, and South-Eastern Norway RHA. Each of the four RHAs are further organised into local health authorities. Beside specialised care, the RHAs are also responsible for conducting research, contributing to the education of health care professionals, and the education of patients and relatives. The RHAs are financed by the state through block grants and activity-based funding. Alongside these financial mechanisms, RHAs receive instructions regarding activities and the quality of services provided (Saunes, Karanikolos & Sagan, 2020).

The municipalities are, in turn, responsible for primary care and social services (Saunes, Karanikolos & Sagan, 2020). Primary care includes general practitioners, nursing homes and home care services, plus various other services which are provided locally over a longer period, including rehabilitation and after-hours emergency services. At a municipal level, the number of private health care actors is significant, since many general practitioners are private but nevertheless enrolled within the public system through contracts with municipalities. The municipal part of the health care and social care system is primarily financed through local taxes and block grants from the state (Vårdanalys, 2017).

Description of the Norwegian cases: the region of Sogn og Fjordane and Luster municipality¹

The Sogn og Fjordane region is located in western Norway. The regional landscape is characterised by mountains, agricultural land and fjords – the main ones being Sognefjorden (the longest in Europe), Førdefjorden and Nordfjorden. In terms of population, Sogn og Fjordane is – with 109 774 inhabitants – the second smallest region in Norway, and no larger cities are located within the region. Sogn og Fjordane covers 26 municipalities in total.

The health authority responsible for health care in Sogn og Fjordane is Helse Førde, which belongs to the regional health authority of Western Norway. Helse Førde runs hospitals in the region and has its headquarters at the central hospital in Førde. Besides the central hospital, there are two local hospitals in the region, Nordfjord sjukehus and Lærdal sjukehus, and also two local psychiatric hospitals. A part of the central hospital is still under reconstruction, and incorporation of digital solutions is an essential part of plans for new hospital buildings.

Luster municipality is the largest one in the region in terms of land coverage, and is home to 5,195 inhabitants. In the local centre, Gaupne, the municipality's only general practitioner's office is located. This also delivers emergency medical care outside office hours. Three care centres are responsible for home care services and for nursing homes in Luster municipality.

Sogn og Fjordane has an ageing population and has an old-age dependency ratio, i.e. the number of people aged 65+ as a share of the working age population (15-64 year), which is higher than the Norwegian average. In Sogn og Fjordane the old-age dependency ratio is 31.9 %, compared with the Norwegian average of 26.4%. In Luster it is even a little higher (33.8%). In addition, the share of the population aged 80 years+ is higher in Sogn og Fjordane (8.8%) and Luster (9.9%) than the national average (6.5%).

An ageing population, more people suffering from chronic illnesses, and recruitment challenges

1 Sogn og Fjordane merged with the region of Hordaland to form the new region Vestland in January 2020, as part of regional reform across Norway. The new region of Vestland consists of 43 municipalities and is the fifth largest in Norway. Our study was conducted prior to the merger, which is why the following description concerns what was previously the region of Sogn og Fjordane.

combined with great distances and sparsely populated areas: these are the central challenges the region and its municipalities are facing in regard to health care and social care. There is therefore a need to find new and innovative ways to deliver and manage these services. Findings from the study show that the solutions for these challenges are closely linked to the implementation of digital solutions spanning all the way from emergency out-patient care to specialised health care and home care services.

Likewise, the national eHealth strategy for the period 2017–2022 emphasises the importance of eHealth solutions to secure a sustainable health care and social care sector that delivers high quality services (Direktoratet for e-helse, 2019). Better cross-sectoral collaboration and focus on change management are also stressed in order to reap the full potential benefits of digital solutions and create a coherent, patient-centred health system. Collaboration between the health authority, municipalities, external actors, and user organisations is a central focus of concern in Sogn og Fjordane,

for the purposes of developing and securing holistic, well-coordinated services. This is a process led by an appointed collaboration leader, based on the region's collaboration strategy from 2013.

Increased national steering and coordination of implementation are emphasised in the eHealth strategy. To support Norwegian municipalities in implementing digital solutions for care, the national Welfare Technology Programme was initiated in 2013 (see Box 4.1). A central objective of this programme has been to help more elderly people stay longer in their own home. In 2017, Luster municipality joined the programme and has since worked with several of the digital solutions recommended. The solutions include digital safety alarms, passive warning systems, and electronic medical dispensers. Since 2019, all municipalities in the region have participated in the programme. On a national level this has shown good results and has proved to be a positive support measure for municipalities in the complex and time-consuming process of implementing digital solutions. Interestingly, an evaluation of the programme found, among other things,

Box 4.1. National Welfare Technology Programme

Based on lessons learned from 31 pilot municipalities, a step-by-step guide to service innovation has been developed. The purpose of this guide is to help municipal project managers drive successful implementation. The guide assists with structuring the process from the stage of mapping the municipality's needs all the way through to the integration of the

technology into daily practice (KS, Direktoratet for e-helse and Helsedirektoratet, 2019). The programme is a collaboration between the Directorate of Health, the Directorate for eHealth, and the Norwegian Association of Local and Regional Authorities. Around 340 of 422 municipalities participate in the programme, which is due to finish in 2020.

Figure 1: The five phases of successful implementation of a welfare technology application from the step-by-step guide. The size of the circles indicates how much time to spend on the task, and the white diamonds indicate important decision-making moments. The three boxes at the bottom must be integrated through the entire process. Source: KS et al., 2019.

that municipalities vary in the degree to which they are aware of the actual benefits gained (Breivik, Rotvold & Boysen, 2019).

Examples of distance-spanning technologies in Sogn og Fjordane and Luster municipality

Remote treatment

Video consultations in dermatology

The dermatological field is a pioneer in digital treatment in the region, and video consultations are now commonly used. In several locations across the region, patients can receive dermatological treatment through a video connection to a dermatologist at the central hospital in Førde, or alternatively a dermatologist who works from another part of the country.

Telephone consultations in mental health care

In mental health care, approximately 20% of all consultations are conducted by telephone. Recently video consultations were put into operation, but current experience in Helse Førde is that patients with mental health problems prefer telephone consultations.

Remote emergency services

In a new pilot project, remote emergency doctors' offices in areas far away from the closest emergency provision will be tested. Emergency offices are installed at existing staffed care facilities, such as nursing homes, where the health care staff will be trained to examine patients with the equipment installed, while having a doctor connected via video. The nurse works as the doctor's prolonged 'arm', and based on the outcome of the examination, the doctor will then plan the next steps for the patient.

Remote monitoring

Digital safety alarms

Safety alarms are used in institutions and private homes. Citizens can press the alarm button when in need of help. The alarm is connected to a shared municipal emergency operation centre located in the city of Florø, which will contact the citizen (or a designated contact person connected to the alarm) directly when they receive a notification. The alarm can be connected to several different contact points (for example home care services), and also to relatives or neighbours. If, for example, a neighbour who is registered as number one on

the contact list does not respond, the next person on the contact list will be contacted, and so on.

Passive warning systems

Passive warning systems which provide digital supervision of patients are increasingly used in home-based and institutionally-based care across the municipalities. These passive warning systems consist of one or more sensors, which inform care services if an accident or other non-regular activity has taken place. One example is door sensors. These will inform care services if a person leaves their home or room during the night. Sensors can also react to movement, a fall, or being absent from a bed, for example.

Location technology

Some nursing homes in Luster municipality have implemented so-called "location technology", in the shape of GPS (Global Positioning Satellite) watches worn by the users. The GPS watch makes it possible for users, especially patients with cognitive disorders, to go for a walk on their own. However, if they walk too far away, an alarm will notify the monitor, who can then see where that person is. The GPS monitor can call the watch and talk to the user and determine if they are lost or in distress.

Electronic medicine dispensers

Electronic medicine dispensers are placed in a citizen's home, and will notify them with sound and lights when it is time to take their medicine. The precise dose of medicine is provided by the dispenser. If the person concerned has not taken the medicine from the dispenser after a certain amount of time, home care services will receive a notification.

Remote meetings

Video connection from ambulances

A new project which is about to be implemented across the region involves installing video cameras on the helmets of ambulance staff, providing a direct connection to the hospital. Through live video recordings, the ambulance staff can then receive direct support from doctors at the hospital.

Internal meetings

Remote meeting systems are frequently used by many parts of the health care system in Sogn og Fjordane. This makes it possible for health care professionals in different geographical locations to be connected easily. Remote meetings are used by the ambulance staff so that all ambulance stations are connected to one joint virtual conference room, for example. Dermatology departments also make use of digital meetings to connect with other departments.

New solutions in health care and social care

App for lung patients: Pust – deg – betre (Breathe for health)

A mobile application called 'Pust – deg – betre' has been developed by a local physiotherapist at the central hospital. This application targets lung patients with the purpose of supporting the patient in between hospital treatments. The app has two central functions. First, it works as a support tool, so that the patient can see a demonstration of recommended training techniques. Second, physiotherapists can set up an individually tailored training programme for the patient.

Digital communication

Digital communication takes place between the patient and the health care services, within the health care organisation, as well as between different parts of the health care and social care system. For example, hospitals may send electronic letters to patients about appointments, sometimes with a digital form attached so that the patient can fill it in and send it back to the hospital ahead of the consultation. SMS warnings are used to remind patients about upcoming appointments. In home care services, all employees have a smart phone on which all relevant information is accessible – such as the schedule for the day, messages from the general practitioner, the patient's journal, and updated medicine lists. They can also enter material directly into the journal, such as test results or other information.

Helsenorge: a national online platform

Easy communication and interaction between citizens and the health care and social care system is a central concern in relation to the continuous development of Helsenorge's online platform. At Helsenorge, patients can find evidence-based health information and go into a self-service plat-

App for lung patients. Source: Helse Førde, <https://helse-forde.no/nyhende/stifting-stottar-prosjekt-for-a-hjelpe-lungesjuke>.

form in order to conduct health care related actions, such as changing general practitioner or receiving compensation for their care-related travel. On the personal page, patients also have access to their patient journal. The Directorate of Health has the overall responsibility for this platform.

Challenges experienced in implementing digital solutions: Regional and municipal findings

Technology-related challenges

In primary as well as specialised care, a lack of interoperability between the electronic systems applied in different sectors is one perceived challenge. As a result of this lack of interoperability, information cannot be shared satisfactorily between different sectors involved in health care and social care. This increases the risk that vital patient information may be lost in transition. Some interviewees are demanding a national, holistic solution which ensures that all health care actors can communicate with each other at any time.

Reported challenges also include concerns about patient data protection and confidentiality. Many uncertainties remain in relation to the protection of patient data, and these are seen to have delayed the digitalisation process overall. In addition, systems that continuously need to be updated are considered a hindering factor. Some interviewees referred to this as 'the Java problem'. Late involvement of the IT department in previous projects also meant that important factors involved in implementation had been bypassed or neglected. This caused a significant amount of

extra work. Finally, there was uncertainty among practitioners about the full potential of the digital technologies available, and what data can be shared and used (e.g. health-related data collected privately from citizens by applications from private suppliers).

Enabling factors for meeting technology-related challenges include, among others, paying attention to the user-friendliness of technical solutions. Technical solutions need to be easy and intuitive to interact with for patients, relatives, and health care professionals alike. If the technologies involved are too complicated, or if they do not work satisfactorily from the start, interviewees said that in their experience people will not use and integrate these solutions, but instead will continue with their previous routines and practices. In addition, they stressed the need to provide a common access point for receiving help and guidance with the technology. In this regard, it is important to be aware that digitalisation is a process in which two sectors with very different backgrounds will need to communicate effectively: that is, IT and health care. Difficulties can arise here, because these two sectors use different professional languages. What is obvious and self-evident for an IT consultant will most likely not be obvious to a health care professional, and vice versa.

Though digital literacy is often presented as an age-related issue, and therefore expected to disappear with older generations who are not so accustomed to digital solutions in everyday life, such literacy is not the same as knowing all the technical language. Even though, in general, the younger generations find digital solutions more intuitive to manage and relate to, they do not necessarily possess the technological background and know-how about how different digital solutions function. A focus on communication between IT professionals and health care professionals will therefore continue to be an important matter to attend to.

Internal organisational and cultural challenges

Getting digital solutions anchored in daily practice and the mind-sets of practitioners

Anchoring digital solutions in daily practice and making health care professionals accept and integrate digital solutions as a natural part of providing health care and social care is perceived as a central challenge in primary care, as well as in specialised health care. Most digital technologies

imply a very different way of providing and delivering care. Therefore, a shift in the mindset of health care professionals is needed with regard to what "good care" entails. The case study suggests that creating an understanding that good care can also be delivered with digital solutions is a challenging process. The introduction of digital solutions in health care and social care demand that people work and think in what is, for some, a completely different way. Likewise, it demands a change in the working culture embedded in the health care system and in the everyday running of the organisation.

Hindering factors experienced in Sogn og Fjordane are, among others, the fact that some care workers do not fully trust the technologies involved and are worried that the quality of care will worsen when direct patient contact is diminished. A few also perceive digital solutions as competing with jobs.

An enabling factor highlighted in our interviews is the integration of digitalisation within the educational system. This makes digitalisation a natural part of what it means to provide and deliver health care and social care. During the course of their education, students become socialised within a certain tradition and working culture, with its inherited norms and customs. If digitalisation is not integrated at this point, there is a risk that it will continue to be seen as an alienating aspect within the health care system, rather than as a useful tool. A telling example from the hospital in Førde concerns their experience of students being surprised about how much (and how complex) the technology involved in health care and social care work at a hospital actually is.

Competence deficiency among health care and social care professionals

Closely related to the challenging process of anchoring digital technologies in daily practice is the challenge of competence deficiency among health care professionals responsible for integrating and managing digital solutions. A barrier to increased competences and knowledge among staff is finding time in an organisation that runs 24/7 and is already under a considerable burden. Each time a new system is implemented or a new technology introduced, people need to be educated and informed about how it all works. On top of that, the organisation will be facing many changes, and some of the health care professionals involved will

Box 4.2. Course in welfare technology: 'The Welfare Technology ABC'

In the municipalities throughout Sogn og Fjordane, care workers can attend a multidisciplinary training course in welfare technology called 'The Welfare Technology ABC'.

The objective of this course is to provide an understanding of the challenges the health care system and social care is facing, why change needs to happen, and what role care workers have in the digital transition. By September 2019, around 480 employees across the region had attended the course, and around 80 people were listed for the following course – which would be the fifth time the course had been held. The course is offered by the inter-municipal Development Centre for Nursing and

Home Services, and the educational material is developed within the national welfare programme. The interviewees reported good effects from the course, because it creates an understanding of the nature and function of the transition among the frontline workers. It also demystifies digitalisation and digital solutions, spurring an interest in how these solutions can benefit their own patients and citizens.

lack the motivation to become properly acquainted with a new system, as this will represent time taken away from their interaction with patients.

However, the enabling factor highlighted is, in fact, educating and informing health care and social care workers about the reasons behind digitalisation, and providing them with the necessary knowledge and tools to participate meaningfully in the process. To get the frontline health care and social care workers on board, it needs to be emphasised in municipal care work, for example (see Box 4.2). Frontline care workers are those who are most familiar with their patients and users. They possess in-depth knowledge about their situation, health status and development. Part of realising the potential of new technologies is also to provide care workers with the right tools for including such technologies within their daily practice.

A lack of human resources to lead the development process

It is a challenge to find human resources in small, rural municipalities for leading the innovation process. Interviewees reported that national guidelines on the implementation of digital technologies have been based on experiences from urban settings. The guidelines are therefore difficult to follow in a rural context, where they do not have the

resources to allocate a person in each municipality to work with digitalisation, for example. The Development Centre for Nursing and Home Services plays a vital role here. The development centre is a national initiative in which each region has its own development centre with the objective of helping municipalities in the region to increase the quality of care services. The national welfare technology programme is anchored at the centre, with an employee from Luster municipality appointed as project leader for the entire region.

Economic challenges

Economy-related challenges or barriers were also identified in relation to digitalisation. In the health care system, doctors are paid per consultation. However, this does not apply to video consultations or other types of digital consultation. Within mental care, e-consultations are paid, so doctors get remunerated per consultation conducted over the telephone. The fact that video consultations do not have the same status in the economic system is considered a hindering factor, because it lowers the incentive for the authorities involved to develop services and implement e-consultations. By extension, the question of how to structure the charging system for e-consultations was raised. For example, when a general practitioner and a

doctor from specialised health care both participate in a video consultation, how should the payment be divided between them?

Technological equipment is often expensive. For a rural region such as Sogn og Fjordane there is a lack of critical mass. Therefore new equipment is a large investment. That is certainly a hindering factor for the implementation of digital solutions. Plans to create a shared municipal centre are already underway in the region. The idea here is that the centre buys a larger quantity of technologies (e.g. electronic medicine dispensers) which the municipalities can then lease. As such, there is no need for each single municipality to invest in each technology itself.

Internet access and patient resistance not considered challenges

Perhaps surprisingly, interviewees at regional and municipal level did not raise broadband connection and Internet access as a significant hindering factor for the implementation of digital solutions in Sogn og Fjordane. Neither was resistance from patients highlighted. On the contrary, several interviewees stressed that patients are pushing for digital solutions in the health care system, as for example with the possibility of sending photos or emails to doctors. While other sectors in the society, such as the financial sector, have managed to digitalize, the health care system is still lagging behind – something which patients find strange. One nurse interviewed used a telling example in describing the digital preparedness of patients: “They [the patients] don’t bring their toothbrush [to the hospital], but they do all bring their telephone”.

Effects and potentials

To drive the development of digital solutions in health care and social care, and to reap their potential benefits, different perspectives were highlighted. These included the importance of user-friendliness for digital solutions, as well as a recognition that such solutions must never become a goal in and of themselves. Instead, digital tools are to be considered supplementary, enabling health care and social care services to provide the best possible treatment for all patients and citizens. This requires further exploration concerning what needs to be done at a physical (face-to-face) meeting, and what can be done at a distance

via digital solutions. Another observation made by interviewees is that health care professionals need to see the clear benefits for their patients in relation to their core task (the delivery of health care or social care). Economic incentives are not considered the primary motivational factor for health care professionals. On the other hand, economic perspectives are naturally considered a significant driver at management level. Attention as to how to approach and find positive arguments for different audiences is therefore required.

Implementing digital solutions is a complex and time-consuming process which requires leaders at different levels to possess the right competences, to lead the change, and to be motivated to do so. They also need to understand the importance of the task. Besides good leadership, one driver for development involves show-casing good examples and letting passionate frontrunners test and develop the solutions.

Reduced transportation

With great distances to cover, and large sparsely populated areas, one of the central positive impacts emphasised for digital solution is less transportation. Health care professionals, patients and relatives can all reduce the time they spend on travelling across large distances. Patients will need to travel less as they receive treatment and enter in dialogue with the health care and social care system in new ways. This is one effect that is especially relevant for patients with chronic illnesses, and who have many appointments at the hospital in the region. Saving time and enjoying a better quality of life when long travel times are cut is a core benefit for patients.

Digital solutions also mean less transportation for care workers operating in municipal home care services. Digital supervision and electronic medicine dispensers, for example, can result in fewer unnecessary visits to people living far away from service centres. Health care and social care workers can also reduce travel time for attending meetings through the introduction of digital solutions which allow for remote meetings. Remote emergency clinics also have the potential to make better judgements for patients, and in that way help to make more informed decisions about next steps – including whether it is necessary to bring the patient to the hospital by ambulance. This may result in fewer unnecessary ambulance journeys,

since doctors have the opportunity to see the patient via video, and have a nurse to carry out different tests and measurements on the patient.

Increased access to health care

In Sogn og Fjordane, remote treatment through video consultations, for example, can help with a situation where there is a shortage of specialists. Specialised health care that only exists physically in one place in the region, or perhaps only in a few places across the country, can now be reached through tailored digital solutions. One effect of this is increasing access to both specialised and highly specialised medical care, resulting in more equal access to health care overall. Informants saw many potential benefits in accessing specialised knowledge from a number of fields other than the few currently in place.

New digital solutions in health care (like the 'pust – deg – betre' application, which provides specialised rehabilitation techniques) is a way to diffuse knowledge among doctors in rural areas: those who are otherwise seldom confronted with the rarer conditions. In that way the application serves multiple purposes, providing better support for patients in rehabilitation as well as being a support tool for doctors faced with illnesses they do not often see. In summary, digital solutions create a variety of opportunities for providing more equal access to health care.

Increased quality of care

Internally within the health care system, remote meetings can facilitate closer and easier collaboration between health care professionals, as well as serving as a conduit through which to share knowledge, opinions and experiences. Remote meetings and video consultations can also function as quality assurance between colleagues across different locations.

Digital solutions can also have derived health effects. For example, digital supervision can allow citizens not to be disturbed during the night, enabling people to have an uninterrupted night's sleep. And those with electronic medical dispensers will receive medicine at the same time each day, which will improve the effects of the medicine. Another example is location technology that can give people the opportunity and freedom to go for a walk – something with positive outcomes for both health and mental wellbeing.

Avoided expenditures

The implementation of digital solutions has the potential to avoid a range of expenditures on a short-term as well as a long-term basis. Interviewees from the local health authority, Helse Førde, emphasised that economic gains can be extensive in the short term, including a decrease in spending on patient transportation, for instance. They refer to a rough estimate indicating that approximately NOK 10 million can be saved if just 20% of consultations are conducted by telephone or video instead of physically. Interviewees from Luster municipality believed that a positive economic impact was to be expected for small municipalities in the long-term perspective. As an example, while home care services in urban municipalities which have a large night-time staff may be able to reduce the number of people on shift directly, by introducing digital supervision, that would not be possible in a home care service such as Luster, where the night-time shift cannot be reduced further without impacting the quality of care. However, there can be significant economic gains in the long term on the basis of identifying expenditures which can be eliminated. Digital supervision can allow citizens to stay longer in their own homes, so that it is possible to postpone the need to move to a nursing home, for example. This can be economically significant, because institutionalised care is expensive. In addition, staying at home can also create benefits for citizens, since the majority prefer to stay in their own home, according to interviewees. Another aspect of the introduction of digital supervision is that although citizens might be well enough to continue living alone in their own homes, they might live too far away from home care services, who do not have the capacity to drive the distance for conducting the visits. As a result, that person will need to move to an institution. With digital supervision, this scenario can be avoided.

Other examples where digital solutions can lower costs include the use of digital communication with patients via electronic letters and text messages. The main hospital reported a positive effect from SMS warnings to patients, because these have resulted in fewer no-shows for scheduled appointments. Another aspect is reduced costs on paper and postage. Avoiding unnecessary hospitalisation is considered another potential positive effect of digital solutions, enabling significant economic gains in the shape of avoided ex-

penditure as result. Finally, Helse Førde found that the most significant economic effect overall was decreased expenditures for patient transportation.

Increased quality of life for patients and relatives

Though economic effects are expected in a long-term perspective, Luster municipality emphasised the short term impact on wellbeing too. This came from increased freedom and safety for those receiving home care, and their relatives. Safety for elderly and fragile citizens is frequently emphasised as a core impact of digital solutions. Citizens who live at home, as well as their relatives, can both enjoy increased feelings of safety, because they know home care services will receive notice in case of an emergency. For instance, if someone with dementia leaves the home in the middle of the night, the emergency office will be notified through its passive warning systems. Or if a frail, elderly person who lives at home alone falls, the safety alarm can be used. Factors such as increased safety, flexibility and freedom can evidently contribute to increased quality of life overall.

Potential negative effects of digital solutions

While many positive effects are experienced or anticipated through the use of digital solutions, some potential negative effects of such implementation are raised. One such negative impact might be increased seclusion and loneliness for people who live at home because physical visits will decrease. Many interviewees in Sogn og Fjordane emphasised that technology and telemedicine is not for everyone or for every condition. Each patient's situation must be individually assessed, in order to determine if the use of a digital solution is the best way of moving forward with their treatment. For some patients, a visit from the home care services also has a beneficial mental and social care dimension, so that a patient's wellbeing can be directly connected to physical visits. For other patients, it will be a relief to have fewer daily home care visits. One potential opportunity is that time can be released for care, and also for health care professionals to spend time on those patients who need it most. The fact that development and imple-

mentation take place simultaneously and are developed by both top-down and bottom-up mechanisms, is positive and challenging at the same time. Solutions being implemented in one medical area or in one department create a situation where the risk is of them not being integrated, adding to the proliferation of a fragmented system.

Though many interviewees stressed that digital solutions should be a supplement to, and not a substitute for, physical meetings, a particular fear was expressed that smaller health facilities might be closed in rural areas.

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4.2 Digital health care and social care in South Karelia, Finland

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For our Finnish case study, the city of Lappeenranta in the region of South Karelia (Etelä-Karjala) was visited in January 2020. *South Karelia Social and Health Care District* (Eksote) provides health care services (including dental care), family and social welfare services, and services for senior citizens in all municipalities across the region. While there have been attempts to centralise provision of health care and social welfare services at the regional level in Finland since 2007, it has been difficult to reach consensus on implementation of a major reform that would improve effectiveness and accessibility of the Finnish health care system (OECD/European Observatory on Health Systems and Policies, 2019). Hence, Eksote became the first hospital district in Finland in which both health care and social welfare services are provided in a centralised manner at the regional level. During the field visit in Eksote, 12 interviews were conducted in total, while there were two interviewees present during one of the interviews.

Total population 2019* ₁	128,756
Population change 2009–2019* ₁	–3.66%
Life expectancy at birth* ₁	Females 83.8 Males 77.9

Public sector share of gross value added 2018*₁

Household access to fixed broadband at 100 Mbps* ₂	53%
Passenger cars per 1.000 inhabitants* ₃	673

*Sources: ₁NSI, ₂National telecom agencies, ₃OECD

The health care and social care system in Finland

The Finnish health system has been described as complex, decentralised, and multi-layered (OECD/ European Observatory on Health Systems and Policies, 2019). At the national level, the Ministry of Social Affairs and Health is responsible for defining general social and health policy, preparing major reforms and legislation, and steering implementation of new legislation. The Government is responsible for deciding on national priorities and proposing bills in Parliament. Both municipal and private health care providers are guided and supervised by the social and health departments of five provincial state offices, which also promote the national and regional objectives of the central state administration (Keskimäki *et al.*, 2019).

The type of Finnish health care receiving public funding can be divided into three systems, all of which are quite different with regard to what services are offered, waiting times, and user costs. These systems are municipal health care, private health care, and occupational health care. While municipal health care is funded by taxes, both private health care and occupational health care are partly funded by National Health Insurance. The statutory National Health Insurance scheme is run by the Social Insurance Institution, which is a government agency that operates under the supervision of Parliament. The scheme covers all Finnish residents, and its funding is mainly based on the state budget and compulsory insurance fees paid by those insured and by employees (Keskimäki *et al.*, 2019).

Specialist level care is organised and provided by 20 hospital districts, which mainly follow the regional administrative borders of Finland – though there are some exceptions. It is obligatory for each municipality to be a member of one hospital district, and the member municipalities are responsible for managing and funding their hospital district (Keskimäki *et al.*, 2019). In seven hospital districts, however, one organisation is responsible, as a municipal federation, for providing all social welfare and health care in all member municipalities. The hospital districts of Kainuu, Kymenlaakso, North Karelia, North Ostrobothnia, Päijät-Häme, South Karelia and South Savo function as such municipal federations (Rissanen, 2019). There is a central hospital in every hospital district, and five of these hospitals are university-level teaching hospitals. They are located in Helsinki, Tampere,

Turku, Kuopio, and Oulu. Twelve central hospitals, including the university-level teaching hospitals, provide extensive on-call services. In some hospital districts, there are also other hospitals, in addition to the central one (Keskimäki *et al.*, 2019).

Municipalities are responsible for maintaining health centres and providing primary health care services. These services include outpatient visits to physicians, nurses, public health nurses, midwives, physiotherapists, and psychologists. A large number of these health centres also have in-patient wards. In addition, municipalities are responsible for providing oral health care. Health centres can be maintained by municipalities independently, or else jointly – by federations of neighbouring municipalities. When it comes to larger cities, health centre services are typically provided by a network of health stations, which are located in different parts of the city. It is also possible for municipalities to purchase some of their primary or specialised health care services from private providers, other municipalities, other hospital districts, or the third sector (Keskimäki *et al.*, 2019).

All employers are responsible for providing preventive occupational health care for their employees, by offering the services themselves or jointly with other employers. Employers can also purchase occupational health care services from another employer, and from municipal health centres, private providers, or other sources. In addition to compulsory occupational health care, most employees receive other medical services, which are voluntarily provided by employers. Some large- and medium-sized employers, for instance, even provide curative outpatient services for their employees (Keskimäki *et al.*, 2019).

The Government of Åland provides all health care services in the autonomous region of Åland, while some services are purchased from Finland or Sweden. Åland is not counted as a hospital district in itself (Keskimäki *et al.*, 2019).

Strategies: national and regional level

Being a part of a broader social and health policy strategy called *Socially Sustainable Finland 2020*, the *eHealth and eSocial Strategy 2020* was completed by the Ministry of Social Affairs and Health in cooperation with a large number of stakeholders. It is emphasised within the strategy that social welfare and health care services need to be client-centred and equally accessible to every citizen. Strategic measures include the implementa-

tion of a national level platform (and other online services) to support citizens' own ability to manage their personal information and to look after their own health and wellbeing. They also comprehend implementation of supportive tools and training for professionals whose working environment is increasingly multi-professional and interactive, the implementation of uniform legislation on the processing of information related to social welfare and health care services, and expansion of national online *Kanta* services to include information on citizens' use of social welfare and health care services in an integrated manner (Ministry of Social Affairs and Health, 2019).

The digitalisation programme is one of four focus areas in Eksote's draft strategy document for the period 2019–2023. The goal of the digitalisation programme is to increase productivity by 0.25% per year. The measures taken to achieve this target include expansion of Eksote's electronic appointment-booking services, the large-scale introduction of the *OmaOlo* tool (which customers can use to evaluate their need of treatment), the use of robotics to create invitation letters for booking appointments, and video-based visits. In general, digital distance-spanning technologies are seen as an integrated feature of Eksote's service production. Additional measures include the expansion of back office services for professionals, the development of customer relationship management to identify customers who use many services, the use of Artificial Intelligence (AI), and the expansion of mobile services to enable mobile working (Eksote, 2019).

Description of the Finnish case: the region of South Karelia

South Karelia is a region located in south-eastern Finland. This region is characterised by the southern shores of Saimaa – which is the biggest lake in Finland, and the fourth largest natural freshwater lake in Europe. In terms of population South Karelia is – with 128,756 inhabitants – the fourth smallest region in Finland, after Åland, Central Ostrobothnia and Kainuu. The region's largest city is Lappeenranta, with 72,699 inhabitants. South Karelia consists of nine municipalities.

The old-age dependency ratio, i.e. the older (65+) as a share of the working age population (15–64 year), is higher in South Karelia (44.9%) than the Finnish average (35.1%). In Lappeenranta (37.3%) this ratio is lower, although still higher than

the Finnish average. The portion of the population 80-years-of-age or over is also higher in South Karelia (12.1%) and Lappeenranta (9.7%), compared with the national average (8.8%). The employment rate for South Karelia (69.7%) and Lappeenranta (69.3%) was lower than the national average (71.7%) in 2018. Similarly, the unemployment rate was higher in South Karelia (10.1%) and Lappeenranta (10.0%) than the national average (7.4%). Life expectancy was lower in South Karelia than for the Finnish average in the period 2016 to 2018: 77.9 years for men and 83.8 years for women, compared to Finnish average of 78.7 years for men and 84.2 years for women.

Since the region of South Karelia is quite small, with a decreasing and ageing population, local decision-makers understood early on that demographic change would make it challenging to provide health care services across the hospital district. The main driving force behind early discussions about possible future solutions was the urge to organise health care and social welfare services in a reasonable manner for residents of the region, by focusing on a customer's perspective. The initiative to create a new hospital district providing both social welfare and health care services (including primary and specialised care) in an integrated manner across the region was approved in 2010. Eksote started to function at the beginning of 2010, but its first employees had already begun to work in 2008 when the initial decision was made. By transferring the municipalities' responsibility to provide health care and social welfare to the region, Eksote became a pioneer in Finland as far as social welfare and health care reform is concerned. These reforms have been discussed at national level in Finland for over a decade, and are still in the process of implementation. In Eksote, the first step was to create a common patient record system that could retrieve information in an integrated manner from two sources – secondary care and specialised hospital care – in order to provide a more holistic overview for the care provider.

Reform in the region of South Karelia has been quite successful in economic terms. Smaller, remote municipalities have been content with maintained services, and larger cities have been satisfied because costs are still fairly small. Overall, the reform process has resulted in better access to care, improved quality, and increased equality between the municipalities. Today, for instance, there are ambulance services present in every municipality.

There are also some ongoing challenges, such as the negative economic situation over recent years, resulting from an ageing population and municipal cuts. It is particularly difficult to maintain a central hospital providing extensive on-call services for specialist care in a region which has fewer than 500,000 inhabitants. It has also been difficult to employ physicians in Eksote – mainly in smaller municipalities, but even in Lappeenranta.

Eksote has also been a forerunner in Finland when it comes to the process of digitalising health care and social care services. As a result, Eksote has been rewarded and visited by national and international groups who want to learn of how to use digital solutions effectively in health care. Eksote also cooperates with some hospital districts, such as Päijät-Häme, and there are increasing connections with the Scandinavian countries, too. There have been some discussions on possible co-operation with Russia, but in some previous projects the experience was that Eksote did not really gain any tangible benefits. Eksote was also one of the first hospital districts in Finland which allowed nurses to renew prescriptions, rather than doctors.

Distance-spanning technologies in health care and social care in South Karelia

Remote treatment

Video consultations

Within elderly care, an increasing proportion of home care visits are now carried out using a video connection. The proportion of video calls among all home care visits is 8% today, and the target is to get to around 10% by the end of 2020 and 15% in a few years' time. There are 1,600 regular home care customers in Eksote, and video calls are now used for 320 of them. In addition, there are 400-600 customers who receive home care over a limited period. The use of video calls started to grow in a systematic manner in 2017, even though they have been in use to some extent since the establishment of Eksote. The video solution includes a fixed camera (one that does not move) and a tablet with an integrated camera which sits on the customer's table. The customer does not need to operate the device in any manner when the video connection is being used. There are four to five remote call employees working during any one shift, and one employee normally does 40 remote calls per shift. The remote call service is used for normal tasks that are done during home visits, such as taking insulin and other medication, measuring

A home care nurse carrying out home care visits by using a video connection. Source: Gustaf Norlén.

blood pressure, doing physical exercise, and recreational activities. The video service for home care customers is also used to organise group meetings with other home care patients, for instance over a lunch, and to provide access to daytime activities. Over the past two years, home care nurses have also had remote call devices in their cars, which is particularly helpful for security patrols which work at night-time. Home care nurses can also open electric door locks remotely, by using a door control service.

Remote facilities are additionally used to provide services at the central hospital. For instance, teenagers can visit a psychiatrist who works in Helsinki, and there is also a local physician working from home due to air problems inside the hospital. Video communication techniques are also used in smaller municipalities which have had difficulties in recruiting physicians. If the customer does not have his or her own computer, they can use the video service at the closest health care centre.

Telephone consultations

A digital home rehabilitation service is provided as a separate product, or in connection to other services based around home rehabilitation. The unit working with this service receives new customers through Eksote's customer management system, and they then make an assessment and do rehabilitation remotely on video, using mobile phones. A numeric application, which is based on ICF, is used to assess customers' opinions with regard to how much help they need, or how difficult it is to do something. The application produces a machine text, which is even available for the customers through *Kanta* – a national online platform.

Remote treatment vehicles

Several mobile social and health care services are provided in Eksote. *Mallu* mobile health care clinic began operations in 2010, *Malla* laboratory car in 2014, and two EMS home mobile clinics in 2016. Both *Mallu* and *Malla* follow a pre-scheduled route, with stops within the region. The EMS home mobile clinic is a unit with a paramedic nurse who can assess patients' needs for care at home – taking measures to treat such conditions as nosebleeds, backache, and urinary retention. The unit is part of Eksote's *On-call in the living room* project, which is developing a new kind of approach for in-home elderly care. The unit can be called upon by home care nurses if necessary. While this unit takes care of all citizens, most of its customers are elderly. It is also possible to create a video connection to a physician, which makes it possible to get a diagnosis, new medication, a plan for follow-up treatment and other measures, all at home. The paramedic nurse has access to the patient information system used in Eksote's other units, including hospitals.

Remote monitoring

Location technology and safety alarms

Navigil wristwatches, featuring an alarm, are used by elderly people with memory disorders. It is possible to use limits specified in the watches to determine how far users can travel from their home. Approximately 2,000 home care customers also use this safety alarm system.

Electronic medicine dispensers

Aksitare medication robots have been used at homes of elderly care patients since 2018. Since existing medication dispensers in the market did not seem to be good enough, Eksote developed

their own medication robot with the assistance of a private company. During the development process, the dispenser was tested and feedback was collected from the customers and nurses. The medicine is given in a cup, and not through a plastic bag, as with other medication robots. It is therefore easier for elderly people to take the medicine. In case the customer has not taken the medicine within an hour, the remote call employee gets an alarm warning. In addition to regular medication, pain killers can be delivered as the need arises. There are 50 to 55 dispensers in use at the moment, and the goal is to have some 100 to 200 customers included within the system.

Automated meal systems

An automated meal system called *Menuhatti* is used for the home care customers in Eksote. It stores up to 18 meals and includes a freezer, an oven, a computer and an Internet connection. The system defrosts the food chosen by the user, and it also provides spoken instructions on how to heat up the meal. Instead of getting food delivered by home care staff, the customers can hence decide what and when they want to eat. Owing to the Internet connection, home care nurses can see remotely what the customer has eaten (see also Andersson *et al.*, 2019).

Other devices

There are plans to begin to use vital measurement devices for home care customers, and these could also be used to monitor other patient groups over shorter time periods, for instance after surgeries. Daily data can be measured at customers' homes, and the resulting trends can be compared with previously collected data. Nurses can also check the data records remotely.

Together with a private company and the local universities, Eksote is part of an EU-funded project called *ELSA Testbed*. The purpose of this initiative is to develop digital and smart sensors which can be used to monitor and collect data. One sensor has been tested for collecting data about temperature, humidity, carbon dioxide level, brightness and movement at home care customers' homes. If defined limits are exceeded, the device sends an alert message both to the professionals and to the home care customer's relatives. Other types of sensor have been tested within this initiative, too.

New solutions in health care and social care

Digital communication

A particular digital solution, the *Hilkka* customer information system, has been used to optimise time schedules of home care nurses by specifying which homes they need to visit when, during their shift. The system also plans the home care customers' daily schedules.

Electronic services are also used at health care centres in order to reduce the number of phone calls. In this case, the system is mostly used to take care of relatively simple matters, such as medical prescriptions for urinary tract infections, tests for sexually transmitted diseases, laboratory referrals, and laboratory results.

A system called *Serena Business Manager (SBM) Solutions* has been used as a customer management solution in Eksote since 2015, and home care rehabilitation was added within this system in 2016. The system's use is currently undergoing a process of re-organisation, since a centralised customer-orientated management system was launched in spring 2020, and a larger organisational change was taking place over summer 2020. This organisational change separates the assessment process from the production and service providers. The goal is to simplify customer processes and to provide a holistic view of the customer, instead of having separate assessments made by every unit.

There is also an increasing use of chat services in Eksote, which offers an alternative way of securing customer services besides telephone calls. There are plans to introduce a chatbot, which can answer customers' initial questions. For instance, if a customer asks what kind of health check a three-year-old needs, the robot could respond that a health check is actually first needed the year after. If the robot cannot answer a question, the chat discussion would then be directed through to a human operator.

Online platforms

The national online platform, *Kanta*, produces digital services for both citizens, and health care and social welfare service providers. Citizens are able to see their medical records and prescriptions using *Kanta*, and the platform also allows them to ask for a repeat prescription, to save their living will, and to arrange an organ donation testament.

Omaolo is a national digital tool to evaluate a user's health condition based on self-assessment.

Immediate feedback is given concerning the probable cause of illness, and whether further measures are needed in addition to rest at home. It is also possible to send the results of the assessment to professional care-providers, to send messages from one person to another, and to book an appointment. Eksote is one of the hospital districts which has connected its own e-service portal to the services provided by *Omaolo*.

A patient e-service portal called *Hyvis* is used in eight hospital districts: South Karelia, South Ostrobothnia, South Savo, East Savo, Central Finland, Kymenlaakso, Päijät-Häme, and Satakunta. This portal is provided by an IT company, and the participating hospital districts share the cost. Citizens can use the service to test and follow their health, and to search for specific health care and social care services. In South Karelia, *Hyvis* can also be used to book appointments with nurses, to receive laboratory results and diagnoses, to provide health status information before visiting a professional, and to receive and send messages. *Hyvis* mainly covers primary care, though there are now also some options for secondary care.

Lifecare is a patient information system, used in Eksote, which includes customers' health care records. Home care nurses, for instance, can check their customers' medical records remotely during home visits. Compared with practices in other case study areas across the Nordic countries, this system is a solution with features unique to Eksote, in that it makes it theoretically possible to obtain data on customers from both social service registers and medical records. While social and health care records are separate, a limited group of professionals has access to both systems.

Artificial Intelligence

Smart diapers have been tested within elderly care, even though they are not yet in everyday use. These diapers can detect at what time they become wet, and create related and relevant care statistics.

Challenges

In this section, challenges experienced with digital transition and the implementation of digital solutions, as raised by interviewees in Eksote, are presented and examined.

Technological challenges

Internet access and technological vulnerability

There are some technological challenges which need to be faced when using digital solutions, particularly at the time the digitalisation process started up in Eksote. For instance, Internet connections were often found not to be working properly. However, the quality of broadband connections and operators is better today, and technological solutions are therefore both more stable and easier to use. Even so, the proximity of the Russian border is difficult, because there are problems in using broadband and mobile phones for home care nurses visiting customers who live near the national border.

In general, data vulnerability and information security have been identified as significant risk factors. There have been a few wider telecommunications outages, and operators and server halls crash sometimes. Eksote has made contingency plans according to the current laws, and they have emergency response models for different situations.

It is of vital importance that the flow of information between different units connected to the system works properly. In one instance, hospital employees had forgotten to notify the system about the repatriation of a home care customer who had been hospitalised. Consequently, home care nurses had not been visiting or calling this customer for a week, until the person's relatives alerted them. This kind of incident could be fatal in the worst-case scenario.

Development of technological solutions and software upgrades

On some occasions, Eksote has been offered digital devices which are not yet fully developed. Employees particularly emphasise the importance of testing digital solutions sufficiently before they are adopted for use. Some employees also remarked upon the need to include grassroots-level nurses in the process of planning the introduction of new digital tools, because those at management level do not always have sufficient insight into the reality of a home care nurse's work. If digital tools are not working properly when they come into use, they may hinder more than benefit the workers using them. Hence, as pointed out by an employee, digital solutions should not be created just for the sake of an overall process of digitalisation, but there should be always a customer-

orientated need behind the introduction of a new digital service.

It has also happened that devices have been developed further beyond their introduction in Eksote, in order to make them better suited to the particular needs of the region. In some cases, digital devices have been experienced as a good solution, but they still needed manual correction when being used. For instance, the Hilikka customer information system does not take into account real driving times when planning time schedules for home care nurses. This deficiency is particularly problematic in South Karelia, due to the existence of a number of lakes which cannot be crossed by someone driving a car. The distance calculation may therefore be wrong. Another example is in the use of a digital solution for obtaining a symptom assessment, which is hampered by the fact that customers cannot include images in their inquiries. As a consequence, it can be difficult for professionals to give any advice concerning vague symptoms such as lumps, rashes or swellings. An image is essential for these complaints.

The pace of technological progress requires continuous skills development, which may prove challenging for some employees. A number of employees also experience the constant internalising of new information resulting from software upgrades as too much for them – something which may slow down their working pace.

Non-integrated and fragmented electronic systems

It is complicated to manage the current customer registration system in Eksote, because customer data is registered in a different way in every care unit. As mentioned above, Eksote is currently developing a new customer management solution which is striving to achieve both a holistic care process and a comprehensive view of customer data. Since there are no existing electronic services that can be used for such a system, Eksote has needed to try to develop its own solution in cooperation with other regions.

In addition, the absence of an integrated information system covering both health care and social welfare services has been hindering the digitalisation process in general. Several units within Eksote have been developing their own electronic solutions, which has resulted in a very scattered system which needs to be re-organised over the course of the ongoing integration process. This

work is sometimes difficult to carry out, due to differing views about it within the organisation. However, in comparison with other Nordic countries, Eksote holds a good deal of integrated information on its customers. This is because both health care and social welfare services are provided through the same organisation.

According to one employee, digital services need to be more user friendly, both for customers and for employees. Some services also seem to lack clear instructions for customers. For instance, when booking an appointment through digital services, the website solution is often experienced as rather incoherent, because it is connected to several different servers. It is also necessary to choose a professional out of a list of names before it is possible to see available appointments. So a customer may have to go through several different professionals before finding one who has bookable appointments. While customers cannot choose the length of their appointment when making a booking, they sometimes have difficulties in knowing what kind of appointment is best suited to the health issue they need help with. It was also pointed out that when electronic services seem to be confusing even for employees, it may be even more difficult for the professionals to convince customers to use them.

Cultural, ethical and organisational challenges

Cultural challenges among the professionals

Some of the main challenges highlighted by decision-makers and regional management personnel included the reluctance of professionals to start using digital solutions instead of sticking to more traditional ones. At the hospital, physicians in particular have often been keen to continue using traditional care processes. It was also pointed out that it is easy to blame technology if something is not working properly. In addition, professionals may claim that patients do not want to use digital tools if they themselves are unwilling to use such devices. This can be a convenient excuse. Professionals may also believe that some digital services are too difficult for customers to use, and physicians may be unwilling to send certain types of information through digital systems. Either that, or they may have forgotten that it is even possible to send information digitally. Another common problem is when physicians only create a limited part of their appointment schedule bookable through electronic services. Indeed, some appointments

with a nurse are not bookable digitally at all. Social workers have sometimes hesitated to use remote services because it is important for them to see what their customers' homes look like.

Particularly at the beginning, when different digital distance-spanning technologies were being introduced, some employees within elderly care were afraid of losing their jobs and being replaced by digital devices. However, they have now noticed that the amount of work is not actually decreasing, because the number of elderly people is increasing all the time, too. Quite to the contrary, it would actually be difficult for current employees to manage to do all the required home care visits if they were not using digital solutions. An exception to this rule is the category of secretaries, since there is less need to send letters and to transcribe dictation. Even so, it needs to be noted that many current jobs could theoretically be automated in the future, when digital solutions are employed to a greater extent and at a higher level. In addition, there is a larger number of specialists, such as physiotherapists, employed within Eksote today compared to former times, when it was common that many employees were unlicensed assisting personnel.

It is also quite usual for elderly home care nurses to have so-called 'device dread', though this is now considered to be a receding problem. Even if the employees' attitudes towards new solutions may be reluctant at the beginning, many of their prejudices will disappear when they have been using digital devices for a while.

Cultural challenges among customers

Some home care customers and customers' relatives feel that the work which currently features digital devices and remote solutions is less important in comparison to the previous work of home care nurses. So home care employees stress the importance of including the use of digital solutions from the very beginning when bringing in new customers. They try to include as much technology as possible at the outset, because it is fairly easy to replace digital tools with nurses if necessary. If services are digitalised later, however, customers and their relatives can easily associate the resulting fall in the number of physical visits with a deterioration in the service.

The elderly people have had difficulties in using some digital solutions, such as the chat service, and those with major memory disorders may not

be able to use digital services at all. In general, however, elderly people are quite used to digital tools nowadays, since they have been forced to learn how to use banks' digital services due to the banks limiting their opening hours.

While many customers are content with digital distance-spanning technologies, there are also customers who refuse to use any digital solutions, including video connections and electronic door locks, within the home care service. In some cases, home care customers' relatives may be more opposed to digital solutions than the customers themselves, and it can be difficult to decide how much relatives can influence when planning a customer's care. Employees also stress the importance of informing and explaining why digital solutions are used in home care in a clear manner. There is already information available on the digital distance-spanning techniques used in Eksote, but since most of this information is digital, it may not help with those who are the most sceptical.

It is difficult to conduct any definitive evaluations concerning the use of digital distance-spanning technologies, since it is usual that feedback is only given by customers who have had negative experiences of digital tools – for instance if something is lacking in a service, or if they think that the service was better before.

Ethical challenges

Some digital distance-spanning technologies are difficult to use with certain customer groups. The unemployed, for instance, were previously asked to fill in a digital inquiry about their health status prior to a health examination at a health care centre. Since a large proportion of these customers are middle-aged men who do not necessarily have a computer, it turned out to be difficult to get them to fill the form in. There may also be other customers who cannot afford to buy a computer or a smart phone, both of which are a prerequisite for being able to use electronic services. Consequently, it may be an ethical problem if citizens are required to acquire expensive personal devices, such as a computer or a smart-phone, in order to be able to access good quality health care or social care services which are meant to be available for all.

Also, mental health patients may not wish to use a service requiring an application to be downloaded onto their mobile phone. Home care customers using video connection may also think that they are being spied upon, even when the remote

connection is not in use. In fact, in general, it can be challenging to guarantee home care customers' security while still preserving their privacy.

Organisational challenges

Several health care professionals said that it was challenging that there is a two-week delay before complete laboratory test results are shown to customers using online platforms (i.e. all test values, including ones that lie outside the laboratory reference ranges). Before, patients used to be able to see all test results immediately. However, the system was changed by the physicians, because they were concerned that many customers might get into a panic if they saw a test result that lies outside the reference range. Since patients themselves are responsible for checking their results and asking for follow-up care if necessary, it is confusing that only laboratory test results within the reference range are visible in Eksote's electronic services. It is also difficult for patients to know which laboratory tests were taken; and they might not always notice if some results are not there (the values out of the normal range). Even if complete test results are visible in the national Kanta service after two weeks, there is a high risk that the customer may not notice that a particular test result is outside of the reference interval. In addition, customers with chronic diseases would benefit from seeing their out-of-range results earlier. The system is confusing even for professionals, because there is no way to signal that a result has been checked and approved by a physician.

Economic challenges

Expensive equipment

Recent years have been challenging in economic terms for Eksote, and it has also become rather difficult to get EU funding for new projects. Even so, the overall experience is that digital distance-spanning technologies can save money if they are used wisely. However, some employees emphasised that it is often expensive to bring new digital solutions into use. While this aspect may be problematic in some organisations, it has been the common understanding in Eksote that the introduction of new digital solutions may be unprofitable at the beginning, but lucrative in the long run. There are some examples of digital tools which were not used in Eksote because of their high implementation cost, such as an automatic blood glucose measurement device. However, some em-

ployees remarked that it would actually be good to make comprehensive cost estimates over a period of time before new devices are brought into use. Some of them say they are continually told by management that the use of digital tools assists economic efficiency, even if they have never seen any concrete calculations as to how much Eksote might save in the long run by using digital distance-spanning technologies instead of more traditional solutions.

Legal challenges

Outdated laws and other legal challenges

When using digital distance-spanning technologies, it is often said that laws accommodating them change too slowly, and that current laws are not applicable to the latest technology any more. Eksote's management is trying to find other ways to get round legal obstacles, for instance by finding customers who are willing to give permission for the use digital solutions. It can also often be challenging to draw lines concerning which professionals are (or should be) able to see customers' information held within in digital service systems.

Today there are two separate electronic systems for health care and social welfare systems. There are technological ways of merging them, but such integration is still not possible legally, since they are regulated by different legal frameworks.

Artificial Intelligence (AI) could be used more widely if its use was not restricted by some current laws. There are also difficulties concerning how Artificial Intelligence might be used in the future, including both legal and ethical challenges. For instance, the system may notice a health risk when analysing a customer's data, but it still may not be legally permissible to contact the customer in such a situation, if the care provider does not have a previously-established care relationship with that customer. There is also a new law concerning secondary use of data once it has been collected – for instance, for research and device development purposes. This law is not especially tricky in Eksote, since Eksote owns all data within its region, instead of it being owned by several municipal data owners. In general, it seems that there are fewer legal challenges in Eksote compared to other case study areas in the Nordic countries.

Effects and potentials

Reduced environmental impacts

The use of digital distance-spanning technologies has resulted in a decreasing need for transportation for customers, customers' relatives, and professionals alike. Also, it is easy to contact a customer through the video connection if there is a safety watch alarm. If there is no real emergency, the safety helper does not need to drive to the customer's home to check up on the situation. On account of the increasing number of automated meal systems within home care, the amount of food waste has also diminished, because customers now choose for themselves what kind of meals they would like to eat. The use of electronic services to provide laboratory results has similarly decreased the need for printing and sending out letters. Taken together, these changes have reduced negative environmental impacts, too.

More flexible solutions and increased access to care

The evidence is that an increasing use of digital solutions provides more flexible options for both professionals and customers. The Hilikka customer information system, for instance, can easily accommodate the limitations of some home care nurses regarding what kind of work they are able to do. Elderly home care nurses may have health problems, but they can still continue working through a video connection instead of being on sick leave, for instance. This kind of flexibility involves a major societal impact, too. In Eksote, it has been hard to recruit professionals in some areas. As a result of the use of video connections, however, there is now a children's psychiatrist working remotely from Helsinki. There is also a remote home care nurse working from a health centre located in the municipality of Imatra.

In a similar way, customers are now offered many services remotely, in their homes. They are also given the possibility of choosing between different services. For instance, it may be easier to visit Mallu laboratory by car than the closest health care centre, or to use electronic services when working, instead of calling and visiting the health care centre. In general, the use of electronic services should shorten phone queues. Chatbots should shorten a customer's waiting time, too, because a robot can deal with simple questions. The

service should also save professionals' time, since they do not need to repeatedly answer the same routine questions.

Increased quality of care

By using remote solutions within home care, it is possible to provide well-timed services for customers, even in sparsely populated areas, and even several times per day. For instance, customers do not need to wait any more for home care nurses to come to give them their medication, and there are therefore no delays due to traffic conditions or similar. The use of medication robots has also increased the safety of medicine provision, because customers take their medication more regularly than was the case previously. In some instances, it has even been possible to reduce dosages, since medicines take better effect when administered with an even intake. Home care nurses also save time, as they do not need to visit customers just to provide medication or to warm-up some food. Instead, they can spend more time visiting customers who really need help.

Home care nurses can enjoy an increased sense of security when there are digital structures in place at their customers' homes, and many customers also feel that they have a safer home environment as a result of the availability of digital solutions. In the near future, nurses will be even supported by the *Gillie IoT* platform, which collects and analyses different kinds of data, in relation to given frames of reference, by means of Artificial Intelligence. Since nurses are mostly busy doing different daily tasks when they visit their customers, they may not readily notice a change in a customer's health status. Even so, an Artificial Intelligence solution would provide an alert if something was wrong with the customer's data values.

The use of electronic services to gain access to laboratory results and medical records has also improved customers' adherence to treatment plans, since they have a better knowledge of their own illness.

The increasing use of digital distance-spanning technologies in Eksote has also influenced the study plans of the local university of applied sciences, LAB, and the local vocational school, Sampo. An Eksote employee has been training teachers of these schools to use digital solutions in health care, and in return Eksote will be able to employ recent graduates who already have knowledge about how digital tools are used in the region.

Avoided expenditures

Home care nurses using video connections can complete some 40 visits during a work day, in comparison to the 10-15 physical visits done by home care nurses. Hence, it is more cost-efficient to use remote visits, particularly for customers living far away from the municipal centres. When it comes to 'risk group' customers, such as violent patients, home care nurses can visit them remotely and in safely by using a video connection, whereas it would require at least two home care nurses to physically visit them at home. In addition, it is an essential benefit of the digital solutions from a cost-reduction perspective that a larger number of elderly customers can access home care services remotely, instead of needing to live in senior care homes. Taking into account the increasing proportions of elderly people, it would not be possible to build so many care homes to house them.

Home care customers who were previously feeling lonely have now been utilising more daily social activities by means of video connections. Many of these customers used to go to the emergency room regularly, or call the main home care or health centre all the time, without any specific reason. This behaviour has now diminished owing to appropriate provision through a remote service.

Increased quality of life for patients and relatives

By applying remote services, the sense of self-worth of home care customers has often been increasing. This improvement is because they are able to carry out many more daily care activities for themselves, under the guidance of remote home care nurses, instead of being served by home care nurses at their home. In many cases, it has been surprising to discover that even customers with mild memory disorders and bad eyesight are now able to complete many everyday chores by themselves. That includes warming-up food, taking medicines, taking insulin, and testing their own blood sugar level. These daily activities also function as a form of rehabilitation for some customers. There are future plans to offer other kinds of services and social activities utilising video connections. Overall, senior citizens' quality of life has improved, since they can stay living at home longer, due to the availability of digital distance-spanning technologies.

Video devices at home care customers' residences can be also used by their closest relatives

Some examples of social activities that can be provided by using the video connection service.

Source: Gustaf Norlén.

without incurring any extra charge. This has increased relatives' participation in the planning of customers' care, because it is easier to organise meetings with the customer, relatives and professionals together, particularly if the relatives live far away. In addition, this digital technique has increased customers' social contacts, with relatives being able to reach them more easily than with a phone alone.

Future potentials

The future use of Artificial Intelligence is considered to possess huge potential in Eksote, since it could be used to enhance efficiency in health care and social care – particularly if it is possible to integrate data from the two systems. These different systems have been collecting data on customers over the past ten years, and by adopting a long-term perspective and incorporating Artificial Intelligence, it should be possible to make predictions as to how a customer's future health is going to look compared with other people living with similar conditions. That could also include information on the cost of the treatment needed. Forecasting future changes in a customer's health status would enable a more efficient use of preventive care services. In that way, customers would be able to stay

living at home longer. In fact, Helsinki University Central Hospital is already using digital solutions to predict sickness. Activity sensors could also be used in a more efficient way within the home care. For instance, these devices could predict deterioration in a customer's health by comparing current activity patterns with data from the past.

Creating a holistic customer data management system has been another major concern in Eksote. For instance, professionals working within the emergency care could benefit from having a more comprehensive view of their customers' state of being when making a diagnosis. While the IT part of that has been the easiest one to change, it has been more difficult to transform the working processes of the professionals involved.

Management has also identified that Eksote and other hospital districts would benefit from greater cooperation. By working together and communicating more with government about the use of digital solutions, it would be easier to get of national decision-makers for driving the digitalisation process forward.

Within home care, the use of remote services could be improved in several ways. For instance, it would be beneficial to use moving cameras instead of the stable ones which are currently in use,

or even to have cameras in other rooms within customers' residences. Home care customers cannot yet call professionals through a video connection device, because there are not enough people to answer these calls within home care; but improving this may be a future option.

Concluding remarks

In general, South Karelia is a rather rural region, and digital services are essential especially where people want to continue living in the most remote municipalities. In general in Finland, eHealth services provide a way to cut costs, too.

Concerning future potentials, the three focus areas of Eksote include the use of Artificial Intelligence, creating a system having a holistic data view, and the use of telemedicine services. Whereas the use of Artificial Intelligence was not even mentioned as a potential in the other case study regions of the Nordic Region, it seems that Eksote is a step further since the basic digital solutions are already working in a good and integrated manner, which makes it possible to start planning for the future use of Artificial Intelligence.

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4.3 Digital health care and social care in Västerbotten, Sweden

Authors: Louise Ormstrup Vestergård and Linnea Löfving

For the Swedish case study, the Västerbotten Region and Storuman municipality were selected as case studies. In total, ten interviews were conducted.

Total population 2019* ₁	270,154
Population change 2009–2019* ₁	4.79%
Life expectancy at birth* ₁	Females 83.7 Males 80.4

Public sector share of gross value added 2018*₁

Number of hospital beds per 100,000 in 2017*₃

Household access to fixed broadband at 100 Mbps* ₂	91%
Passenger cars per 1,000 inhabitants* ₃	534

*Sources: ₁NSI, ₂National telecom agencies, ₃OECD

The health care and social care system in Sweden

The Swedish health care system is described as decentralised, since regions (earlier county councils) and municipalities are responsible for ensuring and delivering health care and social care. At state level, the Ministry of Health and Social Affairs is responsible for the overall guidelines and policies for the Swedish health care and social care system (Anell, Glenngård & Merkur, 2012; Vetenskapsrådet, 2016).

The regional authorities are responsible for organising and delivering primary and secondary health care services within their respective regions, and therefore run both primary care facilities and hospitals. Primary care can be delivered via public health facilities or by private health care actors working with agreement from the regions. Highly specialised care is managed by seven university hospitals located across Sweden. In a few of the northernmost regions, intermediate health care facilities have been established, known as cottage hospitals. These cottage hospitals are found in rural areas where the distance to specialised care is vast. Though organised under primary care, cottage hospitals have in-patient care facilities and provide emergency care as well as other extended health care services (Molén & Holmner, 2016). Municipalities are responsible for home-based care services, for elderly care, and for care for people with physical and mental disabilities.

The Swedish health care and social care system is primarily financed via regional and municipal taxes, alongside some direct state contributions. A small part of the financing originates from patient fees (Vetenskapsrådet, 2016).

Since 2016, private health care actors who offer digital health care services – particularly video consultations with general practitioners – have become prominent in Sweden, especially within primary care (Socialstyrelsen, 2018; SKL, 2019). Through subcontracting agreements, private companies are part of the Swedish health care system and in this way are able to get reimbursement for their services from the patient's home region. Their introduction into the health care system was quick and extensive, and became an unexpected and significant economic issue for the regions (Olsson, 2017). As a result, measures were quickly introduced to lower the economic burden (SKL, 2019). New private health care actors using digital solutions continue to be an issue for debate.

The discussion concerns how this new point of access to health care affects the consumption of health care services and how it impacts the overall shape of public health care system (Inspektionen för vård och omsorg, 2018; Socialstyrelsen, 2018). Several regions have started to offer similar digital health care services via their own platforms (Socialstyrelsen, 2019).

The national eHealth strategy offers a vision that, by 2025, Sweden will be best in the world at using the opportunities offered by eHealth and digitalisation (Ministry of Health and Social Affairs, 2016). The aim is that digitalisation and eHealth will make it easier for people to achieve good health and welfare, as well as developing and strengthen resources for increased personal independence and participation in society.

Description of the Swedish cases: Region Västerbotten and Storuman municipality

The region of Västerbotten is the second most northerly region in Sweden. Its landscape is characterised by vast forest areas, lakes, with a coastline to the east and mountains to the west. The total population in Västerbotten is 270,154 (2019), 46% of whom live in the coastal city and regional centre of Umeå, the largest settlement in the region.

Västerbotten covers 15 municipalities, which are divided into inland municipalities and coastal municipalities. The eight inland municipalities (Dorotea, Lycksele, Malå, Norsjö, Sorsele, Vilhelmina, Åsele and Storuman) sit alongside two municipalities (Arjeplog and Arvidsjaur) from the regional neighbour to the north, Norrbotten. Together, they have established a means of collaboration based on their common rural characteristics and the particular challenges they experience. Central concerns are an aging population, lack of economic growth and depopulation. From 1990 to 2017, the population in the eight inland municipalities declined from 21% to 15% of the total regional population (Löfving, Norlén and Heleniak, 2019). The collaboration is officially called Region 10, and the aim is to strengthen the development of inland municipalities, as well as to be a joint voice for highlighting issues faced by inland municipalities compared to the coastal municipalities and the rest of the country.

As a part of the regional reform process in Sweden, the association of local authorities and the county council known as 'Region Västerbotten'

was merged into Region Västerbotten in January 2019. This means that the responsibility for primary care, secondary care and dental care – as well as for regional development – is now gathered under the aegis of one actor. With this merger, a new organisational structure is being developed for the health care system. The aim is to secure enhanced collaboration between primary and secondary care (Jonsson, 2018).

In the region of Västerbotten two regional hospitals are located, in the cities of Lycksele and Skellefteå. Norrlands University Hospital is located in Umeå. It provides specialised care to the four most northern regions in Sweden, covering approximately 50% of Sweden's area and 10% of the Swedish population (Molén & Holmner, 2016). The region has a total of 33 primary care facilities, of which seven are cottage hospitals. All cottage hospitals are located in the inland municipalities, with two of them being in Storuman municipality, in the towns of Tärnaby and Storuman. Emergency health care is also located in the cottage hospitals (Region Västerbotten, 2019).

The regional research and development institute, the Centre for Rural Medicine, is located in Storuman municipality. The institute has worked extensively with health care provision in rural areas, one example being the establishment of virtual health care rooms (Socialstyrelsen, 2018). In these facilities, Internet and medical technologies are used to offer basic primary health care services also in locations which otherwise have limited access to primary care. The first virtual health care room facility was tested in the village of Slussfors, in Storuman municipality, in 2014. Here patients and users can have video consultations with health care providers located at Storuman cottage hospital (Näverlo *et al.*, 2016) and the Centre for Rural Medicine in the Västerbotten County Council primary care department has implemented a VHR evaluation framework. This research focuses on evaluation of patient perceptions of the usability of the VHR and its contribution to their health care.

In relation to health care and social care overall, the central challenges the region faces are an aging population, recruitment issues, a pressured economy, and medical and demographic developments which result in increasing health care needs among a larger patient group (Region Västerbotten, 2013; Jonsson, 2018). Recruitment issues are particularly present in rural areas, where a large turnover of doctors is usual.

Box 4.3. Digital Västerbotten: Regional agenda for digitalisation

In 2014, a digital agenda was presented in the region of Västerbotten. This digital agenda focuses on seven strategic areas where digitalisation is expected to have the greatest effects on the region's development (Region Västerbotten, 2013). One of these areas is "increased participation, quality, and efficiency in health care and social care". The objectives for 2020 are that 80% of the region's population should have access to, and utilize, digital channels in their communications with the health care system. Also that quality and efficiency will increase with the use of digital solutions, and that all health care givers will have access to a shared electronic patient journal.

The main objective in regard to the Digital Agenda for Västerbotten is to reduce distances, as well as to facilitate cooperation between the region and the municipalities concerning digital solutions. An interviewee in Region Västerbotten reported that they define digitalisation as "organisational development with technology". In this formula, the purpose is to place organisational development at the centre, rather than technical digital solutions.

Examples of distance-spanning technologies in Region Västerbotten and Storuman municipality

Remote treatment

Video consultations with nutritionists

In 2017 nutritionists in Region Västerbotten started to offer video consultations. Within the current procedure the first meeting is held physically, while check-up consultations are conducted digitally. Patients log-in using an official electronic-ID to secure patient identity. It is estimated that 80% of consultations are now conducted digitally. In a new project, Region Västerbotten, together with Umeå University, will also test the effects of conducting the first meeting with a nutritionist digitally.

A local nutritionist who often conducts digital consultations emphasises that people frequently jump to the conclusion that the digital solution or meeting is to replace a physical appointment.

However, this is not entirely correct, because the digital meeting often comes instead of a telephone call.

Remote analysis of x-rays and pictures

X-ray pictures are sent from the cottage hospital in Storuman municipality for specialist interpretation at the hospitals in the region. This procedure has been one practiced for more than two decades. This illustrates that digitalisation in the health care system has actually been an ongoing process for a long time. However, according to interviewees at the cottage hospital, the practice is not without its problems, because it has proved difficult to get people to inspect the pictures. The same procedure is used within the field of dermatology, where pictures are sent to a skin clinic in Umeå for analysis by an expert.

Remote monitoring

Digital supervision

In terms of elderly care in Storuman municipality, a smaller number of cameras are used for night-time supervision at nursing homes, as well as in private homes. A camera turns on at a pre-defined moment during the night, and if the person appears to have left their bed, or if any other irregularity is detected, home care services will make a visit.

Electronic medicine dispensers

In elderly care, a number of electronic medicine dispensers have been tested, with good results. These dispensers are a source of independence for the people who use them, because they can take their medicines themselves, at the same time every day.

Remote meetings

Internal meetings, education and training via video connections

For quite some time Region Västerbotten has used a video conference system for internal group meetings within the organisation. The system has also been utilised for training or educational purposes among health care staff. Within health care and social care work, continuous training is needed to keep up with new research. However, since this takes a good deal of time and resources (which are scarce in the rural areas), the possibility of connecting through video instead of travelling to Stockholm over the course of a day seems a positive, resource-saving alternative.

Digital communication

Communication platform 'Prator'

A communication platform called Prator is used by all municipalities and Region Västerbotten to communicate about shared patients. This is especially helpful in the transfer of patients from hospitals, for which the region is responsible, to home care, where the municipality is responsible.

Online booking systems

Some clinics in the region have implemented online booking systems, whereby patients can book and rebook appointments online. These systems make it simpler and smoother for people to book appointments. This also creates less administrative work at clinics, which releases time for other tasks.

Challenges experienced with implementing digital solutions: Regional and municipal findings

Internal organisational challenges

Anchoring the digital solutions in the organisation

Interviewees in Storuman municipality and Region Västerbotten emphasised that management must be the main driver behind digital transformation. Competences to support organisational development are therefore necessary at managerial level, including an understanding of why the organisation needs to work with digital solutions. The region has already focused on raising competences among managers as part of a previous project. Even so, continued attention is required, it is recognised.

In addition, a further reported challenge is anchoring digital solutions within everyday practices. Attention is needed not only to the implementation phase, but equally importantly to the integration phase, where the technology becomes an integrated part of a daily routine. The difficulty here is that too little time and too few resources are spent on the entire implementation and integration process. If a solution is not properly integrated, the anticipated benefits may not occur. Instead the digital solutions which were intended to make the organisation more efficient merely turn into extra tasks. In addition, it is necessary to understand that digitalisation is a continuous and on-going process, not a project that has an end date. However, a hindering factor in anchoring digital solutions is an existing pressured work force, who may get frustrated when new proce-

dures and solutions are presented on top of an already packed schedule.

To enable effective implementation, our interviewees stressed the importance of information and communication with health care professionals, looking at "what we are doing, why we are doing it, and why it is important". This transparency is expected to help eliminate concerns among employees – for example, the fear of losing their jobs. In addition, the necessity of informing the public about the changes was highlighted – including explanations as to why these changes are coming in, and what impact they will have on citizens in their encounter with the health care system.

Whilst Region Västerbotten has been considered a national front-runner in its work with digitalisation, interviewees in Storuman municipality reported that it continues to be quite "analogue" in its overall approach, and at the initial stage of a digitalisation process. Interviewees reported that a digital strategist had been hired in 2019, when the municipality realised that it lacked the competences needed to work strategically with a broad range of digital questions within the organisation. The digital strategist was taken on in order to create a structured development plan for continued work with digitalisation across the entire municipal structure. Looking back, interviewees at the municipal management level reflected on the need to have a guiding development plan with a long-term perspective drawn up from the very beginning.

Norms, traditions and culture in the health care system

An interviewee in Storuman municipality described digitalisation in this way: "It [digitalisation] is, rather, a transition of the norms and culture the entire health care system is based on."

Digitalisation is a process which effects, and sometimes collides with, the existing norms and cultures of the health care and social care system. This perspective was highlighted as pertaining at both municipal and regional levels. To realise the positive impact of digitalisation, it is necessary to understand how existing embedded norms, traditions and notions are affected when digital solutions are introduced, and how to accommodate this shift. For example, health care and social care professionals need to adjust their perceptions about how to deliver care when digital night-time supervision is introduced. This adjustment, and an

acceptance of a radically different way of delivering care, was seen by interviewees as a challenge when implementing digital solutions. Changing perceptions is not only a matter for health care and social care professionals, but also for leaders and for management.

One enabling factor is to let engaged actors lead the way, setting good examples which can then operate as an inspiration for others. Local health care professionals who are already working with video consultations in everyday practice emphasise the need not to get stuck with restrictions, but instead to focus on opportunities and to 'think outside the box'. One example is given by a health care professional: a video connection where a person sits statically in front of the screen will not provide knowledge about that person's physical condition; but it is possible to ask the patient to stand up and to take a walk in front of the camera. Though it is important to be digitally innovative, it is clear that limitations exist. This is why the health care professionals in Region Västerbotten also emphasised the need to scrutinise the circumstances under which digital solutions can work, for which medical fields, and for which patients.

Lack of interoperability between electronic systems

The lack of interoperability between electronic systems which cannot communicate with each other and share data is another challenge that has been presented. Rules and regulations can get in the way when trying to connect different systems and to share patient data, it is reported.

Economic challenges

Budgets in both the municipal and regional parts of the health care and social care system are tight. This is why the large investments that digitalisation demands are described as a central challenge. Interviewees reported that it can be difficult to predict the long-term positive economic effects that digital solutions can deliver for the organisation. Yet without clear, proven effects it can be difficult to motivate investment in an already pressured economy. As the economic argument remains central for decision-makers within the organisation, it is necessary to be able to indicate the positive economic effects for the organisation when a digital solution is implemented. Economic limitations are one of the most frequently reported reasons for delays with innovation and develop-

ment initiatives. As such, an enabling factor would be to have better measures or indicators – ones capable of predicting actual effects.

The Swedish state occasionally distributes to municipalities economic resources which is targeted for a specific purpose, and which municipalities need to spend within a fairly short period of time. Interviewees reported that this targeted money is challenging, because it forces municipalities to make quick decisions based on limited planning, and therefore risks responses which have not been properly thought through. Instead municipalities should be given more time to spend this money; or the money should be distributed in a manner that gives municipalities more influence on how it is used in line with the municipal development plan and the local situation.

The absence of a coherent and proper economic compensation model is also reported as hindering change. For example, if an investment is made to change a procedure in primary care, the effects of that change is perhaps not realised in primary care but within the hospitals which will have fewer hospitalisations. However, the money saved by this change in procedure is not transferred back to the place where the investment was made, and that produced the effect. As such, investments which could have a multitude of positive effects – such as better quality health care, expenditure avoided, and better use of human resources – are held up.

Other factors that challenge the implementation of digital solutions

Sharing experiences between regions and municipalities, and developing guidelines for the effective implementation of digital solutions, are both naturally considered valuable. However, it is important to pay attention to the fact that the way digital solutions and systems work in urban areas is not directly transferable to rural areas. So, with a small population spread across a vast geographical area, the effects of changes made in urban areas are hard to realise in rural areas.

Generally, broadband connections are reported to be good and reliable. However, there are still some areas where broadband has not been developed. In addition, some regulations at municipal level are also reported not to be properly updated and adapted to digitalisation, which hamper the development overall.

Effects and potentials

When asked about the effects and potentials of implementing digital solutions in health care and social care, several interviewees emphasised that digitalisation "is a question of survival". Whether to digitalise or not is no longer up for discussion. It is vital for the organisation to digitalise in order to deliver and secure health care for its patients and users. As such, digitalisation is perceived as a central tool to manage demographic and health developments. Increased quality of care and increased access to health services, were continually emphasised effects and potential benefits in this regard. This includes preventing the need for long journeys; increased access to specialised health knowledge; efficiency; avoiding unnecessary expenditure; increased safety for the citizens who live in rural areas, and the provision of a tool to manage existing recruitment challenges in both social care and health care.

To reap the full potentials of digitalisation, and to accommodate current and future challenges to the health care and social care systems, better cooperation is needed between municipalities, as well as between municipalities and the region. This is reported as being crucial. It includes better knowledge sharing and communication, as well as innovative ways to work together across large municipal borders.

Increase access to services and prevent unnecessary travels

Digital solutions can help overcome challenges connected with large distances and remote, sparsely populated areas, as well as helping provide more equal access to services. Virtual health care rooms and video consultations are examples of solutions that increase citizens' access to health care in Västerbotten. Increased access to health care and social care services also adds to a feeling of safety for citizens who live in rural, remote areas. Digital solutions can additionally provide increased flexibility for both citizens and health care professionals, since video consultations complement the need for meeting physically. Before nutritionists in the region started offering video consultations, they had to travel around the region and were only present at health facilities occasionally for a few days. As video consultations are rolled out, citizens no longer need to wait until their nutritionist visits the local area again. Instead, they can receive help when they need it.

Access to specialist knowledge is enhanced when data can be sent to specialists for analysis, or when specialists can be connected via a video connection, and can serve as a support and quality assurer for local health care professionals. For rural areas, this has significant potential. Doctors can now work as generalists with channels to health care professionals possessing specialist knowledge. This has the potential to improve the quality of the care they are able to provide.

Reducing travelling time to health care facilities for patients is another positive effect. Besides saving time and avoiding the nuisance of travelling significant distances, fragile patients, in particular, can benefit from avoiding a large number of long and exhausting journeys. Home care services can also avoid the need to spend time and resources on unnecessary journeys when (for example) night-time supervision technologies are used. When work tasks are able to be conducted more efficiently there is the potential for releasing resources and time towards the needs of other patients. Environmental benefits were also mentioned to some extent during interviews, notably in relation to the reduction in travelling that digital solutions can entail.

Solve recruitment challenges

Another potential effect of digital solutions is to manage those recruitment challenges which are especially prevalent in rural parts of the region, in terms of recruiting both health care and social care professionals. Through the use of medicine dispensers and digital night-time supervision, digital solutions can release health care and social care workers to do other tasks. As a result, what is otherwise a growing need for more health care and social care professionals can be mitigated to some extent. New, flexible working arrangements can make work environments more attractive, too. This means that health care professionals can conduct a proportion of their appointments or consultations via video, so that it is not necessary for them to be physically present all the time. More flexible working conditions may also assist to increasing doctor continuity, and to avoiding a large turnover of general practitioners.

Reduce costs and avoid expenditures

Positive economic benefits from digitalisation are expected in a long-term perspective. Currently, significant investment need to be made in order

to reduce costs and avoid future expenditure. In a short-term perspective, digitalisation does not necessarily result in reduced costs, however. To the contrary, it requires initial investment. But reduced costs and expenditure can be expected in relation to the more efficient use of time by health care and social care workers – for instance, through making fewer journeys and making administrative tasks more efficient.

If citizens are enabled to stay in their own homes for a longer period of time, there can be positive effects for their wellbeing as well as significant reductions in future expenditure for the health care and social care system. Another factor here is that patients and relatives can avoid taking half- or whole-days off work in order to travel to a health care facility, for example for a follow-up consultation.

Facilitate strategic planning

With the introduction of digital solutions and improved data access, the possibility of creating a better overview of resources and better planning conditions also arises. In this way, data and statistical analyses can be used to evaluate working processes and to find improved, systematic patterns. This is brought forward as a significant potential benefit of future digitalisation in health care and social care.

Possible negative effects of digital solutions

Though digitalisation is considered a necessity for health care and social care organisations, and its effects are expected to be primarily positive, some potential negative impacts were also mentioned by interviewees. The first one is a fear that the wellbeing of patients will be negatively affected by reduced physical meetings and human contact being removed from care work. This can contribute to increased feelings of loneliness, for example. Secondly, there is the risk of deepening the digital divide among citizens who do not know how to handle the digital solutions, or who cannot afford to invest in the technology needed. This means that there is a risk of creating a digitally isolated group of citizens who do not possess the requisite digital skills, or who feel insecure about using such technologies.

Increased costs from digital solutions not being implemented properly, and the risk of them not being used, are other potential negatives at both the municipal and regional level. Problems can also

arise if digital solutions do not fit the particular demands of the health service or of those using it. Several concrete examples of failed investment in digital solutions were found across the region.

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4.4 Digital health care and social care in Nordjylland, Denmark

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For the Danish case study, the Nordjylland region and Morsø municipality were selected. A total of nine interviews or group interviews were conducted. In total, 15 people were interviewed. Particular to the Danish case was the fact that one group interview was conducted, involving three citizens in Morsø municipality.

Total population 2019* ₁	589,755
Population change 2009-2019* ₁	2.54%
Life expectancy at birth* ₁	Females 82.8 Males 78.9

Household access to fixed broadband at 100 Mbps* ₂	91%
Passenger cars per 1.000 inhabitants* ₃	471

*Sources: ₁NSI, ₂National telecom agencies, ₃OECD

The health care and social care system in Denmark

The Danish health system can be described as decentralised, since responsibility for primary and secondary health care is located at the regional and municipal levels (Olejaz *et al.*, 2012). The Ministry of Health, Sundheds- og Ældreministeriet, is the primary health authority at state level. Among other things, it is responsible for the regulation and supervision of the health system.

The five regions own and run public hospitals, as well as holding responsibility for emergency care, psychiatric care and other specialised forms of health care. The regions also manage the planning of access to general practitioners, of whom the vast majority are self-employed health care professionals. General practitioners constitute the core of primary health care. They are gatekeepers to the health care system as a whole, since they are responsible for referring patients to specialised care and other primary care services in the municipalities. The regions are also responsible for financing other specialist health care – as with ear-nose-throat and eye doctors, for example. Regional health care is financed by the state through block-grants and activity-based funding, alongside municipal contributions (Vårdanalys, 2017; Danish Ministry of Health, 2018). The 98 municipalities are responsible for primary care – such as home care services, nursing homes, and rehabilitation outside hospitals – as well as health promotion and disease prevention. The municipal portion of the health system is financed through taxes collected at municipal level.

The current national eHealth strategy started in 2018 and runs through to 2022. It has the central objective of strengthening the coherence of the health care system as a whole, with the specific aim of providing and delivering more patient-centred care (Danish Ministry of Health, 2018).

The Danish cases: the region of Nordjylland and Morsø municipality

The region of Nordjylland covers the northern parts of Jutland. The regional landscape is characterised by agricultural land and is penetrated by the Limfjord from coast-to-coast. In terms of population the region is – with 589,755 inhabitants – the smallest region in Denmark. Aalborg is the regional centre and the largest city in the region with 215,312 inhabitants. Region Nordjylland is responsible for the operation of the health system

within its borders, including the running of hospitals. One psychiatric and two somatic hospitals operate in the region. The somatic hospitals are Aalborg university hospital and a regional hospital, both of which have branches in multiple locations across the region.

The region covers 11 municipalities. Morsø municipality is the second smallest in the region, with 20,514 inhabitants. The municipality covers the entire island of Mors, which is located in the western part of the Limfjord. Mors is connected to the mainland via two bridges, in the east and in the west, and two short ferry routes, one in the north and one in the south. The old-age dependency ratio is slightly higher in Nordjylland (33.3%) than the Danish average (30.6%). In Morsø the ratio is much higher (43.5 %). In addition, the proportion of the population above 80 years-of-age is higher in Nordjylland (7.9%) and Morsø (11.1%) than the national average (7.1%).

In rural areas across Denmark the recruitment of general practitioners is an increasing problem. As the regions are responsible for securing citizens' access to a general practitioner in their locality, they have since 2013 had the possibility of establishing regional clinics (for a maximum of a six-year period) as an alternative to a general practitioner's office. The establishment of a regional clinic is only possible if no general practitioners express an interest in running an office (Vårdanalys, 2017; Simonsen & Bidstrup, 2019). As part of the agreement to create a regional clinic, the region is obliged actively to contribute to innovation and development of the health care system. In 2018, 1% of the population in Region Nordjylland had a regional clinic as their primary care facility (Simonsen & Bidstrup, 2019). In Morsø municipality, two of a total of five practitioners offices are regional clinics.

'Nye Veje': a development project between region and municipality

Region Nordjylland and Morsø municipality run a collaborative development project called 'Nye Veje'² (Region Nordjylland, 2019). 'Nye Veje' was established in conjunction with the creation of a regional clinic in Morsø municipality in 2017. As the project's name indicates, the objective is to explore new solutions to help solve problems faced by the health

2 Translated into English as 'New Ways'.

care and social care system. The emphasis is on new models for organising the health care system and enabling better cross-sectoral collaboration. The project is scheduled to run from 2017 to 2023 and is organised into different phases. Each phase lasts around six to eight months and contains approximately eight smaller projects where different types of models or solutions are tested across Morsø municipality. Each model and solution is evaluated, and based on the evaluation a decision is made as to whether to continue developing the solution or not. A citizen-patient council has been established as part of the project, through which citizens are invited to help develop it and to bring new ideas to the table.

One of the five focus areas in 'Nye Veje' looks at gaining experience from the increased use of digital solutions in health care. Some of the solutions that have been tested, and were continued afterwards, are described in the presentation of digital solutions below. One of the projects in the third phase is called 'Flexible digital access to primary care'. Here digital consultations are tested outside regular opening hours, using time slots between 7am to 8 am and 4pm to 6 pm. The objective is to offer citizens more flexible access to primary care. A valuable characteristic of this project, as stressed by interviewees at municipal as well as regional level, is the freedom to test different solutions in practice – without pressure to evidence certain results. So a key finding of a trial as part of this project might well be that the solution does not function in practice, or that the field is not ripe for that particular solution.

It is important to emphasise that the 'Nye Veje' project operates with a different framework to the rest of the health care system, as general practitioner care and specialised care is brought together into one organisation. However, the project makes it possible to showcase good examples of how digital solutions can work in practice.

Examples of distance-spanning technologies in Region Nordjylland and Morsø municipality

Remote treatment

My VideoDoctor is an application for video consultations offered at regional clinics across Region Nordjylland. This solution was tested in the first phase of 'Nye Veje', with its aim being to create improved access to general practitioners. In the beginning patients had to visit the regional clinic, where they were connected through video to a

doctor located at a distance. Today the application is being implemented within everyday practice at regional clinics, and patients can use their own smartphone, tablet or computer to access it. For security purposes, the national electronic ID is used for entry onto the platform. According to interviewees, a different national application is now under development within the Organisation of General Practitioners (PLO).

Another project established within 'Nye Veje' is the creation of unmanned outpatient video clinics. The first outpatient video clinic, for patients with diabetes and metabolic diseases, was tested in 2018. Instead of travelling to the hospital in the city of Thisted, patients are able to visit the outpatient clinic in Nykøbing Mors. They can conduct a consultation with a doctor at the hospital via a screen in the clinic. Beyond the project, more clinics were set up in other parts of the region, e.g. on the island municipality of Læsø. Every outpatient clinic has a telephone with a direct connection to the regional IT department, so that patients can receive support. Each health room is located either at, or near, another health care or care facility (e.g. a nursing home), where an employee will check the room every morning. Great emphasis was put on the design of the outpatient clinic's interior. While not manned, it should be as simple and intuitive for the patient as possible. So, all clinics have exactly the same design. The purpose is to make it easy for IT supporters to instruct and help patients within the video rooms.

While outpatient video clinics had not received the expected number of patients as of October 2019, Region Nordjylland, along with Morsø municipality, has great expectations for these clinics and is actively working to get more hospital departments connected to them. One aim is to connect the anaesthesia department, where – ahead of surgery – patients can conduct preparation meetings from the outpatient clinic instead of physically going to hospital. According to local records, 70 patients used outpatient video clinics between January and September 2019.

Remote monitoring

All patients with Chronic Obstructive Pulmonary Disease (COPD) in Region Nordjylland receive the possibility of monitoring their condition from home. Using the monitoring equipment, patients can conduct measurements for themselves – after which data is sent automatically from the moni-

toring device to the relevant health care professionals. Based on the positive results from Region Nordjylland, this telemedical solution will now be made available for all COPD patients in Denmark. For more information, see the *Vård och omsorg på distans: 24 praktiska exempel från Norden* report.

A monitoring solution is also available for citizens suffering from chronic heart disease and heart failure. Patients receive a tablet, a digital blood pressure monitor, and a scale – with the purpose of using these at home on a weekly basis. A research report on the economic impact of this monitoring system has concluded that it is highly cost-effective for the treatment of patients with heart failure. Significant cost savings were identified in relation to hospitalisations, primary care contacts, and total expenditure (Vestergaard *et al.*, 2020).

Remote meetings

Digital meetings between different health care and social care facilities in the region are now used to develop and share knowledge and experience. These digital meetings enable knowledge dissemination, the development of competences among health professionals, and the promotion of valuable relationships between actors in locations which are situated far apart.

On a few occasions, digital patient handover meetings have been conducted so that the patient, relatives, a general practitioner, the hospital, and the municipality can talk together in a video conference. Interviewees said that this kind of cross-sectoral handover meeting has great potential – particularly because it would not otherwise have been possible to hold physical meetings where so many different actors could be present at the same time. For example, a doctor located at Mors would not be able to drive two hours each way to the hospital in Aalborg. However, despite the significant benefit of securing better cross-sectoral involvement in handover, and more patient centred care, digital handover meetings have still only been used to a very limited extent.

New solutions in health care and social care

Digitally supported rehabilitation has been made available for patients with dysphagia, a condition in which a person has trouble chewing and/or swallowing. One employee in the region had the idea of developing an exercise app, so that instead of patients needing to travel to hospital to exercise with a health care professional, they can now

download an app upon which an individual training programme can be set up. The patient can also watch demonstration videos showing the correct way to practice the different exercises specified.

Challenges experienced with the implementation of digital solutions: Regional and municipal findings

As the descriptions above indicate, several digital solutions have been implemented and are being tested across both the region and the municipality – particularly within the framework of the 'Nye Veje' development project. Findings from the study show that the key hindering factors and challenges facing digitalisation in the health care and social care systems are those related to non-integrated electronic systems across sectors – along with economic resource and cultural adaptation required in the reorganisation of these systems. The implementation of new digital solutions within an organisation which is already pressured both economically and time-wise are seen as major obstacles to digital development.

Technical-related challenges

The problem of non-integrated electronic systems, along with issues of sharing data between the municipality, the region and general practitioners, is recognised as a central challenge at regional as well as municipal level. A particular negative effect of electronic systems which are not integrated properly is that citizens themselves are often placed in the position of being knowledge carriers across sectors, and thus of being the only actor who holds the full picture. This is a situation which can be both frustrating and stressful for citizens, relatives and health care professionals alike. According to interviewees, the problem of sharing data and information across sectors has in some cases resulted in feelings of mistrust towards digital systems among social care workers operating at municipal level. In short, they cannot be certain that the information they are using within the system has been properly updated. In such situations, the potential efficiency that the digital system was designed to produce is wasted, and instead it becomes an extra burden.

Technical challenges were not emphasised as a central problem by interviewees. Instead, they emphasised the necessity to develop user-friendly digital solutions which are properly adopted to everyday operations and tasks performed by

health care and social care professionals. A related challenge is the difficulty of deciding which solution or system to invest in, because so many different ones are now available on the market. The question of good broadband access and mobile connectivity was also raised by interviewees at municipal level, while not being considered a significant challenge at regional level.

Economy-related challenges

Economic challenges were also raised. The three sectors within the health care system (region, municipality, and general practitioners) each have their own economy. This can be a difficulty as far as collaborative digital transformation for the entire health care and social care systems is concerned. Interviewees noted that no system is in place to determine how much a general practitioner is to be compensated financially for a digital consultation, or why physical consultations are financially better for private clinics. The lack of economic incentives for general practitioners to conduct video consultations is an organisational barrier. It stops implementation being driven forward. In addition, some interviewees pointed to the difficulty of arguing for significant investment before knowing the actual effects of proposed digital solutions.

Internal organisational and cultural challenges

Besides non-integrated systems, economic pressures, and time constraints, the reorganisation of working procedures and the cultural shift that it demands are perceived to be core challenges at municipal as well as regional level. Digital solutions demand new ways of working and a new overall perception of the provision of social care and health care. All interviewees emphasised that digital solutions will always be supplementary to actual physical meetings, and that this is why digitalisation should never be seen as a goal in and of itself. Some practitioners who participated in the study reflected on the need to establish clear rules for how often a video consultation should be supplemented with a physical meeting, as well as setting out what kind of consultations can be conducted digitally. One limitation of a digital consultation, it was said, is that it is not possible to gain a holistic impression of the patient – including how they walk and how they look overall.

In order to successfully drive the implementation of digital solutions and the often significant changes they bring for everyone involved, good

change management is considered vital. Leaders must be provided with the necessary competences to drive institutional change. They are considered central 'cultural carriers', and thereby holds a powerful position within the overall process.

Scepticism towards digital solutions was reported to come primarily from the health care and social care professionals, while citizens and patients are generally interested in using more digital solutions in their contact with the health care and social care system. While health care professionals' scepticism is linked to fears over a decreasing quality of health provision, such scepticism is acknowledged as having a healthy dimension too – because patient security and quality of service is something that has to be maintained. Some managers at municipal level expressed a concern that the operational system becomes more vulnerable when it is increasingly dependent upon digital systems. A contrary enabling factor for meeting the scepticism of health personnel resides in communicating the purpose of the digital solution clearly, and showing how it creates value for both the patient and for the professional's core task. In this regard, show-casing good practice and letting passionate frontrunners lead the way was considered essential.

The various challenges identified above are interrelated. The absence of an economic incentive for implementing video consultations among general practitioners is connected to a cultural shift in the organisation, whereby consultations conducted via a video link can in some cases have the same value as physical consultations. Or even more value. Some interviewees stressed how health care professionals have been taught that care is a practice bound up with physical contact. Digital solutions disrupt this understanding and demand that health professionals adapt their perception of how social care and health care can be delivered.

Potentials and effects

Digitalisation is considered a central tool for managing a situation where there are an increasing number of people with chronic illnesses. The effects which proved most anticipated and significant for those in Region Nordjylland and Morsø municipality were an increased quality of health care which is more patient-centred, running alongside the more efficient use of human and financial resources across the whole system.

The inclusion of video connections in health care and social care is seen at both regional and municipal levels as a central digital solution. Video connections enable new ways for patients and the health care system to maintain contact through visual consultations or digital outpatient clinics. Also, they offer new ways for those working in the health care system to interact with one another via digital meetings aimed at relationship building and knowledge sharing, or alternatively handing a patient over from one sector to the other. That video connections enable both patients and health personnel to see each other is something that is recognised as making a great difference, compared to just a telephone conversation.

Increased quality of care and patient involvement

As patients can now be involved in their own care and health situation to a greater extent, increased patient empowerment was emphasised as an important effect of digitalisation during interviews. A solution such as video consultations can also reduce the number of visits needed to a health facility. This can be especially important for citizens with chronic illnesses who need to have many different types of contact with the health system, and who constantly get confronted with their position as a sick person – when sitting in waiting rooms, for example. Through video consultation their role as patient is less obvious psychologically, which can contribute to positive mental well-being. Increased feelings of safety resulting from digital monitoring solutions were also reported positively, because citizens can follow the development of their condition, as well as knowing that health professionals will be alerted if a significant change occurs. In these ways, digitalisation can be considered a means to achieve the wider vision of the health care and social care system: namely, to provide patient-centred care.

Health care workers at the regional clinic in Morsø municipality are now able to get in touch with patients who they would otherwise not have been in contact with, especially psychiatric patients. For this patient group, going to a clinic where they need to relate both to staff and other patients can be an overwhelming experience. As a result, they may choose to stay away.

Less transportation

Digital solutions such as video consultations and monitoring devices make it possible for patients to avoid long (and for fragile patients) exhausting, journeys to and from the hospital. Such travel also brings about other stress factors, like long waiting times and difficulties in finding parking spaces. Digital solutions can also result in more flexibility for patients, who can avoid taking time off work to travel to a health facility. Examples presented during interviews included patients having the possibility of conducting their appointments from a second home, or for a truck driver to take an appointment from a parking lot on the highway. Though video consultations produce many positive effects for patients and the health system alike, interviewees emphasised that digital “meeting” must be seen as a supplement to physical appointments, since not all consultations are appropriate for being conducted via video. In addition, each patient needs to be evaluated individually, in order to assess whether a video consultation is what should be used. However, follow-up appointments are especially highlighted as situations where it would make a great deal of sense to conduct many of these meetings digitally.

Less requirement for transportation also produces economic benefits for the region, because reimbursements for patient travel can be reduced. Interviewees also stressed the positive environmental effects of minimising transportation needs.

Recruitment and quality assurance

At the regional clinic, digital technologies are recognised as being a possible solution for the challenge of recruiting general practitioners into rural areas. By offering video consultations to patients, doctors can achieve more flexible working schedules, because they no longer need to be physically present on all days during the week. Currently, a doctor works three days at the clinic and two days at a distance during the week, for example. Besides increased flexibility for both patients and doctors, another potential benefit is increased continuity for patients in terms of the general practitioner they see.

A number of other beneficial effects are already being experienced when it comes to digital meetings – for example where health care professionals working within the same field, but located in different geographical locations, can join meet-

ings for the exchange of experience and knowledge. These meetings are considered helpful in lifting the quality of health care, because colleagues geographically far apart can easily get in contact with one another and discuss medical situations. Digital meetings hold the potential to improve the transition from one health care sector to the other through digital handover meetings. However, however meetings that involve many different participants demand that working procedures are well-coordinated, which can be a challenge in itself.

To experience the greatest benefits from digital solutions, interviewees said that it is necessary to operate at a regional or even national level, and to focus on cross-sectoral collaboration. In a local study, referred to by one manager in the region, the conclusion was that few and simple alterations to the municipal care system could have major beneficial effects for the regional health care system. As such, cross-sectoral collaboration is considered key for reaping the great potentials of digitalisation. However, at the moment, the cross-sectoral collaboration is considered a central hindering factor in terms of further progress.

For a rural municipality such as Morsø, the primary effects emphasised by interviewees are, first, better and easier access to specialists and to the health system in general; second, that patients can avoid long, exhausting and unnecessary journeys to and from health facilities; and third, securing good quality health care provision through easier recruitment of general practitioners and better knowledge sharing and contact with health colleagues and specialists for quality assurance. Cost reductions from unnecessary hospitalisations and patient transportation is considered a significant potential effect from a regional perspective.

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4.5 Digital health care and social care in the East Iceland health region

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For the Icelandic case study, the municipalities of Fjarðabyggð and Fljótshálsa were selected. In total, 11 interviews/group interviews were conducted, involving a total of 15 people. The interviewees came from the health care system at both local and national level, from regional organisations and local authorities, as well ministries and public health care institutions operating at national level.

Total population 2019* ₁	13,059
Population change 2009-2019* ₁	1.63%
Life expectancy at birth (Iceland)* ₁	Females 83.2 Males 80.6

Public sector share of gross value added 2018*₁

Number of hospital beds per 100,000 in 2017*₃

Household access to fixed broadband at 100 Mbps* ₃	21.19%
Passenger cars per 1,000 inhabitants* ₂	755

*Sources: ₁NSI, ₂National telecom agencies, ₃OECD

The health care and social care system in Iceland

Iceland has a state-centred health system, with universal coverage, which is mostly publicly funded, covers all residents, and has a partly integrated purchaser-provider relationship. The national health insurance system is financed through the annual national budget (OECD, 2019). The structure of the Icelandic governance system, its small population of just over 360,000 people spread around a large geographical area that covers over 100,000 km², and long distances between larger settlements – all contribute to a quite centralised health care system. There are just two governance levels in Iceland, the governmental and the municipal. There are no administrative regions, but the country is nonetheless divided into seven different health regions. The responsibility for providing specialised and primary health services lies with the government, and the Ministry of Health is responsible for health care within the regions. Specialised health care is mainly provided at the larger hospitals in Reykjavik and Akureyri.

The Ministry of Social Affairs and the Ministry of Transport and Local Government are responsible for home care and social support in the health regions. Over the past years and decades welfare tasks have gradually been moved from the state level to the municipalities. One of those tasks is “the care of people elderly”. The operation of nursing homes, along with the residential day care of the elderly, is therefore largely in the hands of municipalities and private providers. However, it is financed by the state government through daily expenses (Samband, 2018).

It can therefore be claimed that the governance of the primary care system is slowly becoming less centralised – even though the state is, and probably will be, the main actor in the field for years to come. Budgets are established at the national level, but the management of primary care centres has been decentralised to regional levels. For example, regions are now encouraged to support the development of health centre networks in rural and isolated communities, in order to improve after-hours services. Nonetheless, the main financial responsibility for providing necessary social and health care lies at the governmental level and with its institutions, which makes the whole health care system more centralised compared to Iceland’s neighbouring countries.

Strategies and policies: national, ‘regional’, and local level

A national eHealth strategy was published in early 2016 by the Directorate of Health, which is a governmental institution. This strategy mainly refers to eHealth as the connected and integrated electronic registration of health records, and the possibilities such a database can provide: “...opportunities for Big Data analytics, e.g. to measure outcomes of healthcare delivery, for quality control and quality improvement of the healthcare system. It is fundamental to use this dynamic information source for the good of the patient, consumers, health professionals, administrators and the government to support decision making and to increase efficiency and quality of the healthcare system for better population health.” (Landlækniir, 2016, p.2)

The main focus in the eHealth strategy is therefore on improving access to information on health records and health services, thus contributing to patient safety and the quality of care, including more efficient use of financial resources. Four main objectives are presented in the strategy to achieve these goals: to ensure secure and seamless access for health professionals to patient information whenever and wherever needed; to ensure secure and seamless electronic access for consumers to their own health information whenever and wherever needed to ensure the security and quality of health information within electronic health records; and finally the need for enhancement of electronic health record data retrieval and information dissemination. The national eHealth strategy is therefore almost entirely concentrated around access to electronic data (Landlækniir, 2016).

In Iceland’s National Regional Development Plan for the years 2018-2024, a broader understanding of the term eHealth is outlined. In the regional development plan eHealth refers more to digital doctor “visits” and goes beyond data registration. The current Icelandic government has also put eHealth on its agenda, and it says in the government’s policy statement that innovation in health shall be promoted so that Iceland will be at the forefront and utilise the latest technologies within the field, including the use of telemedicine. The same document also emphasises the further development of high-speed Internet connections throughout the country, in order to be able to develop telemedical solutions (Alþingi, 2018).

In 2017, a working group was appointed by Iceland's Ministry of Health Services³ to formulate proposals for the continued construction and development of the path to organising and implementing "distance health services". The tasks of the working group were: to conduct diagnostic work related to the implementation of distance health services, to make proposals for possible projects that could be started soon, and to secure cooperation within and between institutions. A part of this new policy is also about encouraging and including municipalities in the development of distance-spanning solutions and eHealth, creating synergies between the health services the state provides and the social services that are the municipalities' responsibility (Velferðarráðuneytið, 2018).

In 2018, the working group delivered its final report. It was divided into two main chapters. The first chapter focuses on the necessary prerequisites for remote health care services and the current environment. Much of it is understandably about technical issues, but the report also discusses the optimisation of skills and knowledge which is already available, but not readily accessible for people in the smaller towns and more rural areas.

The second chapter introduces specified proposals for remote health care projects which could be launched soon. Among the recommendations for the Minister of Health was the proposal to develop a new national policy within the field of eHealth, and to secure finance for the sector – especially regarding the technical part. There was also a suggestion about appointing a specific advisory group with specialist knowledge in related technical issues, laws and quality assurance – but also knowledge about innovation in health services, in order to develop such a policy and secure its smooth implementation across the whole country.

Finally, there was a recommendation to start a number of 'health care at a distance' pilot projects over the next three years (2018–2020), focusing on projects which secure access to specialised doctors (often located in urban areas only) and which contribute to better the communication between medical specialists and health institutions. One of these projects, started as a result of this policy, is

the subject of this case study. This is the ongoing pilot project from Kirkjubæjarklaustur municipality in the South Region, which was expanded to municipalities in the East Health Region, where four locations have now been equipped with telemedicine clinics.

Another policy document which carefully addresses distance-spanning health solutions is the Minister of Health's policy chapter published in the financial plan for 2019–2023. This plan envisages increasing the access of patients to specialised health care services and outlines the possibility of providing a wider range of services in patients' home region. This is partly to be done by securing specialised health services outside the capital area, by increasingly providing services of specialists working at larger health institutions, utilising regular visits to the regions and greater use of digital connectivity (Fjármála og efnahagsráðuneyti, 2018).

The same document mentions the need to increase the proportion of patients receiving specialised nursing care at home. The Government stipulates that home care needs to be re-evaluated, and that it is important to enable elderly people to live as long as possible in their own homes with appropriate health care and social services. It says in the policy that through the introduction of distance health services, efforts are being made to make the public's access to general and specialised health services more equal. It is intended that promoting distance health services in rural areas through contracts with specialist hospitals will also increase the number of jobs in rural areas without the necessity for placement. As such it is seen as beneficial both for providing better health care and securing more local jobs in rural areas, while also improving the knowledge and experience of health care professionals, and meeting the service needs of individuals in those areas (Fjármála og efnahagsráðuneyti, 2018).

Due to the sparse population and large service area for the health regions, eHealth is increasingly promoted as a solution. Although many of the distance-spanning solutions utilised in health service provision are still in the planning phase, digital services have recently been used to a greater extent by general practitioners, for consultations and guidance offered through telemedicine clinics. These have been placed in selected areas in some rural regions (OECD, 2019; plus interviews). One such pilot programme is discussed in this case study.

3 For clarification: Until 2019, health and social affairs were the provenance of the Ministry of Welfare but, from 1st January 2019 the ministry was divided into two – the Ministry of Social Affairs and the Ministry of Health.

Description of the Icelandic case: Fljótsdalshérað and Fjarðabyggð

Fljótsdalshérað and Fjarðabyggð are two municipalities in East Iceland, together covering a large and diverse geographical area. The region is characterised by fjords and the sea in the east, with mountains and the highland area stretching from Iceland's only forest to the national park of Vatnajökull glacier and the Kverkfjöll mountains.

The areas that is now known as Fjarðabyggð was in fact nine municipalities back in 1987.⁴ However, the following year a reform process began. As a result, the last municipality of today's Fjarðabyggð joined in mid-summer 2018 (Fjarðabyggð, 2019). There are no larger cities in the region, but a total of seven towns, or more urban settlements, are located within Fjarðabyggð. The northernmost is Mjóifjörður, one of the smallest villages in Iceland, with a population of just 15. On the other hand, Norðfjörður is the most populated part of Fjarðabyggð, with a population of 1,469 (Hagstofa, 2020).

Fljótsdalshérað formally became a single administrative municipality in 2004, when the residents of three municipalities agreed in an election to merge their municipalities into one. Previously, smaller municipalities had merged in the 1990s.⁵ There are no city-sized urban areas in Fljótsdalshérað, but the largest urban settlement is Egilsstaðir and Fellabær, with some 2,899 residents (Hagstofa, 2020) & Fljótsdalshérað, 2019).

In late October 2019, the neighbouring municipalities of Borgarfjarðarhreppur, Djúpvogshreppur and Seyðisfjarðarkaupstaður voted for a merger, along with the residents of Fljótsdalshérað. Upon their merger, the already geographically largest municipality in Iceland became even larger. The two municipalities together therefore make up the majority of the East Iceland health region, which in total has just over 13,000 inhabitants and a geographical area of 22,721 km².

These large distances make it more difficult for residents in more rural areas to receive services

which are largely provided by more urban areas. At the same time, this dispersed settlement and the size of the municipality increases its diversity and land quality, both with regard to agriculture and no less in terms of tourists coming to the region.

As mentioned earlier, there are only two levels of governance in Iceland, governmental and municipal, and therefore no formal regional authorities. Nonetheless, many municipalities collaborate on different social and health related issues. Fjarðabyggð and Fljótsdalshérað, along with the other municipalities in the region, cooperate on various social affairs which they are directly responsible for providing. Health care, however, is the responsibility of the Icelandic national government.

Digital welfare solutions on the agenda

Different representatives from municipalities that cover the East Iceland health region were interviewed for this case study. They were all in agreement that there is much potential in distance-spanning technologies. However, the current use of such technologies in home care and other social service tasks that the municipalities are responsible for remains very limited. Both at a state level, and in the municipalities, the importance of innovation and technology in service delivery to the elderly and other social matters is on the agenda, however.

In 2016, the Minister of Social Affairs and Housing released a report on innovation and technology in the field of welfare services. This puts forward the understanding that welfare technology can change, and most likely will change, the future of Iceland's welfare services (Velferðarráðuneyti, 2016). The people working on these issues at the municipalities in East Iceland share this vision. They are very well aware that one of the main challenges is a foreseen change in the age of the nation's population – in particular, an increased ratio of senior citizens, especially in more rural areas. At the same time, while future senior citizens will live longer, be healthier and have better overall living conditions than previous generations, they will also most likely be better aware of their rights, too. They will make different demands on the welfare service provided to them, and will want to have more of a say about issues involving them. They will also be better acquainted with technology. Because of all this, both national and municipal authorities are optimistic that digital solutions can help to provide better services, for

4 These municipalities, from north to south, were: Mjóafjarðarhreppur, Norðfjarðarhreppur, Neskaupstaður, Helgustaðahreppur, Eskifjarðarkaupstaður, Reyðarfjarðarhreppur, Fáskrúðsfjarðarhreppur, Búðahreppur, Stöðvarhreppur and Breiðdalshreppur.

5 Jökuldalshreppur, Hlíðarhreppur and Tunguhreppur merged into Norður-Hérað. Egilsstaðabær, Skriðdalshreppur, Vallahreppur, Eiðþinghá and Hjaltastaðþinghá merged into the municipality of Austur-Hérað. These two municipalities, together with Fellahreppi, then merged into Fljótsdalshérað.

Map 4.1. East Iceland health region covers the seven municipalities shown above. Since late 2019 Fljótsháð has merged with Borgarfjarðarhreppur, Seyðisfjörður and Borgarfjarðarhreppur. Those municipalities, along with Fjarðabyggð, together make a geographically very large area with few inhabitants.

example in social service provision for the elderly. Our interviewees agree that introducing more and better digital solutions is necessary in itself, and for being able to help fulfil many of the demands of those using these services.

Currently there is groundwork being conducted by the Ministry of Welfare, along with the coalition of municipalities (*Samband íslenskra sveitarfélaga*), which needs to be completed before implementing, and then moving towards, further digital solutions. This work focuses on cooperation between all relevant stakeholders and is built on the policy and strategy presented in 2015. This strategy has clear goals for innovation in welfare services, concerning how technology can be useful for citizens and can contribute to a better quality of life. According to this policy, welfare technology can be divided into four main areas: security technologies, social communication technologies, training and self-care technologies, and such techniques as may compensate for loss and support improved wellbeing. The areas of focus for this are care, assistance, assistive technology, rehabilitation and support in the labour market; while on the

institutional side it focuses on planning and employee training.

With the exception of electronic data sharing, the use of distance-spanning technologies in Iceland is still rather limited, but many possibilities are on the agenda and in development. Recently, however, more direct distance-spanning solutions have been introduced within health care in East Iceland, which has actively been using and experimenting with the use of telemedicine clinics, for instance.

Digital health care solutions in use in the region

Many digital solutions for internal and external communications, access to medical data and suchlike, are in use all over the country. Being part of a central national health care system, the East Iceland health region uses many of these digital solutions. But since 2018

more emphasis has been placed on specific pilot projects, providing specific solutions for the more remote areas. These have been introduced in East Iceland, expanding on good results from a pilot project in Kirkjubæjarklaustur municipality in the South Iceland health region.

Digital communication and online platforms

The National Centre for eHealth is the responsibility of the Directorate of Health. It includes an electronic medical record which can be accessed across all health institutes in the country. It is also accessible for individuals wishing to obtain an overview of their own health information. The electronic health record consists of many specific health information systems used by health care professionals, such as general medical records systems, pharmaceutical prescriptions, laboratory systems, radiology systems, surgical systems, booking systems, references, etc. This constitutes the WHO's definition of eHealth, which is the use of information and communication technologies for health (WHO, 2019). The database is in use across the whole of Iceland. In the East Iceland health region,

there has also been the introduction recently of a broader set of technologies which support care between patients and providers in different locations. The OECD defines this as Telehealth (OECD, 2019).

A large part of the day to day activities of health care in East Iceland involves telephone consultations. This form of service has been around for as long as telephones have been in common use, and as such it is not defined as a 'digital solution' within the health care system. However, it is clearly a distance-spanning technology, and is (and has been for a long time) a useful tool for limited consultations, re-prescription of medicines, and other minor tasks. It is also, according to interviewees, interesting to compare regular phone consultations to digital 'phone calls' in the context of Icelandic law concerning individual privacy. According to law, telephone consultations are normal practice, but when the communication becomes 'digital' then other, much stricter rules apply.

Telemedical examinations and consultations

The physician in the East Iceland region is physically present in that region for ten days every month. The rest of the month he works from the capital, Reykjavik. However, he is fully employed by the hospital in Neskaupstaður in East Iceland. The doctor's main tasks are telephone consultation. He can renew prescriptions for medicine, and is now also able to do patient examinations through digital equipment (Interviews).

In 2018, the health authorities in the region received financial support to buy telemedical equipment, which is now located at four places across the region. This equipment is situated in health centres, and it is operated by nurses. A person can come into the health care centre nearest to their home location, and can be examined by a doctor situated some 700 km away. All communication is encrypted by the device, so the doctor can use a normal computer or telephone. That means he can be located anywhere while performing the examination (Embætti landlæknis, 2019). From the autumn of 2019, a nurse has been hired exclusively for this project. Hopes are that more nurses may be hired to operate all four telemedical centres, with only the one doctor "at the other end" for all of them (Embætti landlæknis, 2020).

Conversations have taken place with some specialist departments at the hospital in Reykja-

vik (the heart, psychiatrics, and diabetes departments) concerning further cooperation. This has not led to direct collaboration so far, but it demonstrates both possibility and interest in developing the service further. Although telemedical equipment has only been in use for a few months in East Iceland, and the project is therefore still in its initial phase, health care staff in the region are in agreement that the experience has been good so far. The equipment is also cited as a valuable addition to the overall health care service that they are able to offer across the region.

Challenges

When analysing the Icelandic case some challenges concerning the smoother implementation and further development of digital distance-spanning solutions in health care were identified. Many of them are overlapping, but they are divided into several categories below, for clarity.

Technological challenges

Interviewees identified challenges with regard to the technological aspects of new devices and data software. Mainly they noticed that when new equipment had been purchased or installed, the funding needed to train employees to use it properly did not always follow with it. This was considered by some to reflect a strange priority in the use of finance – that is, investing in expensive equipment, but not funding the necessary training of personnel or securing finance for new positions to operate these new solutions properly.

The importance of considering the user aspect of new equipment was also mentioned by many people. That is, "consulting the consumers", or those using the service, in implementing and developing its solutions. Some raised concern that routines and ways of providing services would have to be tailored suit the technology, instead of the technology meeting the needs of its users. A common opinion was that the focus needed to be on both ends of the conversation, and that user participation and consultation should be used actively in the development of new solutions.

Some concern was expressed about the slow development of certain additions to digital platforms and solutions meeting the needs of personnel, based on user experience. People also said how important it was to have a holistic view of digital development, and not unnecessarily to use many

different systems for similar work. The need for good integration and cooperation in developing digital transformation was also mentioned in this context – making sure, for example, that home assistance, home medical care, and social care do not use three different systems when they could be better integrated into one system.

It is a problem when different actors operating in the same field are using different systems, especially in a small country like Iceland. Additional costs then become too much of a barrier in making the systems compatible with each other. While health care has a common system for the whole country, some private clinics use different systems. In the past that has caused the medical records to be less than complete. A unified, central system for medical data is clearly an advantage in this sense, because all public health providers are then using the same system. However, municipalities sometimes each use their own solutions for simple things like registration for social services, and these are not always compatible with parallel systems in other municipalities.

Cultural challenges among professionals and users

Positive views on introducing new digital solutions were reported among most interviewees in East Iceland. This was the case both for users and staff – with a few exceptions on the user side, due to scepticism about the technology. Most often, however, staff were able to introduce the benefits to user, with positive results and experiences.

Even so, it was also reported that it has sometimes proved difficult to change institutional routines among personnel, especially in the absence of the training needed for using new equipment and software. Changing routine processes and structures, and getting digital solutions solidly anchored in daily practice without proper knowledge, was noted as a hindrance to progress. In some instances, it was reported that the technology itself seemed to be the priority, not how to employ it to benefit professionals and users.

Regarding home care and social services, the few examples of limitations in introducing digital solutions were mainly reported to be due to lack of technological competence among some users.

Regulatory challenges

Clear differences of opinion emerged concerning how fast or slow the transition to a more digitally-oriented health care was advancing. Some interviewees within health care expressed the view that changes were happening too slowly, while others said that they were too fast. From the standpoint of the state, it is clear that changes need to be introduced gradually, securing a smooth transition and making sure that everything is done according to the requisite laws and regulations.

The current laws are also a factor in how rapidly changes can be made. Privacy considerations and the law on individual rights of privacy were repeatedly said to be too restrictive for the natural development of digital health care solutions at a distance. While everyone agreed that the individual's health records are very delicate information, demands on security were seen as too strict and inconsistent. In this respect, interviewees referred to the aforementioned example of a patient calling a doctor for a consultation. This was fine, according to the law, if it was made by telephone. However, if the call took place via a digital channel, a number of demanding security measures had to be taken. Some went so far as to say that privacy laws are restricting the development of digital solutions in the health industry, because there are simply too many unanswered questions, and matters to clarify, in relation to the protection of patient data. All of this delays the digitalisation process.

Some of our interviewees said that some degree of simplification was necessary on this matter. They wondered why banking, financial and other personal information could be almost exclusively digital, while regulations and standards for privacy regarding health issues were stricter.

Governance challenges

The question of ownership of a service provided at the start of a transition process towards new digital solutions, and the introduction of new technology, has caused some challenges for Iceland. Limited local anchoring seems to play a role in this, since many of the public services provided in Iceland are the responsibility of national government and not the local authorities.

Regarding health issues, the government's role is clear. The state finances and provides the service. Within the Ministry of Social Affairs, the role is more policy-oriented. The municipalities them-

selves have to carry out the services. Through their collective organisation (*Samband íslenskra sveitarfélaga*), municipalities negotiate with the state about how the necessary services will be provided and funding.

Many different national and regional level policies must be considered when moving plans forward. Special growth plans for the regions, the National Health Act, the regional development plan, and so on – these are not always in line with one another when it comes to issues like providing social services. Difference of opinion can be found between the state and some municipalities about how to divide specific tasks and how to fund them (Samband, 2018). While both policy and the law say that equal access to welfare services must be secured across the country, different levels of governing authority do not always agree on how to go about this, which can be challenging.

However, recent policy development has been addressing these issues. It aims to work towards more cooperation among all relevant stakeholders, encouraging an increase in place-based participation, and thereby creating more “local ownership”.

Structural and institutional challenges

One of the main obstacles to further expansion regarding the possibilities of telemedical technology in East Iceland lies in the structural and institutional framework of the Icelandic health care system. A significant proportion of primary care is provided by private specialists. These have contracts with the state through the Icelandic Health Insurance scheme⁶ (OECD, 2019). While it has proved hard for many regions outside the capital area in Iceland to recruit medical professionals, telemedical technology has made it possible for certain examinations and consultations to take place at a distance. Despite this, it has been hard to secure the services of specialists, and partnership from (for example) privately operated health clinics located in Reykjavík.

Health centres in the capital, as in most parts of the country, have more than enough on their plates right now. They are not interested in tak-

ing on these tasks. Some of our interviewees said that being able to forge such collaboration would be very beneficial to the care they would be able to offer across their region. Even so, they understood this to be hard to achieve, because there are no legal obligations, nor financial gains, to be made from it (Sjúkratryggingar Íslands a, 2019). Some added that structural reasons, and the way contracts are made between specialists and the state, plus the personal benefits of certain health professions, have all contributed to the fact that a more digitally-oriented health care system has been slow coming. It was a common view that because of how things are, and how they have been structured in the past, changes are going to be difficult to achieve.

“When it is not financially advantageous to develop and adapt to change, the simplest thing to do is to carry on as usual. There is no interest from health care centres in other places in Iceland to ‘meet patients’ from East Iceland through distance solutions, simply because they do not see the financial benefits compared to meeting patients the way they have always done, face-to-face at their clinics. They already have enough patients and while there is no financial incentive or a legal obligation either, they are reluctant.” So said one interviewee, adding that there could be more productivity in all aspects of the health care with the advent of more digital solutions. The interviewee continued:

“The financial incentive is none, and while it is not one hundred percent clear how to bill for a video meeting with a doctor, and the contracts between specialists and Icelandic Health Insurance lack clauses on ‘securing regional services’, developing telemedical services will be a tough task. Specialists have contracts with the state over performing certain services, but there is nothing in those contracts about where those services are to be performed. According to law, everyone is entitled to the same health care, and it is illegal to discriminate based on residence. Still, there is nothing in the contracts between Icelandic Health Insurance and the doctors about the placement of their services. If they have no obligation to serve the rural regions and can fulfil their contracts from their clinics, they are going to do that, since it is the most convenient [thing to do].”

⁶ Social insurance in Iceland is financed by the State Treasury. People do not pay special premiums for their social insurance; instead, employers pay premiums to the State Treasury on all wages paid. The funds collected by these means are used, among other things, to finance social insurance (Sjúkratryggingar Íslands, 2019).

According to this argument, it could be said that the health care system's structural and regulatory foundations have not developed in such a way as to work more effectively with eHealth and telemedical services. While the challenge is mainly structural and institutional, it is also about the distribution of funds. It could therefore be considered an economic challenge, too.

Economic challenges

Funding health care is expensive, and a challenge common to many welfare states. Ageing populations, along with continued technological progress, are expected to put more pressure on health spending over the coming years. A higher old-age ratio will increase the need for health and long-term care at the very same time as fewer working age people are available to meet those needs. Based on OECD projections, the health spending share of GDP is expected to grow from 8.3% of GDP in 2015 to 10.4% of GDP in 2030 under the current set of policies (Lorenzoni *et al.*, 2019).

In rural regions, like that of East Iceland, the economic challenges in providing sufficient health care and social care in the coming years will be even greater than in larger urban areas. It is already very hard to attract competent medical staff. Often they have to be hired for shorter periods of time with higher salaries. This is one of the reasons why telemedical solutions are seen as attractive. However, even though digital solutions can solve some of the personnel challenges, the new technology does not solve anything by itself.

In East Iceland, some interviewees pointed out that after receiving funds to invest in expensive telemedical equipment, finance for personnel to operate it had not followed. Nor had finance to provide the necessary training for those already employed, so that they could use the new technology properly. The health region already has four telemedical clinics operational, and discussions have been ongoing about installing a fifth one. According to locals, the need for funding for more personnel is now much greater than for more equipment. This is also an example of the mentality some have towards the development, whereby technology and equipment is itself seen as the solution. Some interviewees expressed the view that digital solutions could never be seen as complete solutions, or as replacements, but must always be viewed as an additional to the kind of services already provided.

Effects and potentials

Even though there are some challenges to overcome in the implementation phase of digital solutions within health care and social care, there are also many positives and potentials identified by those working in the sector.

Increased access to care – saving time, transport and money

While interviewing people working with health care in East Iceland, it was regularly mentioned that telemedical solutions are a necessity for offering certain types of service. With these tools, it was possible to add to the availability of regional services which would otherwise need to be sought far away. In other words, through digital solutions, services that have not been available before can now be offered. In more remote places, like the settlement in Borgarfjörður Eystri, these changes have been described as revolutionary. Borgarfjörður had no medical staff for a long time. However, since late 2019, a nurse has been present and is being trained to operate a telemedical clinic. So the service went from being non-existent in the village to one where it was possible to meet a nurse, to 'see' a doctor, and to do so with short notice, in their own town, through the assistance of a digital solution.

In this case both health care professionals and patients save time and transport, thus also contributing to less energy use and fewer CO2 emissions. The state saves itself the travel compensation it would otherwise have to pay to the patient, or the salary and travel costs of a health care professional having to travel to more remote regions. These economic savings can then be allocated to other purposes. Employee travel time costs can be used more efficiently, for example, while the process as a whole provides more equal and convenient access.

More efficient health care

According to many interviewees, the Icelandic health care system has been very conservative in its development. Some said that the most effective and efficient way of conducting primary health care was not necessarily through a doctor's visit. In many cases a doctor's presence was not needed to deliver a satisfactory result from the visit. Often the intervention is more counselling oriented, or a routine task that other health care staff are perfectly qualified to resolve successfully.

In this case, interviewees referred to the experiences of a neighbouring region in the south, where the Klaustur project has been using tele-medical technology for some years now. This experience illustrates how technology is in fact used for diagnosis less-and-less, since the doctor at the other end trusts the judgement of the nurse operating the machine and treating the patient more-and-more. The nurse's skills and experience in making the correct judgement have developed through using the technology and by consulting a doctor. In this way, both efficiency and productivity has increased with the use of technology, while also providing improved access to health services for local people across the region.

Increased quality of care

Telemedical equipment – with its hi-tech cameras, recording equipment and measurement tools – can also increase the quality of decision-making on the part of medical staff. The equipment can directly register data into an electronic medical record, adding photos and other more detailed information. The technology therefore helps to create more thorough documentation, and it also helps a health care professional to make appropriate comparisons and be better in their treatment decisions. Detailed photos and documentation can help to determine if a condition is getting worse or better, and therefore assist decisions about whether further treatment is necessary or not. This also contributes to a better use of finance, for example by decreasing the unnecessary use of medicine or other medical interventions as a precautionary measure. Technology is therefore both adding to the quality of decisions made by health care staff, and helping to eliminate unnecessary expenditures.

These factors were highlighted by the medical staff interviewed, and they were identified as an indicator of the many possibilities that exist for further employing digital solutions in improving services not only for patients, but also for professionals.

Increased quality of life for patients and relatives

While some of what has already been mentioned contributes to increased quality of life for patients and medical staff, it also has positive effects on users' relatives, people noted. Having to travel long distances for medical purposes often par-

ticularly effects close relatives, because in some instances patients simply cannot travel by themselves. Some therefore mentioned that a definite gain in being able to offer better services in the home region was increased independence on the part of users of the service. Overall, great appreciation was expressed regarding digital solutions in both health and social matters, and there was less scepticism towards this than many had anticipated. One interviewee pointed out that most people were already doing things digitally, and were therefore quite used to it. People are now familiar with different technologies, and generally trusting towards them. Because of that they have no problem taking a digital step forward in health care, as well.

Expectations and aims

Most of those interviewed for the case study saw moving towards further digital solutions in health care and social care as an inevitable development. Both on the state side and at the municipal level there was agreement that in a small country like Iceland there is no choice but to try and find common ground. It is necessary to cooperate on as many levels as possible, to create synergies, and to seek to save time and resources. Different policies and plans are therefore united in their intention of working towards the same goal: making sure that access to welfare services becomes easier and more equal. The different public documents – the National Health Policy, regional development plans, special growth plans for vulnerable rural regions, municipal plans, etc. – do not always agree on how to achieve these goals or how things should be done, however.

In the policy of the Ministry of Social Affairs, it states that welfare services, especially for the elderly, will in future be more intense, and will need to show improved results. That requires those who attend to these services to adapt to a broader way of thinking. It calls for increased flexibility in the organisation of institutions and work units. Innovation in service delivery for the elderly will make tougher demands on staff at all service levels, regarding technical skills, knowledge and experience in meeting the individual needs of those who need to use the service. Digital solutions are therefore seen as important contributions towards meeting the future demands of social services. This view is shared by the Federation of Municipalities in Iceland (Velferðarráðuneyti, 2015; Samband, 2018).

New policies aiming at greater collaboration between all stakeholders, and including the local authorities more in the development, have now been introduced. Work based on this cooperative plan has begun. Cooperation between municipalities on different social and welfare issues, and over various other matters, is already a fact. So further collaboration with local actors in developing services the state provides, like health care, is now also on the agenda. At both the state and regional levels, people see enormous potentials in the development of digital distance-spanning solutions, both for social and health care-related affairs.

The current strategy of seeking more collaboration between the state and municipalities on social issues aims to create fresh possibilities for cooperation between the local community, users and other stakeholders – while also successfully preparing for change, collectively increasing knowledge, and enhancing capacity-building. Providing the right solutions, and identifying ways to disseminate those solutions, is considered necessary for increasing the quality for users, and also for improving welfare service working conditions.

On the health care side, the implementation of pilot projects for an increasing use of telemedicine is underway. Its goals are to create new means of communication, and new ways of conducting operational processes, while also empowering both health care professionals and the public users of health care to embrace the real possibilities of eHealth. Creating synergies between health services and social services is also one of the goals, as is integrating new ways of approaching welfare-related matters.

Iceland is in a unique position to develop an exemplary functional eHealth system, and to make the most of available distance-spanning technologies in improving health care. The country has strong infrastructure, a good overall health system, and very competent medical staff. The development of telemedicine has already begun, and has been successful where it has been tested. Its development is, however, somewhat behind Norway and Sweden, for example. Iceland could therefore pick up on the success stories from its neighbours, while avoiding their mistakes in creating a well-functioning telemedical system – using the advantages of having one central actor in providing health services for the whole country, while also involving regional authorities in the planning and decision-making process.

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4.6 Digital health care and social care in Greenland

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In Greenland, five interviews were conducted, with a total of eight people involved. Some of these were carried out while on a fieldtrip in Greenland, along with three in Nuuk and one in Kangerlussuaq. Due to the COVID-19 outbreak in the spring of 2020, several interviews had to be conducted via Skype, though researchers were in place in Nuuk. The fieldtrip to Sisimiut was cancelled. Upon return, the remaining interviews were also conducted via skype.

Public sector share of gross value added 2018

Total population 2019	55,992
Population change 2009–2019	–0.3%
Life expectancy at birth	Females 72.45 Males 68.65

Sources: NSI

The health care and social care system in Greenland

Health care in Greenland is organised and run at state level by the Agency for Health and Prevention, which includes both primary and secondary health care, as well as dental care. The five municipalities are responsible for care services, including home care and nursing homes. The private health care sector is almost non-existent in Greenland.

For organisational purposes, the country was divided into five health regions in 2011. These have the same geographical scope as the five Greenlandic municipalities. In each health region there is a regional hospital. Dronning Ingrid's Hospital, in Nuuk, functions as the national hospital (Statistics Greenland, 2018; Larsen, 2019). The regional hospitals provide the core health service in each region, but other, additional types of health facility have been established in the smaller towns and settlements. Larger health centres are located in towns with more than 1,200 inhabitants, where staff include doctors and nurses, among others. Emergency care is also located at the larger health centres. Smaller health centres are located in towns with a population of between 500 and 1,200. Here staff include nurses and health assistants. In settlements with 200 to 500 inhabitants, nursing stations are in place. These are typically manned by two health workers, e.g. a nurse and an assistant. In smaller settlements, settlement consultations have been established. These are minded by a health assistant (Larsen, 2019). In total, the Agency for Health and Prevention runs 74 health facilities across Greenland. In 16 of these, there are doctors.

In the mid-1990s, telemedicine was first introduced into the Greenlandic health system. In 1999, the Directorate for Health and Research adopted a three-year action plan for the implementation, development and evaluation of telemedicine (Stensgaard, 2000; Højgaard, 2016). The objective that drove this early focus on digital solutions was the need to secure equal access to health services for all citizens. In the current national digital strategy, one of the central aims is to continue the digitalisation process within the health care system. This is because digitalisation is perceived to be vital in the effort to create a coherent and operational health system (Digitaliseringsstyrelsen, 2018). A central goal is to have one shared electronic patient journal system for the entire health care system. Though most facilities are connected to the

same system, some facilities in Eastern Greenland use another one, due to (among other things) digital infrastructure challenges. In the digital strategy, a key objective is to explore the possibility of connecting the municipal care sector to the electronic patient journal system.

The geography, infrastructure and Arctic climate in Greenland create a radically different situation for the delivery and management of health care and social care compared to the other Nordic countries. As towns and villages are not connected by road, Greenland is heavily dependent on marine and aviation infrastructure – the latter, especially. Most Greenlandic settlements either have an airport or a heliport (Jungsberg *et al.*, 2019). In addition, there are socio-economic factors which stand out in comparison with other Nordic countries and the autonomous territories. Life expectancy at birth in 2019 was 68.7 years for males and 72.5 years for females. These are significantly lower than the life expectancy rates in other Nordic countries. In Denmark, for example, both women and men are expected to live around 10 years longer. Suicide rates are also six or seven times higher in Greenland compared with the other Nordic countries (Statistics Greenland, 2018).

Digital solutions in the Greenlandic health care and social care sector

The central distance-spanning technology connecting towns and settlements to the regional hospitals is called Pipaluk. Pipaluk is a computer-based, storage and forwarding system which is connected to several medical devices in order to monitor and measure different vital indicators (Nielsen *et al.*, 2017). Pipaluk has been described as a “many-armed squid”, because it has a multitude of functions within its capacity (Højgaard, 2016). Results from these measurements are saved in the electronic patient journal, which can subsequently be accessed and analysed at the regional hospitals. Pipaluk is in operation in 68 locations. According to interviewees, more than 50% of employees who are responsible for the management of Pipaluk in the settlements are non-health care educated employees. They are personnel who have received a course enabling them to use the equipment properly. To be able to use the Pipaluk equipment effectively is the central skill required by staff working there.

The extent to which Pipaluk is used varies between the health regions. As such Pipaluk is only

*Pipaluk, placed on the right side of the bed, in a consultation room at the nursing station in Kangerlussuaq.
Source: Louise Ormstrup Vestergård.*

used as an access point to the electronic patient journal system at the nursing station in Kangerlussuaq in Qeqqa health region, while it is used on a daily basis in the Disko health region. In Kangerlussuaq, the essential technologies at the nursing station are the telephone and a digital camera. Pictures are uploaded to the electronic patient journal system, which is then accessed by doctors at the regional hospital in Sisimiut.

In the Disko health region all enquiries from smaller health facilities are conducted via Pipaluk, and it is estimated that the regional hospital in Aasiaat receives around 40 such enquiries a day. A system has been established whereby a nurse or an assistant at the regional hospital has responsibility for attending to all inquiries. In addition, a doctor spends one hour in attendance with more complicated cases. The established system and the fixed protocol for handling communication with smaller health facilities (and the enquiries received) is reported to be essential for harvesting the benefits that Pipaluk offers. In addition, it is important that the person who holds responsibility for communication with the smaller towns and settlements is skilled in both Danish and Greenlandic. This is necessary because employees in the smaller health facilities primarily speak Greenlandic, while the majority of doctors in the hospitals are

Danes.

Within the health system, telemedical solutions to send health data for analysis and diagnosis abroad, primarily to specialists in Denmark, are implemented across many fields. Examples are MRI scans and x-rays, plus photographs from dermatology and eye diseases. As Greenland is a small society, specialists are not available within all medical fields. They are therefore highly dependent on access to specialists abroad in order to provide health care. Teleneurology was implemented in 2016, firstly through an agreement with Roskilde hospital in Denmark, and later conducted by a neurologist located in Nuuk. The advantage of teleneurology is that better assessments of citizens can be made for the purposes of deciding whether a patient needs to be transported for immediate treatment at the hospital in Nuuk. Occasionally, smaller video snippets can be uploaded to the electronic journal system. These help to support the assessment.

Skype for Business, also referred to as tele-skype by an interviewee, is a central solution across the health system. Tele-skype is used for consultations, as well as being a communication tool between hospitals and the smaller health facilities. For psychological treatments, Skype is an indispensable tool. The psychology department in

Nuuk conducts consultations with patients across Greenland. In addition, psychologists have Skype meetings with child psychologists at a Danish hospital each week. These provide a forum for discussing patients and getting advice concerning treatment. That is essential, as there is no full-time child psychologist in Greenland. Skype for Business is also used for educational purposes, and for internal meetings in health regions, as well as meetings between health regions.

Increasingly telemedical consultations are used for patient assessment. This is where a doctor in Greenland and a doctor in Denmark collaboratively assess patients before they are referred on for surgery in Denmark. This procedure is currently in place for patients with back problems, with the result that fewer patients are sent to Denmark only to hear that they do not qualify for surgery. We are informed that, prior to this procedure, 50% of patients with back problems were rejected for surgery in Denmark, which has now decreased to 20%.

In Sermersooq municipality, digital solutions have been used in the care sector to a very limited extent. As an electronic patient journal system has not been implemented, all records are written down with pen and paper. The distance-spanning technology that is reported mostly used is the telephone, which is considered a central and important solution for daily operations within the care system. Recently, online education has been tested in the municipality of Sermersooq for dementia coordinators and nursing home staff in settlements on the east coast. The intention behind e-learning is to diffuse knowledge across vast geographical distances, and to support employees with the best possible tools for carrying out their work. Tests using digital supervision as sensor technology for citizens with dementia have also been conducted recently, but further knowledge of their effects and adaptation needs in relation to Greenlandic culture is needed. Though the significant potentials of digital solutions are acknowledged, interviewees report that digitalisation is not a prioritised focus area, because there are other urgent issues needing attention – especially the large turnover of staff and difficulties with recruiting well-educated staff.

The management of the Greenlandic health system reports that they receive more and more requests to test new telemedical solutions in Greenland. However, with a large turnover of staff

and limited resources to implement and drive the projects, they unfortunately have to reject some of these.

Challenges that effect the implementation and use of digital solutions

Recruitment-related concerns constitute a general and central challenge repeatedly emphasised in relation to the Greenlandic health care and social care system. The health care and social care sectors alike experience a large turnover of staff and have difficulties in recruiting and retaining people. Interviewees inform us that of the 100 doctors present in Greenland, only around 20 are tenured. Another dimension of the recruitment problem is a lack of people holding an official health care and social care education.

Cultural and language barriers are also presented as a challenge in the delivery of health care. This is a difficulty which has also been identified in a recent Danish study looking at citizens' perspectives on telemedicine in Greenland (Nielsen *et al.*, 2017). Due to the language barrier, translators are often needed. Though some are very skilled and possess a knowledge of health care, so as to understand the purpose of a doctor's questions, others do not hold the requisite knowledge to be able to translate properly. As a result, important information or nuances risk getting lost in translation. In addition, the high turnover of staff also occasionally results in information not reaching the patients, for example about an upcoming consultation.

A fundamental factor in being able to reap the benefits of digital solutions in health care and social care is well-functioning digital infrastructure. While the mostly populated part of the west coast is connected via sea cable, the northern and eastern parts of the country are connected to the Internet via radio chains and satellite links. Occasionally it happens that the connection is lost. For example, an incident was reported in which cables for a northern located settlement had been destroyed by dogs. In such a situation it is not easy to get someone to fix these cables, as they have to be flown in by helicopter. This is highly expensive. For a situation like that, settlements rely on the telephone in health-related matters. Another interviewee reports that a small settlement on the West coast has been without the Internet for more than a year. Now, having located the issue, they must wait until summer to fix it. This is when

the fjords are no longer frozen and the settlement is again accessible by ship. In Eastern Greenland, too, there is experience of losing the Internet connection. Interviewees report that this is a central factor in why Pipaluk is used to such a limited extent in this area. The problem is that data cannot be transmitted.

Limited financial means, as well as lack of human resources to drive the implementation of digital solutions, are also presented as factors hampering development. As Greenland is not a part of the European Union, legislation on GDPR does not apply in Greenland. According to interviewees, this explains why the sharing of data is not recognised as a hindering factor for innovation and for the use of digital solutions in health care – as with Skype for Business, for example. However, data protection is given great attention, and work is being conducted on the basis that all solutions should follow same standards as those applied in Denmark, which is in the EU.

Effects and potentials

To use digital solutions in health care is, for our interviewees, primarily a matter of securing the delivery of health services to all inhabitants. In other words, the central effect is adjudged to be increased access to, and quality of, health care services. Access to specialist knowledge at regional hospitals, and from specialists abroad, is another dimension of the accessibility to health care which digital solutions enable. Patients can also receive attention more quickly, since they do not need to wait for a doctor to visit the settlement. According to one of the doctors, digital communication also reduces waiting lists and helps visits to settlements to be more efficient, because they now only attend for severe cases. Others can be attended through digital means. As such, greater efficiency is also experienced as a significant gain from the use of digital solutions. It means that more patients can receive treatment, and both diagnosis and treatment can be conducted more rapidly. Great potentials therefore exist for using the scarce resources of the Greenlandic health care system better and more effectively.

Avoiding unnecessary and expensive patient journeys, both abroad and internally within Greenland, is recognised as important – as well as reducing domestic travel for health care and social care professionals. Currently, we are told, 11% of the total health care budget is spent on travel. In the

social care sector, avoiding expensive travel and accommodation for teachers is one desired effect of working with e-learning. Significant economic savings can be made by limiting the amount of travel and avoiding unnecessary travel. In the care sector, the desire to be connected to the electronic patient journal system includes its potential positive effect in avoiding important information getting lost in the communication between the social care and health care sectors, as well as between shifts. A standardised electronic system for sharing information is seen to be especially relevant, given a large turnover of staff and the presence of less-educated health care and social care workers.

It is noticeable that the health care and social care systems in Greenland are challenged by a shortage of well-educated health care and social care workers, by difficulties in recruiting doctors especially, and by a large turnover of staff. These challenges result in testing and implementing digital solutions being given lower priority in relation to the daily operation of the health care system. Especially when exploring new types of innovative digital solutions, the core concern is that the solutions are intuitive, simple and functional.

The implementation of distance-spanning technologies can provide invaluable access to health care services for all citizens, especially for those in the smaller, isolated settlements – and also general access to specialist knowledge, both from the national hospital in Nuuk and from abroad. Our findings indicate that how digital solutions are used differ extensively between health regions. Factors such as language and culture, as well as socio-economic indicators, need to be taken into consideration in the Greenlandic context.

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4.7 Digital health care and social care on the Faroe Islands

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For the Faroese study, Klaksvík municipality was chosen as the case, while the region being investigated is the Faroe Islands. A total of six group interviews were conducted, two in Klaksvík municipality and four in Tórshavn, the regional centre.

Public sector share of gross value added 2018*₁

Total population 2019	51,300
Population change 2009-2019	5.52%
Life expectancy at birth	Females 85.3 Males 90.4

Educational attainment level

Sources: NSI

The health care and social care system on the Faroe Islands

Health care on the Faroe Islands is a shared area of governance between the Faroe Islands and Denmark (Statsministeriet, 2019). The Faroese Ministry of Health, Heilsumálaráðið, is mainly responsible for the health care system. The Danish Board of Health, and in particular the Chief Medical Officer on the Faroes, who is employed by the Danish Ministry of Health, is responsible for the supervision of health services (Heilsumálaráðið, 2018b). The health care and social care systems are financed through taxation.

Hospital services are run by the Faroese Ministry of Health. For treatment that is not offered on the Faroe Islands, patients receive their treatment abroad – primarily at the Rigshospitalet in Copenhagen (Heilsumálaráðið, 2018c). In 2018, DKK 180.47 million was spent on treatment abroad, including transport and accommodation for patients and relatives (Statsministeriet, 2019). Emergency services for the entire region are located at the hospital in Tórshavn (Heilsumálaráðið, 2018a). Since 2014, the only maternity ward on the islands has been located at the hospital in Tórshavn.

The Faroese Ministry of Health is also responsible for general practitioners working in primary care. The Faroe Islands are divided into nine doctoral districts, with a total of 34 general practitioners (Statsministeriet, 2019). As in Denmark, general practitioners are gatekeepers within the health care system. Hospitals and general practitioners, including pharmacies, have had a shared electronic journal system in operation since 2011.

From 2015, municipalities were given responsibility for elderly care by the state. One requirement was that a minimum of 3,000 citizens should be included in one service cluster. This means that the 29 municipalities of which many have fewer than 3,000 citizens each have had to collaborate in order to fulfil this obligation. That has resulted in eight municipal collaborations overall (Statsministeriet, 2019). The municipalities will also be joining the electronic journal system, which is expected to be up and running in 2021. When implemented, one single journal system will cover the entire health care and social care sector on the Faroe Islands.

Three hospitals provide health care to the Faroese population, with the national hospital being located in the capital, Tórshavn, and two smaller hospitals in Klaksvík and on Suðuroy. The case-study municipality of Klaksvík is responsible

for delivering elderly care for a total of five municipalities. Findings from our study indicate that the central challenges faced by the health care and social care sectors include a growing elderly population, recruitment difficulties, and shortage of sufficiently educated personnel.

Talgildu Føroyar, the national digital strategy

Receiving its inspiration from Estonia and Denmark, the Faroese digitalisation programme, known as Talgildu Føroyar, was created in 2015. It was the first national digital strategy for the Islands (Talgildu Føroyar, 2015). The central aims are to digitalise more public services across the Faroe Islands, and to create one common digital infrastructure for the public and private sectors, and for the benefit of Faroese citizens. The digitalisation strategy for 2015-2020 was organised under the aegis of the Ministry of Finance as a public-private partnership. In order to realise the potentials of digitalisation, it was important to involve both public sector partners and private partners from (among other industries) telecommunications, banking and insurance. To date, Tórshavn is the only municipality involved. However, the ambition is now to involve all municipalities across the Faroe Islands.

The programme consists of several projects. The flagship project is the e-ID, i.e. a digital identity and signature that will live up to European standards, and which will be encrypted in order also to be capable of being used when travelling abroad. The programme also consists of an infrastructure platform with basic data, a data exchange layer known as "Heldin", and a user-platform enabling users to access different digital services.

Until now, basic data from the civil registry, the land cadastre, the land registry and geodata have been incorporated within the platform. A business registry is also underway. As the digitalisation strategy comes to an end in 2020, the current government has stated that it wants to develop the programme further. Apart from improving citizens' access to data and services, and securing safe data sharing, the expected effects lie within job creation in the IT-sector. This is connected to the development of services on the platform, and also to improving global business opportunities for Faroese companies through the use of digital signatures.

The health care sector and the social care sector have so far been involved in the digitalisation programme only to a very limited extent. However,

Tórshavn hospital has expressed a strong interest in becoming more involved, in order to ensure that services provided by the infrastructure platform will also be compatible with the patient journal system currently being used. The patient journal system is used by all three hospitals across the Faroe Islands, and also by the municipal doctors and the pharmacies. A recently initiated collaboration between the hospitals and the association of local authorities, Kommunufelagið, will also give municipal elderly care services access to this system during the coming years. At a future stage, citizens are expected to be able to access their health data and book doctor's appointments via the user platform, something that is not available at the moment.

Digital solutions on the Faroe Islands

Findings from this study in Tórshavn and Klaksvík municipality indicate that in elderly care digital solutions are used only to a limited extent. The safety alarm commonly employed in other Nordic countries is also utilised on the Faroe Islands. In some elderly care homes, a few sensor systems have been introduced for patients with dementia. These have produced positive results, including an improved sense of safety among patients, care workers and relatives. Other digital solutions have been tested in the two municipalities, though with mixed results this time. One of the perceived difficulties was finding digital solutions which were suitable for individual needs. Another difficulty was that many digital solutions are introduced over a fixed project period, but focus disappears when the project period ends. One distance-spanning solution which was strongly emphasised as very important was the humble telephone, a technology which is integrated in daily life to such a large extent that it is seldomly mentioned when discussing digital solutions.

Both in Tórshavn and in Klaksvík municipality, elderly care workers are very much looking forward to having a joint electronic patient journal system in conjunction with the health care sector. This joint system is expected to improve the quality of services delivered, due both to improved communication between sectors and easier access to patient information. Currently, securing access to updated medicine lists in different parts of the health system is considered a serious challenge, since this can result in the very serious problem of

providing the wrong medication to patients. This is a challenge that the shared information system is expected to address. In Tórshavn municipality, an upcoming digitalisation strategy is expected to contribute to increased political focus, and therefore the possibility of increased economic resources being directed towards digitalisation. Despite the limited use of digital solutions in Klaksvík, elderly care workers expressed a strong interest in using digital applications if this can help improve the wellbeing and safety of patients and relatives. A particular focus on the needs of the individual patient was emphasised, dismissing the idea of a 'one-size-fits-all' approach. Telerehabilitation was mentioned as a digital solution intended for implementation in the near future. This is expected to have positive health effects and to increase accessibility to care services, especially for elderly people who live in smaller villages or islands. That is, those who need to travel to the city of Klaksvík in order to participate in care services there. In this case, digital solutions are seen as complementary to physical meetings.

In comparison with the elderly care sector, the health care sector on the Faroe Islands is more familiar with digital tools and uses them more. For example, the hospital in Tórshavn uses remote consultation with doctors at hospitals in Denmark, and sending photographs and x-rays from dermatology, neurology, mammography, and wound examinations for analysis by hospitals abroad. The hospital in Klaksvík serves the whole Faroe Islands within the specific medical area of sleep apnea. Nurses instruct the patients about handling the relevant equipment at home during the night, and data is then sent for analysis to a hospital in Vejle, Denmark. This is a good example of procedures which are especially devised to compensate for a lack of specialists within certain medical fields. In addition, when doctors from Danish hospitals travel to the Faroes to perform surgeries or other treatments not offered by doctors on the Islands, pictures and other information are sent ahead so that they can prepare in advance. Remote meetings are frequently used between the three hospitals on the Faroe Islands, in order to reduce both travel time and costs.

Online remote education has been highlighted as a digital solution which holds potentials for employees attending specialist courses and education. Currently a few agreements are in place, e.g.

with an educational centre in Denmark for specialist courses, but otherwise remote education has not been taken up to any great extent.

Regional development effects and challenges

"The Faroe Islands probably has the best broadband coverage in the world", several Faroese interviewed for the study stated during the field-trip. Digital infrastructure, it quickly became clear, is not considered a significant hindering factor for the implementation of digital solutions in the health care and social care sectors across the small island state.

Challenges emphasised during our interviews included such factors as limited financial resources, a lack of human resources to drive the implementation, and time constraints in focussing on digital solutions at both management and practical levels. Lack of knowledge about which solutions exist was not considered an issue, but rather lack of time. Data management was another concern, centred around sharing data between health actors and sectors in a secure way. In prolongation, Faroese legislation is reported not to have been properly updated and adjusted to handle the many issues related to digitalisation in health care and social care. One example comes from Klaksvík municipality. Here an iPad had been used within elderly care to show videos about how to lift a particular patient who had very special injuries out of bed, ensuring that all care workers operated in the same way and had access to the same knowledge. However, the use of the iPad had to be halted, because the legislation in this area did not permit it.

Concerns related to further digital development within the field included the question of how to organise the everyday operation and management of the digital solutions, and how citizens and health care personnel will react towards such solutions. Interviewees found that digital solutions are often associated with cynicism about cost savings, and as such their introduction is especially linked in people's minds to a decline in the quality of care. Some interviewees emphasised the importance of the implementation process among health care and social care workers, stressing that not all personnel are accustomed to using new kinds of technology. Too little attention to the integration stage – engaging digital solutions with everyday practices – was also considered a challenge.

As regards the regional development results from using distance-spanning solutions on the

Faroe Islands, the results are limited precisely due to limited use of these solutions. It is important to note that the Faroe Islands is a small society, relationships are close, and thanks to a well-developed infrastructure, travel distances are not long for most people. For example, in Klaksvík, most elderly patients in need of daily care could be reached by elderly care workers within less than a 30-minute drive. Exceptions are of course the citizens on smaller islands who can only be reached by ferry. However, the number of such people is few and declining, and elderly care workers only travel there occasionally. This is also a result of the fact that many older people choose to move to the city of Klaksvík when they reach a stage where they are in need of more help.

The greatest effects of digital solutions are seen in terms of access to specialist knowledge, so that x-rays, pictures and other health data can be sent for analysis abroad, and to specialists in locations such as Denmark, Barcelona (Spain) or even Sydney (Australia). The solution most commonly emphasised in the case study is the common electronic patient journal system and communication platform for all health care and social care professionals. Increased quality of care through easier and better information sharing and more efficient use of resources (eliminating unnecessary telephone calls back and forth between sectors) are among the anticipated effects. The possibility of sharing patient journals between hospitals in Denmark and the Faroes is also emphasised, for its potential in securing both a better quality of care, and security in its delivery. Another potential effect of digital solutions envisaged within the care sector is that citizens will be able to stay at home longer. This is connected both to the question about quality of life for Faroese citizens (who, according to local studies referred to by interviewees, prefer to stay at home), but also the question of economy. The latter arises from the fact that institutional care is costly for the providing organisation. While improved accessibility was considered an essential impact of digital solutions in other Nordic case studies, what came through on the Faroe Islands was primarily the question of increased wellbeing for citizens.

The sense of urgency around implementing digital solutions to manage challenges faced by health systems in other Nordic countries was not found to be present to the same extent on the Faroe Islands. Instead of health care and social care

organisations, patients were expected to be the main actors driving the process, as they continue to push for (and demand) beneficial access to different digital solutions in their relationship with health care and social care services.

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5. Analysis and Discussion

The aim of this research has been to explore the regional development effects and potentials, as well as the obstacles facing digitalisation in health care and social care across the Nordic Region. To this end our research has consisted of desk studies on digitalisation in health care and social care and the implications for regional development, plus case studies from Nordic regions and municipalities. Including interviews with those at senior management level, and with project leaders and health care workers. An accessibility analysis aimed at understanding how access to health care and social care can be improved through digital solutions has also been conducted.

The three main research questions we asked were:

1. What are the regional development effects of implementing digital solutions in health care and social care?
2. What are the obstacles of implementing digital solutions in health care and social care?
3. What are the potentials of implementing digital solutions in health care and social care from a regional development perspective?

The results of these case studies show that the first research question, on regional development *effects*, and the third question, on regional development *potentials*, were very difficult to disentangle. Digitalisation in health care and social care is at a rather early stage of development. This means that few comprehensive and systematic quantitative and qualitative follow-up studies have yet been conducted. That was confirmed in the research literature. But also, in the interviews conducted, it was sometimes difficult for interviewees to determine which effects had been realised, and which ones were still anticipated.

A second important lesson from this research project is that "health care and social care with distance-spanning solutions" is part of a larger process of digital transformation continuously taking place throughout the health care and social care sectors. In order to be successful, it is important that these processes are integrated and involve health care professionals at different levels,

experts from different fields of expertise, and also the various stakeholders.

For those reasons, our research questions have been reformulated, and the presentation of results in this section is organised according to the following three questions:

1. What are the effects and potentials of digitalisation in health care and social care?
2. What are the obstacles to implementing digitalisation in health care and social care?
3. How can digitalisation in health care and social care contribute to regional development?

5.1 What are the effects and potentials of digitalisation in health care and social care?

The case studies show that important benefits from digitalisation in health care and social care can be found in a number of areas. In Table 5.1, examples of the effects and potentials of digitalisation in health care and social care across the Nordic Region have been grouped into four thematic areas: quality (including issues of safety and flexibility), efficiency, inclusion and accessibility.

Quality

Perhaps the most frequent aspect raised in interviews was the question of increased quality. This included benefits such as increased safety and quality of life for patients, but also increased quality in the provision of health care through for example sharing information and data, alongside spatially-distanced medical consultations with specialists. Qualitative aspects raised in elderly care were often related to safety for example safety alarms and the use of GPS and sensors, but also flexibility and improved quality of life when elderly people are able to avoid travelling and stay home longer.

Efficiency

Among the benefits related to increased efficiency, many of the aspects raised in our interviews highlighted improved efficiency through shared information and data. Also, adaptation to individual needs – which was expected to increase

Table 5.1. Examples of effects and potentials from case study regions.

	Norway	Finland	Sweden	Denmark	Iceland	Greenland	Faroe Islands
Quality (incl. safety and flexibility)	Improved quality of health care and social care through sharing of data.	Increased quality and safety in home care. E.g. GPS, sensors and safety alarms.	Increased quality of life. E.g. elderly can live longer at home.	Improved flexibility for patients. E.g. medical consultation at distance.	Increased quality and availability of care. E.g. decision support for health care professionals. Improved flexibility for patients and health care staff.	Improved quality of health care through access to specialised health care. E.g. through consultations with specialists at hospitals abroad.	Improved safety for patients through access to external expertise.
Efficiency (incl. staff, organisation)	Improved cost effectiveness. E.g. Reduced costs for administration, no shows to medical appointments and transports.	Reduced economic costs. E.g. Health care and social care services adapted to individual needs.	Reduced economic costs for health care sector. E.g. Reduced time in hospitals.	Increased attractiveness to recruit health care staff in remote areas. E.g. general practitioners.	Increased possibilities to offer quality health care services in remote areas. Better access to professionals. Increased competence building of professionals. Shorter distances for patients and staff. Economic savings.	Improved quality of health care through access to specialised health care. E.g. through consultations with specialists at hospitals abroad.	Improved efficiency through shared data among staff in home care.
Inclusion	Increased inclusion through easier interaction and closer follow up between health care professionals and patients, ex. COPD patients.	Increased inclusion through more frequent attendance of elderly in home care.	Increased participation and patients' involvement in own treatment.	Facilitated dialogue between health care staff, patient and relatives.	Higher flexibility and more alternatives for citizens in the health care system. Facilitated dialogue between health care staff, more competence building.		Facilitated dialogue between different professions in health care.
Accessibility	Improved accessibility to health care expertise. E.g. digitalised ambulances.	Increased accessibility for patients to health care services. E.g. digitalised moving laboratories.	Increased accessibility for patients to health care. E.g. virtual health rooms.	Improved accessibility to shared data. E.g. Health care meetings with different health care professionals.	Increased accessibility and availability of health care. E.g. video consultations with health care professionals.	Increased accessibility to health care. E.g. through Pipaluk.	Increased accessibility for health care professionals to expertise network.

quality, too. The cost saving potentials were to be found more in the efficient use of competences and resources, when for example specialist care can be accessed remotely. This includes decreased paperwork and administration, reduced costs for transport, and from an employers' perspective, an improved ability to recruit health care workers to remote areas. Improved flexibility in the delivery of health care and social care services was also cited, as well as the increased provision of welfare services to patients and users in rural areas.

Inclusion

As regards inclusion and interaction, a range of benefits were identified in our interviews. Among these was the increased involvement of patients in their own treatment, and facilitated dialogue and interaction (i.e. between health care providers; between patients and health care providers; and between health care providers, elderly people using home care, and their relatives).

Accessibility

In terms of accessibility, the main points raised in interviews concerned the benefits of increased accessibility for inhabitants to health care and welfare services, and the ability to be able to make an appointment with a doctor at a distance, or to benefit from a remote video consultation. Also, for health care professionals and users, there was increased access to shared information, and improved access to both specialists and professional health care networks.

Within this research we have conducted a more in-depth assessment of citizens' access to health care and social care services in our case study regions. These have been examined in terms of five categories: primary health services (out-patient, appointment based); primary health services including drop-in care office hours, drop-in care 24/7, hospitals with in-patient care, and university hospitals offering highly specialised care. (A summary of the main findings is found below,

Map 5.1. Accessibility to primary care in Nordjylland, Denmark.

Map 5.2. Accessibility to primary care in Sogn og Fjordane.

and for the full report please see the Appendix *In-depth accessibility study, Annex to Digital Health Care and Social care – Regional development impacts in the Nordic countries*)

The accessibility study shows that the accessibility to out-patient primary health care services is good in general. This is especially so in Nordjylland – which, despite being a rural region, has fairly short distances, so that 98.7% of the population can reach outpatient primary care within 10 minutes driving time.

At the other end of the spectrum among the rural regions we find Sogn og Fjordane in Norway, and the Eastern health region in Iceland, where only 58.7% and 65.7% of the population respectively can reach patient primary care within a 10-minute drive.

Out-patient primary care usually plays an important role for patients with chronic conditions, the elderly, and other groups who are in need of frequent and regular medical contact. However, as we have seen, the organisation of health care

and social care varies considerably among the Nordic countries. This means that exactly what type of treatments and services are found within outpatient primary care may also vary. However, in our case studies we found many examples of how access to health care and social care can be improved by using digital solutions, such as virtual health rooms in Västerbotten, Sweden; the Mallu mobile health care clinic in South Karelia, Finland; and Pipaluk in Greenland.

How health care and social care is spatially organised is related to the national health care systems in individual countries, but it is also related to population density within the regions.

The influence of population density is additionally reflected when we look at access to drop-in care 24/7, and highly specialised care. In Västerbotten, Sweden, for instance, only 51% of the population can reach the specialised in-patient care in Umeå within a 40-minute car drive. For inhabitants in the municipality of Storuman, it takes more than a two-hour car drive. However, to com-

Map 5.3. Accessibility to primary care in Eastern health region, Iceland.

pensate for the large distances across the region Västerbotten, 24/7 out-patient drop-in care and in-patient care are offered in nine different facilities spread out across the region.

In South Karelia, 98.6% of the population can reach in-patient care through a one-hour car ride, and nearly two thirds (63.4%) of the population can reach one of two 24/7 out-patient drop-in care centres. These are also open in the evening and at weekends and are within a 10-minute car drive for many. Indeed, 90.9% of people can reach them within half-an-hour.

The provision of health care is in general related to population patterns, meaning that facilities and doctors are located where people live which means that populated areas have better access to health care facilities. That is, populated areas have better access to health care facilities. However, our accessibility studies show that the vast majority of the population can access drop-in care 24/7, and in-patient care within an hour's car ride. For out-patient care, accessibility for the vast majority is reduced to between 10 minutes and half-an-hour. Although digitalisation in health

care and social care can be assumed to have positive effects for all inhabitants, it is perhaps in the rural and very remote areas, such as in the Västerbotten inland, northern and western part of South Karelia and the Eastern Health region in Iceland, where the largest gains can be found.

As regards the accessibility of elderly care, this also includes an important relationship between where the elderly population in need of care resides, and the services which are offered in that location. Over the past 30 years, the trend has been to offer more home care services for elderly people, and less institutionalised care in formal care homes for the elderly (Nomesco, 2017). Another trend heading in the same direction is that hospitalisation has decreased, in line with national strategies and more effective treatments which do not require a stay in hospital. However, this, in turn, increases the need for more home care support and for proximity to basic services such as grocery stores and pharmacies.

It also affects how home care service is organised, so that it can also facilitate access for those residents living in very remote areas. In the case

Map 5.4. Population density in the case study regions, except for Greenland and the Faroe Islands.

Map 5.5. Accessibility of highly specialised in-patient care in Västerbotten, Sweden.

Map 5.6. Accessibility of in-patient care in South Karelia, Finland.

studies we found several examples of digital solutions playing an important role in the planning of home care services, in the exchange of information between care givers and care takers (as well as relatives), and in providing those receiving care with increased flexibility and quality of care through the use of alarms, GPS and sensors, for example.

Since the outbreak of the Covid-19 pandemic, there has been an enormous reported increase in the use of national eHealth platforms to access health information, as well as an increase in the use of digital solutions which improve the availability of health care and facilitate social distancing. These are most probably only the first steps towards a more frequent use of digital solutions to communicate and interact within the health care and social care sector, and this may also become "the new normal" in the future.

5.2 What are the obstacles to implementing digitalisation in health care and social care?

Our case study results point to the fact that implementing digitalisation in health care and social care is, to a large extent, an issue about leadership and management. This in turn requires economic resources, adequate time allocation, and active change management. The successful implementation of digitalisation in health care and social care also builds on the involvement of staff, and requires that the digital solutions are user friendly – both for health care professionals and for users and patients.

The legislative frameworks involved also play an important role, because they determine what kind of health care services health care providers are permitted to give, to whom, and under what circumstances. Digitalisation in health care and

Map 5.7. Accessibility of out-patient drop-in care, 24/7, in the Eastern health region.

social care is found at the intersection between different pieces of legislation regulating health care, social protection, patient safety, integrity and personal security, and the financing of health care. An international outlook by the Swedish National Board of Health and Welfare points to a general lack of steering and guidance documents for digital health care and social care services (Socialstyrelsen, 2018a). Although guidelines and recommendations for health care providers are being developed continuously by the responsible national authorities, the main challenge here concerns the concomitant need to integrate digital solutions into health care systems, alongside the integration of the different parts of the health care system itself. Welfare indicators and measures to follow-up and evaluate digitally provided health care services are important in ensuring quality, safety and efficiency (Socialstyrelsen, 2018b; Friðleifsdóttir *et al.*, 2011; Hyppönen *et al.*, 2017)

Information and data constitute the single most important unit when it comes to digital health care and social care. This data is assembled, analysed and shared in order to facilitate the work of health care professionals and benefit the quality of care provided to patients. In health care and social care, access to data (patient data) is the cornerstone of the system. Information and data is also the main component for Artificial Intelligence (AI), which is now increasing due to access to big data, improved algorithms and computability (DIGG, 2019; Polson & Scott, 2018).

Although a large number of citizens are positive towards the increased use of digital solutions in health care and social care, many people fear that there is insufficient built-in security to prevent intrusion in medical information systems, uncertainty regarding the ownership of health data, a decrease in health care quality, and a loss of personal contact among the elderly (Socialstyrelsen,

Table 5.2. Examples of obstacles in implementing digital solutions in health care and social care in the case study regions.

	Norway	Finland	Sweden	Denmark	Iceland	Greenland	Faroe Islands
Governance challenges	Lack of change management and skills development	Difficult to receive EU funding for new projects. Some devices too expensive to be introduced.	Lack of change management	Lack of coordination among different stakeholders Lack of change management	Central government responsible for health care. Contracts with specialist doctors include no obligation of placement of services.	Recruitment of skilled health care staff	Lack of sense of urgency among health care workers
Technical challenges	Lack of integrated data systems Lack of user-friendly digital solutions	Lack of integration and interoperability between data systems	Lack of integrated data systems	Lack of integrated data systems Lack of user-friendly digital solutions	Too little focus on usability of technology, not used to full potential.	Internet access (via cable, satellite and radio)	Lack of user-friendly digital solutions
Legislative challenges	Data security and patient data	Development of data security and AI	Not updated regulations hamper development	Risk management and resilience	Data security and integrity standards are high.		Data security and patient data
Economic challenges	Lack of economic resources (incl. time) for training Lack of economic incentives	Difficult to receive EU funding for new projects. Some devices too expensive to be introduced.	Lack of long-term economic resources	Lack of economic incentives	Reimbursement system for medical doctors, limited incentive to participate in eHealth. Limited funding to train/operate staff to use technology.	Lack of economic resources	Lack of economic incentives
Cultural challenges	Health care ethics and trust in technology in elderly care	Lack of interest among doctors and general attitude towards innovation and new ideas	What is health care ethics at distance?	Health care ethics	Lack of interest and incentive among medical doctors to change practices, have a strong professional culture	Language barriers and need for translation	Health care and social care ethics at distance

2018b). An evaluation from the Swedish Health and Social Care Inspectorate (IVO) shows that the main risks of digitalisation in health care and social care are related to the areas of lack of competence and skills, prescriptions, insufficient medical evaluation, issues of identity control, reports of concerns regarding children, information security and unclear responsibilities regarding health care provision (Inspektionen för vård och omsorg, 2018).

The case studies showed that lack of accessibility to data, due to legal obstacles or due to lack of interoperability between different data systems, have been found to be major obstacles to the effective development of digital solutions in health care and social care.

The case studies also showed that economic incentives and reimbursement models have a large effect on the implementation of digitalisation and use of digital solutions in health care and social care.

Finally, several of our interviews showed that, for some health care workers, there is a cultural goal conflict between the work ethics of health care professionals, and the economic efficiency paradigm influencing the implementation of digital solutions in health care and social care. In order to get staff to comply with new, digitalised ways of working, these different mindsets and conflicting goal need to be attended to and addressed.

In all case study regions, it was made clear that digital solutions are complementary to regular health care and social care procedures. In a few cases, there was an expression of concern that digitalisation implies that jobs in health care and social care will (or need to) disappear.

5.3 How can digitalisation in health care and social care contribute to regional development?

In this study we understand regional development in terms of the Agenda 2030 goals of economic sustainability, social sustainability, and environmental sustainability.

Our case studies showed that digitalisation in health care and social care is expected to contribute to regional economic development by improving economic efficiency and by decreasing economic costs for those involved in providing health care services. The providers of health care services in the Nordic countries are mostly public sector actors, but there are also private actors, especially in elderly care. Increased cost effectiveness in both

the public and private sectors can be expected to benefit the regional economy overall.

Many examples were given in the case study regions as regards improving efficiency. These include shared data, improved quality of care, improved accessibility, and patient involvement.

Research literature points towards potentials in reducing economic costs related to digitalisation in health care and social care. However, many of the studies conducted are limited in scope. The vast majority of jobs in the health care and social care sector are not fully automatable, and in combination with what seems to be an almost ubiquitous lack of nurses and doctors, the fear of losing jobs due to digitalisation (expressed in some case study regions) seems not to be a very large risk overall. The case studies mostly refer to the reduction of economic costs as potentials and expected results, rather than concrete, measurable effects. A few tangible examples were mentioned, mostly from Eksote in South Karelia, which has been running eHealth services for 10 years already; but also from Sogn og Fjordane, which could point to decreased paperwork, reduced no-shows to medical appointments after introducing SMS reminders, and decreased costs for health care transportation from the increased use of video consultations – examples that connect improved efficiency with reduced economic costs. Decreased costs for health care transportation due to increased use of video consultations was also found in the Faroe Islands.

However, in general there seems to be a lack of indicators for, and systematically collected economic data regarding, digitalisation in health care and social care. This may be explained by the fact that digitalisation in these sectors is at an early stage, and also that there is a lack of knowledge about how to better measure the effects of digitalisation.

Perhaps most importantly, digitalisation in health care and social care is expected to contribute to improved health, quality of life and well-being. Individuals today are not only connected and informed decision-makers, but they are also changing their behaviour, which means digitally accessing more customer and patient-centred services (Hyppönen *et al.*, 2017). Our case studies show that flexibility for patients and users can be increased, as well as safety. They indicate that digitalisation in home care has contributed to elderly

Box 5.1. A tool for measuring the effects of an innovation

In the Norwegian national welfare technology programme, a model to measure the effects of service innovations (e.g. the introduction of a welfare technology) has been developed. The utility of an innovation is divided into three potential positive effects:

1. better quality
2. time savings
3. expenditures avoided

To release the potential positive effects, three steps are required. Firstly, a mapping of effects. Secondly, a plan for how to achieve these effects; and thirdly, a follow-up process in which the effects of an innovation are calculated or investigated. Based on the first two effect reports from the national welfare technology programme, the Health Directorate recommended that Norwegian municipalities should integrate different technologies into their municipal care services. These technologies included location technology, electronic medical dispensers, electronic door locks, digital supervision, and logistic solutions to optimise and plan care workers' routes (Melting & Frantzen, 2015; Melting, 2017). The municipalities involved in the project all reported significant positive effects from the implementation of digital technologies – in terms of saved time, better quality of care, and avoiding unnecessary expenditures (Melting, 2017).

being able to live at home for longer. Digitalisation in health care and social care also contributes to participation and inclusiveness, for instance through remote monitoring via laptops in elderly care (in South Karelia in Finland), and increased options and flexibility for choosing between physical and/or digital contact with the health care system (SOU 2019b).

For those working in health care and social care, digitalisation implies greater flexibility for working remotely. It also involves more safety and improved quality in the provision of health care and social care when it is possible to consult col-

leagues remotely and increase knowledge through professional networks. Both our research, that of the OECD, and government reports (e.g. SOU 2019) point to digitalisation in health care and social care as an enabler of increased spatial justice and a means to improve equal opportunities within these sectors. It is, however, important to acknowledge and pay attention to digital divides, such as those between urban and rural areas, where urban areas enjoy both better access to broadband and higher skills; or between generations, where younger generations are more accustomed to using digital tools than the elderly; or between gender and ethnic groups. From a gender perspective, digitalisation in health care and social care has an important role from two perspectives, mainly. First, since women have longer life expectancy than men, and since many digital tools in the care sector are there to improve quality of life for the elderly, elderly women are likely to enjoy the benefits of using digital solutions longer. Second, the workforce in the health care and social care sectors is heavily imbalanced as regards gender (there are more women), and hence women there are also expected to be effected to a greater extent by digital transformations in health care and social care.

The most important effect and potential of digitalisation in health care and social care as far as environmental development is concerned comes from reducing transport impacts – that is, transport for patients to health care meetings, but also health care providers now working from single care facilities or from home. A reduction in transportation may also be achieved by setting up mobile health care facilities, such as the virtual health rooms in Västerbotten, the Malla buses in South Karelia, or the improvement of digital technologies in ambulances, boats and helicopters in Sogn og Fjordane. Our accessibility study shows that digitalisation in health care and social care holds a special potential for increased access for those living in the most rural and remote areas.

In order to release the potentials of digitalisation in health care and social care for regional development, this research has pointed towards several challenges which need further attention. These have also been confirmed in the research literature and in government reports. In the table below we have identified challenges related to regional development and to economic, social and environmental sustainability. In order to under-

stand how the potentials can be realized, they are framed within the institutional framework of different time-horizons for change.

The interaction between institutional levels goes both in two directions, i.e. institutions at higher levels such as culture, traditions, and formal institutions influence institutions at lower levels, such as governance, resource allocation and practices. However, those institutions at lower levels are also, in the longer run, determining institutions at higher levels. In order to highlight the potentials of digitalisation in health care and social care in contributing to regional development, the imperative and active form has been used in the table. As can also be seen in the table, some of the changes involved are related to all three sustainability goals.

In our case studies it became apparent how institutional dynamics at higher levels, for example legislation, or traditions and work ethics among health care professionals, were sometimes hindering further development of digitalisation in health care and social care. We also found evidence of how practice influences and pushes development in higher institutional levels. From a policymaking perspective, it is important to understand how these different time frames for change interact, in order to address change at the different institutional levels.

Another important aspect of realising the potentials for regional development from digitalisation in health care and social care, is to foster collaboration among those authorities and stakeholders responsible for different parts of the

Table 5.3. Potentials from digital in health care and social care contributing to regional development.

Change in different time frames	... to improve quality of services, efficiency and contribute to regional economic development	... to improve health, quality of life, inclusion and contribute to regional social development	... to improve accessibility and contribute to regional environmental development
Institutional embeddedness/ Culture Change in 100+ years	Involve health care professionals in discussions about digitalisation and health care and social care ethics. Foster research and broad discussion on the implications of digitalisation in society.	Involve health care professionals in discussions about digitalisation and health care and social care ethics. Foster research and broad discussion on the implications of digitalisation in society.	Foster research and broad discussion on the implications of digitalisation in society.
Institutional environment/ Government Change in 10–100 years	Adapt government and governance structures to a digitalised era. Improve broadband access and mobile infrastructure. Adapt legislation to a digitalised era. Allocate long-term financial resources for a digital transformation.	Adapt government and governance structures to a digitalised era. Improve broadband access and mobile infrastructure. Adapt legislation to a digitalised era. Allocate long term financial resources for a digital transformation.	Improve broadband access and mobile infrastructure. Adapt government and governance structures to a digitalised era. Adapt legislation to a digitalised era. Allocate long term financial resources for a digital transformation.
Governance/ Policy Change in 1–10 years	Activate leadership and change management. Adapt economic incentives and reimbursement models. Increase comprehensive research on implications of digitalisation related to quality of services and efficiency.	Activate leadership and change management. Increase comprehensive research on implications of digitalisation related to quality of life, inclusion and social development.	Activate leadership and change management. Increase comprehensive research on implications of digitalisation related to accessibility and spatial justice.
Resource allocation/ Practise Continuous change	Improve digitalisation skills among professionals. Improve digitalisation skills among citizens.	Improve digitalisation skills among citizens.	Improve digitalisation skills among professionals. Improve digitalisation skills among citizens.

health care system. The need for close collaboration between different actors within the health care system and within the social care system was clearly expressed in our case study regions, but also a need for collaboration between the two sectors, health care and social care.

The Norwegian road map to service innovation, introduced within the National Welfare Technology Programme in 2015, is a very practical tool kit for how to implement digital solutions in health care and social care. The national welfare technology programme, which was initiated by the Directorates of health and eHealth and the Association of Local Authorities, includes three areas of service innovation and testing, project introduction and testing and digital infrastructure. It includes all Norwegian municipalities (Nordens välfärdscenter, 2020). Another example of national level collaboration is the Swedish Digital vård och omsorg, which assembles five different authorities, the Association of Local Authorities and Regions, research institutes, and other stakeholders in the digital transformation of health care and social care, and provides guidance regarding legislation and regulations, as well as best practice (Digital vård och omsorg, 2020).

The last decade of digitalisation has had a significant impact on society, and with the Covid-19 pandemic over the last few months, this has happened at an incredible speed. Digital solutions have quickly become an even more integrated part of everyday life in societies all around the world. Ex-

pressions such as "the fourth industrial revolution" and "the digital transformation" show that what we face is a significant societal "game changer".

The speed of digitalisation has generated important challenges for institutions and organisations in keeping up with the pace of change. This also goes for health care systems, which are complex webs involving different organisations and actors, different professions, and different levels of government – all of whom are guided by sector specific and organisational goals, financial resources and economic incentives. With regard to negotiating this complexity, it becomes important to involve different actors and stakeholders, to adapt governance structures, and to set joint long-term goals which all actors and stakeholders can commit to. Although all the Nordic countries have strategies for increasing digitalisation and eHealth, it still seems as if steps towards these goals were being taken at a quite moderate pace until the Covid-19 crisis emerged.

The motivation for increasing the use of digital solutions in health care and social care is manifold. In this study we have looked at motivations guided by increased quality and efficiency, improved inclusion and participation, and increased accessibility and spatial justice. With an increasingly elderly population, it is anticipated that digital solutions will help to confront the challenge of lack of skills and competences in the health care and social care sectors, and also to reducing economic costs in the longer-run.

6. Concluding remarks and future research

The provision of digital solutions in health care and social care fits into a larger discussion about the provision of welfare services in rural and sparsely populated areas (ref TG1 project, Valfärdskommissionen, 2020). In Sweden, for example, the newly-launched Welfare Commission (Valfärdskommissionen) has been assigned by the Swedish government to look particularly into the needs for skills, financial resources and establishment of welfare services in sparsely populated areas – all in order to improve the accessibility of welfare services, and to foster good quality, prudent and intelligent uses of public resources. As regards health care and social care, the investigation has particularly examined what kind of health care facilities inhabitants expect and appreciate, and the requirement for health care staff to be willing to work on a longer-term basis in sparsely populated areas (SOU, 2019; Valfärdskommissionen, 2020).

The Nordic countries hold great potential in regard to digitalisation. DESI 2019, which measures connectivity, human capital, the use of Internet services, and the integration of digital technology and digital public services, has a ranking that shows Finland at top, and Sweden and Denmark coming second and fourth respectively. This points to a very strong digital maturity among the population, and it is likely that this is also the case for the rest of the Nordic population (DESI, 2019).

However, in order to harness the full potentials of this process, the Nordic countries still have important challenges to face. They need to keep up the pace of change. The next step in digitalisation lies with Artificial Intelligence (AI). However,

the Swedish authority DIGG has shown that the use of AI in the public sector is still at a very under-developed stage, and is largely based on individual initiatives. It suffers from a lack of change management aptitudes, lack of access to relevant data, lack of developed legal and ethical considerations, and lack of access to AI skills (DIGG, 2019).

In 2018, the Nordic Council of Ministers, together with the Baltic ministers, presented a declaration on AI (Nordic Council of Ministers, 2018). Also as regards AI, we came across a number of problems relating to institutional and legislative frameworks. In order to support EU member states, the European Commission has initiated ethical guidelines for trustworthy Artificial Intelligence development. This includes the principles of lawfulness, ethics and robustness, "...since, even with good intentions, AI systems can cause unintentional harm" (AI HLEG, 2019, p. 5).

Both ongoing and future digitalisation in health care and social care will entail important challenges (Greenhalgh *et al.*, 2020; OECD 2020), on which more research is needed. This also goes for the effects, potentials, and obstacles to digitalisation in health care and social care as far as regional economic development, social development and environmental development are concerned.

A future research agenda should explore more in-depth how effects and potentials of digital health care and social care relate to regional development, as well as how digital health care and social care can contribute to economic, social and environmental sustainability.

Table 6.1. Towards a research agenda for regional development impacts of digital health care and social care relating to the Global Agenda 2030 goals in-depth studies of regional development effects and potentials related to the UN Global goals

Sustainability goals	Research fields	Research questions
Assessment of economic effects and potentials of using digital solutions in health care and social care (economic sustainability)	<ul style="list-style-type: none"> ■ Intra-organisational effects for service providers/financers relating to costs and cost-effectiveness (incl. jobs) ■ Long term economic regional development effects (incl. jobs) 	<ul style="list-style-type: none"> ■ Have digital solutions in health care and social care contributed to increasing or decreasing economic costs? How? How much? Are digital solutions in health care and social care expected to increase or decrease economic costs? How? How much? ■ Have digital solutions in health care and social care impacted on who is providing those services? How? How much? (Ex. public – private) Are digital solutions in health care and social care expected to impact on who is providing those services? How? How much? (Ex. public – private) ■ Have digital solutions in health care and social care contributed to changing the number of jobs in the region? How? Are digital solutions in health care and social care expected to change the number of jobs in the region? How? ■ Have digital solutions in health care and social care changed the nature of jobs in the region? How? Are digital solutions in health care and social care expected to change the nature of jobs in the region? How?
Assessment of social effects and potentials of using digital solutions in health care (social sustainability)	<ul style="list-style-type: none"> ■ Quality of health and quality of life ■ Structure and content of work in health care and social care ■ Citizen participation and inclusiveness ■ Spatial justice 	<ul style="list-style-type: none"> ■ Have digital solutions in health care and social care contributed to the wellbeing of inhabitants in the region? How? Find measurable examples. Are digital solutions expected to contribute to the wellbeing of inhabitants in the region? How? Find measurable examples. ■ Despite the cost saving potential benefits and evidence of health improvement, adoption of digital solutions among health and social service providers is slow, ad hoc and to a large degree project based. Why?
Assessment of environmental effects and potentials of using digital solutions in health care and social care (environmental sustainability)	<ul style="list-style-type: none"> ■ Infrastructure and transportation 	<ul style="list-style-type: none"> ■ Have digital solutions in health care and social care contributed to increased accessibility to health care and social care? How? ■ Are digital solutions in health care and social care expected to contribute to increased accessibility to health care and social care? How?

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Appendix

1. Interview guide

2. Accessibility report: In-depth accessibility study, Annex to Digital Health Care and Social care – Regional development impacts in the Nordic countries Report 2020:16 (in separate report)

Appendix 1: Interviewguide

Present project objectives and conditions for participation

Interviewee

Who:

Title/role/work description:

Digital solutions in health care and care

What we want to know: *What are the regional development effects of implementing digital solutions in health care and care?*

1. Which digital solutions do you work with, and can you describe this work? / Hvilke digitale løsninger arbejder du/I med og vil du beskrive dette arbejde?

2. What are the effects of implementing and using digital solutions in health care and care in this region/municipality? Hvad er effekterne ved at implementere digitale løsninger i sundhedsvæsenet her i regionen/kommunen?

- a. For the organization? / For organisationen?
- b. For the region in total? E.g. economy, jobs, environmental factors? / For regionen overordnet set? E.g. økonomi, jobs, miljømæssige faktorer?
- c. For the sparsely populated, rural areas in the region? Specifikt for landdistrikterne?
- d. For the patients? / For patienterne?
- e. For the health care providers? / For de ansatte i sundhedssystemet?
- f. Other aspects? / Andre fordele?

3: Strategisk: Have you developed digitalisation strategies that focus on the health care and care area? / Har I udviklet konkrete digitaliseringsstrategier for sundheds- og omsorgsområdet?

Obstacles

What we want to know: *What are the obstacles of implementing digital solutions in health care and care?*

1. What are the obstacles with introducing and using digital solutions in health care and care? / Hvad er udfordringerne med at introducere og anvende digitale løsninger i sundheds- og omsorgsarbejdet?

For example:

- a. In the implementation process? / I implementeringsprocessen?
- b. Technical problems with the solutions? / Tekniske problemer?
- c. Difficulties in using the technology? / Vanskeligheder ved at bruge teknologien?
- d. Resistance from the health care professionals? / Modstand fra sundhedspersonalet?
- e. Resistance from the patients? / Modstand fra patienterne?
- f. Resistance from the patient's family and friends? Modstand fra pårørende?
- g. Ethical issues or considerations with using the digital solutions? / Ethiske problemstillinger eller overvejelser?
- h. Legal issues (GDPR)? / Juridiske problemer?
- i. Organisational? / På et organisatorisk niveau?
- j. Economic issues? / Økonomiske problemer?
- k. Any other obstacles? / Andet?

2. Did any of the digital solutions not meet your expectations? Why?/ Er der nogle af de digitale løsninger I har indført, som ikke har levet op til jeres forventninger? Hvorfor/hvordan?

Potentials

What we want to know: *What are the potentials of implementing digital solutions in health care and care from a regional development perspective?*

1. What are the potentials in using digital solutions in health care and care? / Hvad er fordelene ved at bruge digitale løsninger i sundheds- og omsorgsarbejdet?

a. Potentials especially for this region/municipality? / Specielt for denne region/kommune?

2. What are the enabling and hampering factors to release those potentials? / Hvad er de hæmmende og fremmende faktorer for at udløse disse potentialer?

Future expectations

1. Now we have addressed the potential effects, but what have been the actual effects of your work with digitalisation in the health care system?

a. Have you developed any evaluations/result reports in the municipality/region of your work with digital solutions? / Har I udarbejdet nogle evalueringer i kommunen/regionen af de digitale løsninger I har indført?

b. What are your future expectations for digitalisation in the area of health care and care? / Hvad er dine fremtidige forventninger for digitalisering på sundheds- og omsorgsområdet?

3. Is there something we haven't addressed, that you think is important to highlight when it comes to using digital solutions in health care and care? / Er der noget, som jeg ikke har spurgt ind til, som du synes er vigtigt at fremhæve?

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