



What kind of health revolution do we want?  
Scenarios for the future of health and care



Teknologirådet

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ISBN 978-82-92447-90-1 (Printed edition)  
ISBN 978-82-92447-91-8 (Electronic Edition)

Published: Oslo, March 2017  
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Available at [www.teknologiradet.no](http://www.teknologiradet.no)



The project is financed in collaboration between Health&Care21, The Norwegian Research Council and The Norwegian Board of Technology

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# WHAT KIND OF HEALTH REVOLUTION DO WE WANT?

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Many people would say that the health and care sector is the most important of all sectors – at least in peacetime. It is about preserving life - and about the joy of life and about security for the individual. Many Norwegians work in the health and care sector and the health services are also vital in enabling other people to return to work after illness and injury. Moreover, health research and welfare innovation are important investment areas for the government with possibilities for a huge market both globally and here at home.

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## BUT WHAT ABOUT THE FUTURE?

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As we know, it is difficult to make predictions, especially concerning the future. We have based the respective scenarios on some powerful drivers and focused on demography, economics and technology.

In conjunction with an expert group, the Norwegian Board of Technology has developed three scenarios, which, in different ways, provide a picture of how citizens, industry and the public sector can meet the health challenges of 2030.

The purpose of the scenarios is to create awareness surrounding the choices we can make today to be prepared for the future. The scenarios are not an attempt to predict the future. They should rather form the basis for discussion of the choices we face today and future policies in the area of health.

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# SCENARIOS FOR THE FUTURE OF HEALTH AND CARE

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As our starting point, we have used the following development trends, which in all likelihood will influence the health sector in 2030, together with two open questions.



## WE ARE GETTING OLDER

- **The age wave has already started.** In 2060, every fifth Norwegian will be 70 years of age or older, compared to every ninth Norwegian today. The percentage of elderly people will be particularly high in more rural areas.<sup>1</sup> The age wave will have some important consequences:
- **Many of us will live with chronic illnesses.** Cardiovascular diseases, cancer and musculoskeletal disorders will dominate.<sup>2</sup>
- **Labour shortage** Relatively fewer people will be required to look after relatively more people. If we maintain the current method of organising the health and care services, we will require twice as many employees in the health sector over the next 50 years.<sup>3</sup>

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<sup>1</sup> <https://www.ssb.no/befolkning/statistikker/folkfram/aar/2016-06-21>

<sup>2</sup> <https://www.regjeringen.no/no/dokumenter/meld.-st.-11-20152016/id2462047/>

<sup>3</sup> <https://www.ssb.no/arbeid-og-lonn/artikler-og-publikasjoner/behovet-for-arbeidskraft-i-helse-og-omsorgssektoren-fremover>

## MAJOR DEMAND ON PUBLIC SECTOR FINANCE

- **Lower revenues** from the oil and gas industry and the pension fund could mean that the tax burden of households will have to rise to up to 65% in 2060 in order to maintain the current level of organisation of welfare services.<sup>4</sup>
- **A continuing welfare state.** There is currently inter-political agreement that the health and care services will be financed by the public sector, and we are assuming that this will still apply in 2030. This will make a reorganisation of the public sector necessary.

## DEMOCRATISATION BY TECHNOLOGY

- **Everyone will have digital superpowers ...** In the last decade, every one of us has experienced a digital revolution. The Internet, smartphones and cloud computing have given us access to information, services and computing power that was previously the preserve of NASA, NSA (National Security Agency) and the largest companies in the world. This development will continue and will characterise how we organise society.
- **... and artificial intelligence**, which interprets, assists and suggests. Increased data power, mass data, and machine learning have brought artificial intelligence to the fore. Computers are solving increasingly more complex tasks and are able to interpret new types of data such as images and natural language.
- **Low threshold.** The Internet of Things means that technology has become part of our surroundings. At the same time, the interface has also moved from signs to speech. We are talking with computers.
- **We can measure and test ourselves ...** People can, for example, easily measure their blood pressure, carry out an ECG, take blood samples, and be diagnosed at home, without visiting their GP.
- **... and take part in research on a daily basis.** Mobile platforms and continuous measurements lower the threshold for participating in research and development and can provide both more data and multiple types of data for research.

## AN OCEAN OF DATA

- **We become transparent.** Huge volumes of data are produced every day, both by citizens and by public and private institutions. As well as activity online, the behaviour of citizens in the physical world is also logged.
- **The health sector is becoming smarter.** The health sector can utilise data from a digitalised health service and from citizens in order to take Norway's pulse – and improve planning, resource distribution and quality assurance. Advanced analytical tools can be used to predict a development and to provide recommendations – on a national level, local level and all the way down to the individual level.
- **Platforms give power.** The health sector is beginning to resemble the Internet economy. Data will become an important value and platforms, such as Apple's App Store and Facebook, will be used by many different players as channels of distribution. Those parties controlling the platform will have significant power and access to a huge volume of data.

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<sup>4</sup> <http://www.aftenposten.no/okonomi/Ekspertgruppe-varsler-om-skatt-pa-65-prosent-9160b.html>

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## TWO IMPORTANT QUESTIONS THAT SHAPE THE SCENARIOS

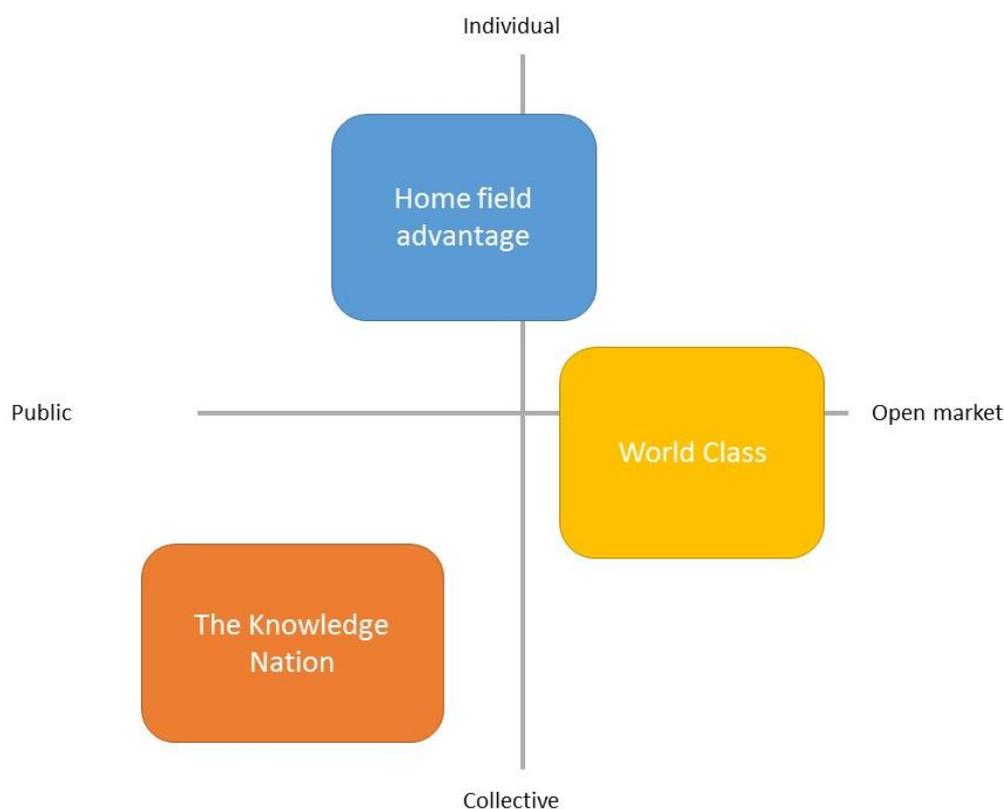
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- Who will offer health and care services?
- What is the role of the citizens?

These are questions in which political decisions will have a major impact on the entire sector. In the diagram below we have placed the two questions along two axes. On one axis, the extreme point is where the authorities organise and offer all services, while at the opposite, private actors deliver health services via an open market. On the other axis, large collective service models are set against a model in which individual citizens and local authorities determine which services and which technology are most suited to their needs.

The three scenarios "Home Field Advantage", "World Class" and "The Knowledge Nation" illustrate the potential consequences, depending on which political choices are made along the axes referred to above.

In each scenario, you will encounter a person. You will be given a description of how this person will be living their life in 2030, and what type of relationship this person has to the health sector. The goal is for these personal stories to demonstrate how political decisions create opportunities and dilemmas for citizens, staff in the health sector, and society in general.



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# SCENARIO 1: HOME FIELD ADVANTAGE

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## MAIN CHARACTERISTICS OF THE SCENARIO

- *Digital technology is cheap* - the gold is to be found in how we use it to organise ourselves and create good services. In this scenario, citizens are continuously involved and are given many opportunities to quickly utilise new technology.
- *Local authority freedom*. Together with users, local authorities have the greatest responsibility for the health and social care services. There is a lot of freedom to try out new solutions locally, whether this concerns Oslo or Oppdal. This leads to major differences between local authorities, but also for learning and imitating successes.
- *Entrepreneur nation*. This local freedom gives space for testing and rapid adoption of new technology. Close collaboration between the municipalities and industry provides Norwegian companies with the opportunity to develop themselves on the home market. National politicians have prioritised setting open standards, establishing seed funds and ensuring a good digital infrastructure. This makes it easy and predictable for private players to develop health services.
- *Flexible*. There is a strong desire to involve citizens in voluntary work in the local community. Several of the voluntary services have been incorporated into the local authorities' time bank, so that volunteers get something in return for their efforts. Some local authorities have gone even further and outsourced certain core tasks to sharing services. Nonetheless, it is expected that as many people as possible will use the technology to actively participate in following up their own health.



Jonas is 31 years of age and works part time as a music teacher at a lower secondary school. He originally trained as a social educator and previously worked in the municipal health service. However, the huge pressure of work meant that he eventually left his job. He has always been interested in music and therefore took further education so that he could teach at school.

Instead of emergency clinics and the GP services, the municipality has established an interdisciplinary health centre with a digital first line. Before patients make contact with the health centre, they analyse their self tests and must perform an intelligent symptom check on their mobile phones.

As well as his part-time job at school, Jonas works at "Health Help", a company that offers support to citizens who are in contact with the health service, or the "fortress", as people call it. He logs on when he is available and receives assignments that vary from technical support in the use of health technology, to participating in video conversations that patients have with their GPs, so that he may subsequently help patients follow up their own health. Jonas likes the flexibility the jobs offer him and thinks it is great that he is able to use all of his expertise.

For many years, Jonas has suffered from anxiety and in periods has been closely followed up by the psychiatric health service. Over the last year, he has felt better and, among other things, has started using the digital personal assistant "Sofie". Sofie talks to Jonas and helps him through the day and in difficult situations. Sofie means that he is better at getting out, he is able to spend time with friends and can manage stress at work. As well as Sofie, the flexibility of Jonas' job has been important to him during more difficult periods. The possibility of adapting each day means that he can retain both of his jobs, even when things are a bit up and down.



Together with Estonia and Singapore, Norway tops the OECD's innovation index for the fourth year in a row.

Through his work as a teacher, Jonas has gotten to know many young people and their parents in the local community. Because of his own background in psychiatry, he is keen to work on mental health issues with young people. He has recently been in contact with the company behind "Sofie", who are in the process of developing a similar service specially aimed at children and young people.

Jonas himself has witnessed pupils who were not picked up by the municipal health service and believes that the self-help service can be of value. The family of a former pupil of Jonas decided last year to move so that she could live in a municipality that offered better services within mental health for young persons.

*"I hope that my experiences can help others in the same situation"*

The company Jonas is working with already has a pilot agreement with the municipality. In the first phase, users are obliged to pay a small fee for the service but if positive results can be demonstrated after a while, there will be an option for the municipality to pay for the service to be offered free to inhabitants. Thus far, they have received good ratings from users and the app is already being offered for free in one of the neighbouring municipalities.

The municipality that Jonas lives in is good at facilitating innovation and, at any given time, there are several services being tested for different groups of patients. This means that health services are being developed rapidly, new technology is constantly being commissioned and services are being reorganised. Jonas likes testing out new things but has noticed that his parents sometimes have trouble keeping pace with developments. Not all services are equally well tested before being rolled out and there are major differences between different municipalities.

His parents miss their GP, and the fact that they only needed to relate to one person. However, Jonas believes it is great that he can choose without anyone else first assessing his needs. He doesn't know whether to laugh or cry over the fact that people want to return to telephone queues and waiting rooms with old magazines.

*"Once my dad has grown accustomed to something, it is difficult if it gets replaced after a short while"*

Jonas spends a few hours every week following up an old man who lives on the same floor. He suffers from COPD and needs help now and then to ensure that the measurements he takes at home are correct. Sometimes Jonas helps his neighbour register health measurements, but other times they mainly drink coffee and chat.

This assistance has now been incorporated into the local time bank so that he "earns" hours he himself can buy services for. For example, when he was going on a cabin trip the previous month he was able to borrow a brand-new hydrogen car for the hours he had earned.

Norway has fallen to 17th place in the UN's ranking of the world's best countries to live in because of the major quality differences between municipalities.

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## SCENARIO 2: WORLD CLASS

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### MAIN CHARACTERISTICS OF THE SCENARIO

- *Global health services.* As a consequence of digitalisation, health services have also become global. In the same way that Google, Amazon, Apple, IBM and Baidu dominate the Internet economy, some major companies also lead the way in a health sector characterised by big data, artificial intelligence and network effects.
- *It is about health, not Theodore Rimpoke.* The government believes that the most optimal health outcomes per krone will be achieved by managing citizens' health services through service providers who are good at prediction, prevention and follow-up. Based on population and health service data, Norwegians are offered world-class services, including for rare ailments and types of cancer that only a few people are afflicted by in Norway. This also provides better negotiation power with the pharmaceutical industry. Norway is attractive, since we can offer good data and a techno-savvy population.
- *From "sickness service" to "health service".* The high volumes of data being collected enable very accurate preventive measures. Citizens can choose how much data they wish to share with the companies, but it is no secret that the services will maintain the highest level of quality if users share as much data as possible – both health data and other information.
- *The whole family put out to tender.* Through tendering schemes, the authorities have selected four consortia who will offer health services in Norway. Citizens can, in turn, choose who they wish to belong to. In addition, Parliament requires the Ministry of Health and Care Services to take direct responsibility for psychiatric and care services for severe cases, following a record volume of inquiries, as well as social media campaigns, prior to the decision.
- *Platform economy.* The companies that win the tendering schemes operate mainly with their own digital platform, in which the companies they collaborate with can contribute to delivering solutions. Some of the best Norwegian companies and research communities are also included, thus affording them greater opportunities to promote themselves internationally.



Alina is a 46-year-old woman who has worked as an auditor for many years. She lives with her husband and has two grown-up children.

Both Alina and her husband have chosen to be customers at Amazing Health. They have a fixed contact person, Hanne, who follows them up frequently.

One year ago, Alina was diagnosed with cancer. Prior to the diagnosis, she was contacted by Hanne and invited to a meeting. She was made aware that Amazing's cancer team had flagged her as high risk and that they therefore wished to take tests and follow her up more closely. It became apparent that the doctors were right and she was immediately put in contact with a specialist centre for this type of cancer. The centre is located in Vienna and she has already been treated there once. She takes the tests in Norway, and once she receives the answers she talks to the doctors in Vienna via a video link together with Hanne, and receives information on how the treatment will be followed up.

Alina's husband is at high risk of developing diabetes and they have therefore been encouraged to be more active and eat more healthy foods. A digital personal assistant uses sensors to register their activities both at home and when they are on the go, and gives Alina and her husband reminders and messages.

Norwegian patients diagnosed with cancer have the best prognoses in the world for survival.

In the beginning, Alina thought it was strange to have a gadget talking to her in the kitchen, but she eventually grew to like it. Alina recalls how envious she was of her uncle, who received his own personal assistant when he became a boss. This is perhaps something quite similar, even if it isn't a real person?

*"It is almost as if they know me better than I know myself"*

Alina and her husband subscribe to a food delivery service, which adapts the meals to the calendar. This ensures that they have a varied and healthy diet that is suited to their lifestyle and health needs. If they have plans to go out one evening, the day's meal is something simple that is quick to make, and if they are expecting a visit, the amount of food is adjusted automatically. Sometimes they receive special offers on goods and services. For example, in the summer, Alina and her husband were on holiday when they received a special offer through one of Amazing Health's collaborating partners.

Alina is grateful to Hanne for contacting her to arrange early testing and treatment of the cancer. She still doesn't completely know how the people at Amazing could know this, but she has been told that all the data she shares with the company helps them recognise signs of the illness at an early phase and provide her with better follow-up. She trusts that the information is treated appropriately and shares as much data as she can.



*"Luckily, they paid attention"*

Alina's daughter is more sceptical and believes her mother is naïve in sharing so much data with these large companies. She works at a university and believes the health companies have far too much influence on research and development in the health sector. It is difficult for people to understand and verify what lies behind the recommendations that are generated by the intelligent systems. Technological development is also characterised by secrecy and protection of intellectual property and patents; and in Norway it is only the hospitals which have been incorporated into the ecosystems which have access to the data.

Norwegian health authorities have been reported to the European data protection authorities 23 times over the last four years due to their handling of citizens' health

Alina sticks to her views and believes her daughter is too young to remember how poor the system used to be, when patient records were driven in a taxi, where each local hospital had its own procedure for hip operations, and when you were left to your own devices after a hospital stay. Data collection is okay, I guess, as long as it can save lives?

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## SCENARIO 3: KNOWLEDGE NATION

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### MAIN CHARACTERISTICS OF THE SCENARIO

- *New diagnosis.* Now everyone can test and measure themselves, receive an immediate interpretation and receive multiple diagnoses. The consequences are a situation in which many citizens want treatment and many treatment providers want to earn money. At the same time, health budgets must also be restricted. Following consultation with the Norwegian Medical Association, the Norwegian Nurses Organisation and the Norwegian Directorate of Health, health politicians have therefore committed themselves to a new and more stringent path for the public sector health services.
- *Evidence trumps everything.* Stringent requirements are in place to ensure that quality and effect are sufficiently documented before new solutions are offered on a national level. The authorities have made a conscious choice to only use relevant and verified health data, and not other data about citizens such as, for example, from social media.
- *QALY.* It is an expressed goal that services and quality shall be equal – regardless of where you live in the country. Prioritisation is more important than ever before, as there are so many possibilities and diagnoses. The Norwegian Directorate of Health has ruled out an extensive system of person-specific health checks. The most innovative solutions are not coming as quickly as some would like, but the Norwegian Directorate of Health is determined that quality adjusted life years shall form the basis for these solutions.
- *And what comes first is research.* With its well-organised health service, Norway has been competent in the field of register research for a long time. This has now been upgraded: All data from the health service is raw material for research and the research is returned to the health service so that quality is constantly improved. There is simply an obligation to contribute, since all citizens also benefit significantly from the services. The Norwegian health sector does well from a research perspective, but scores low on innovation.
- *Family silver.* The health authorities are concerned about information security – data shall be stored safely within the country's borders and not shared with players who have commercial interests. Health data is regarded as a national resource, but citizens have no control over how their data is used internally in the health service or in the public sector.



Jan is an 82-year-old retired construction worker. He is married but lives alone after his wife Karin was diagnosed with Alzheimer's. She lives in a nursing home close by and Jan visits her every day. They have a son, Andreas, who lives in another part of the country together with his family.

Jan has been largely healthy the whole of his life, although many members of his family have suffered from heart problems. He has therefore been given a smartwatch on prescription so that he can take part in a continuous health check for people with his profile. The watch measures his heart rate every day and this data is sent automatically to a nurse. He is aware that all data from the home measurements is used for research purposes and he thinks this is fine. He would like to contribute to better public health.

Norwegian citizens have the highest life expectancy in the world.

The health authorities are focused on prevention and early identification of illnesses and push tests on people, even though they are allowed to say no. Jan knows that this is a sensible solution, although sometimes he thinks that it would have been better to not be aware of the risk of illness and rather just tackle it when it happened. If Karin had known earlier in her life that she would contract Alzheimer's, he believes that this would have had a negative impact on her life.

Jan wants to live at home for as long as possible. The nursing home where his wife is staying is within walking distance, and he knows the neighbours. He is therefore happy that he can take the measurements himself and talk to the doctor from home when necessary. His son, Andreas, wants him to use several types of measuring equipment at home in order to receive better follow up. For a period, Jan tested several different sensors, but was eventually informed that his doctor could only receive data from prescription equipment. Jan settled for this, but Andreas is still annoyed.



The nursing home that Karin lives in maintains a high level of quality. As a relative, Jan knows that he has an option to learn about which data they are collecting on Karin, which analyses they are performing and the analysis results. This is often very complicated information and the one occasion he asked to view the information he could barely understand what he was sent. He now thinks it is best to leave it alone, not least since he knows that he does not have the option to influence which information regarding Karin's health the doctors collect and use.

*"Even if I don't understand everything, I trust that the doctors are competent people who know what they're doing".*

He is very satisfied with the nursing home that Karin lives in and knows that she receives good follow up there. There are rarely any changes in the services, which means that it is easy for both him and Karin to follow the routines at the home.

Andreas says that the home continues to use a lot of old technology and is a little out of date, but Jan likes the fact that changes don't occur too often. The authorities are probably wise not to jump at all the possibilities that present themselves. Jan believes the health service also provided good quality in the old days and believes that it is important that we don't let technology completely take over. He is glad that the general practitioner scheme still exists and finds it favourable to only have to relate to one person.

As his mother has Alzheimer's, Andreas wants to find out whether he might also be predisposed to the same condition. He bought a gene test from an American company, which indicated that he had a moderate risk of contracting Alzheimer's.

Several countries in Europe have started using a promising type of gene therapy for Alzheimer's. This is yet to be prioritised by Norwegian health authorities so Andreas has therefore not been able to participate in such treatment. His frustration regarding the tough prioritisation of the health authorities has affected his relationship with the public sector, and he has started saving for treatment at a private hospital in Denmark.

Patient journeys abroad have increased by 70% in the last three years. These journeys are financed either privately or via grassroots financing through social media.