

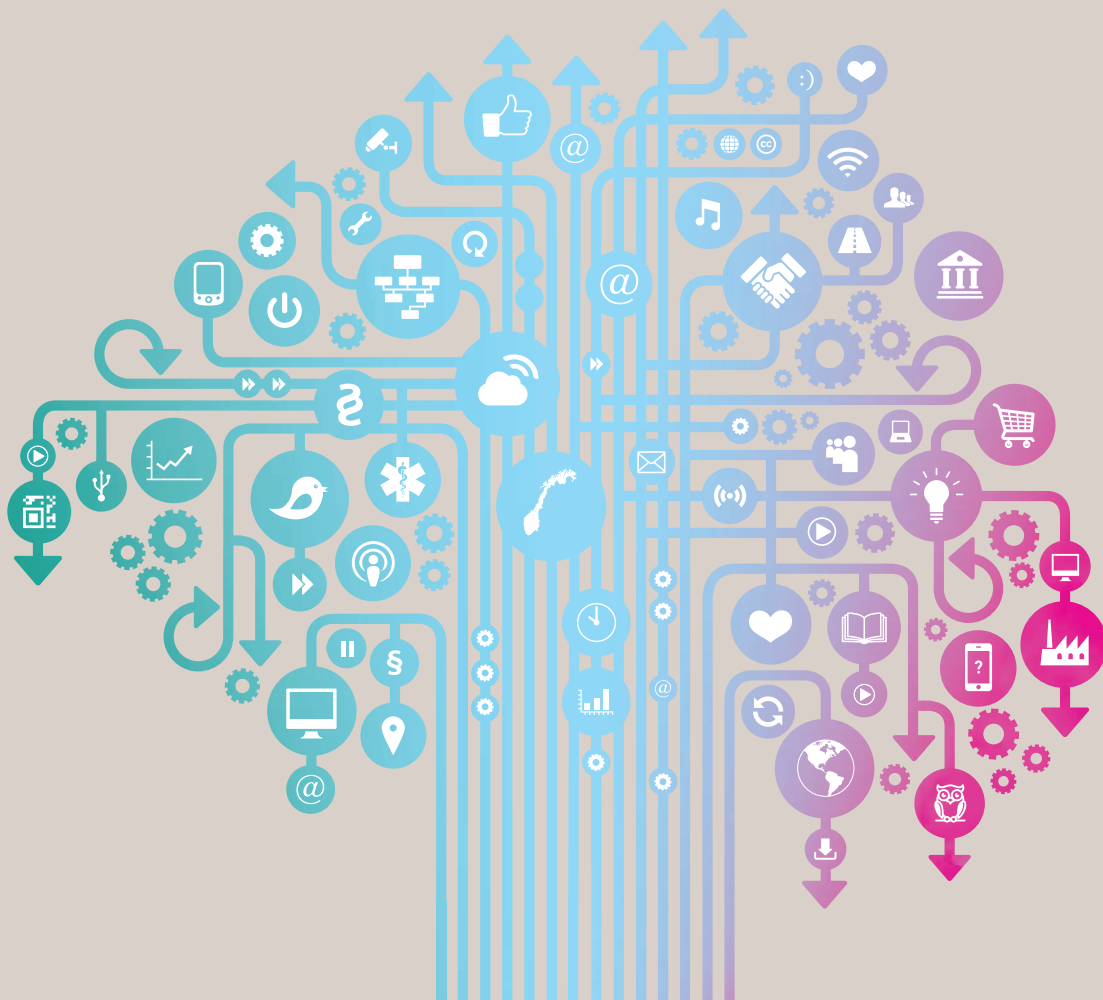


NORWEGIAN MINISTRY OF GOVERNMENT
ADMINISTRATION, REFORM AND CHURCH AFFAIRS

Meld. St. 23 (2012–2013) Report to the Storting (white paper)

Digital Agenda for Norway

ICT for Growth and Value Creation





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Recommendation from the Ministry of Government Administration, Reform and Church Affairs 22 March 2013, approved in the Council of State on the same date. (white paper from the Stoltenberg II Government)

1 Introduction

1.1 An agenda for the digital revolution

This white paper presents the Government's policy on how Norwegian society should take advantage of opportunities offered by ICT and the internet for value creation and innovation.

We are in the midst of a technological and social revolution that is based on the internet and on new ways of using ICT. In only 20 years, technology has radically changed our lives. Whether we like it or not, this technology plays an increasingly larger role in everyday life. ICT is used in everything: from telephones, cars, TVs, home appliances, and radiators, to passenger information displays at bus stops. Technology is used in almost every home, school, hospital, and public meeting place as well as in most workplaces and public institutions. The internet, computers, and mobile phones have changed how we search for information, communicate with each other, and consume entertainment.

We can safely say that we are experiencing a digital revolution. Technology and society are changing rapidly, far more so than during the Industrial Revolution around 200 years ago. Machines were the basis of the Industrial Revolution; the internet and web services form the basis of today's digital revolution.

Use of the internet became widespread 20 years ago, and since then the size of the network and the volume of information exchanged have steadily increased. Internet traffic is growing 30–35 per cent yearly,¹ meaning that traffic almost doubles every other year. This growth is partly due to new users and partly due to the fact that more and more *things* are being connected to the internet. According to predictions by networking company Cisco, up to 19 billion devices will be communicating via the internet by 2016: in 2010 there were 9 billion.

The internet fundamentally affects our everyday lives. It provides the basis for new forms of social interaction and communication. It drives and supports change in existing services and development of new ones. It also facilitates productivity growth. Through increasingly less expensive and better ICT equipment, the internet has provided the basis for significant innovation in business and industry and for a highly profitable ICT industry.

In a growing number of areas, ICT is no longer a supporting function, but rather the core of the operation. ICT fundamentally transforms how goods and services are supplied. Many industries, such as banking and travel, have understood and

¹ Cisco (2011): *Cisco Visual Networking Index (VNI)*

Box 1.1 What is ICT?

A popular definition of ICT (information and communications technology) is that it encompasses technologies that can gather, store, process, communicate, visualise, and use data and information in electronic form. In practice this means that ICT entails all types of terminals we use for communication, such as radio, TV, satellite, mobile phones, computers, and tablets. The hardware, the electronics, and the software are all products of ICT. Because we include hardware in this definition, electronic components such as screens, sensors, etc. are regarded as ICT. Most people associate computers, mobile phones, and the software they use with ICT, but ICT is found in many other objects we encounter in our everyday lives:

- Advanced washing machines have sensors that weigh wash loads, calculate how much water is required, and gauge when the rinse water is clean enough to complete the cycle.
- GPS systems use satellites to find out where receivers are located, and most GPS system suppliers have large central systems that receive information from different GPS terminals. Because this involves vast amounts of data from millions of users, the data can be used to calculate travel time, find out what roads are closed, and even identify roads in unmapped or poorly mapped places, based on where the users are driving.
- New electric meters contain a module that can both transmit information to power companies and receive information on, for example, prices in real time.
- Modern passports contain small electronic RFID (radio-frequency identification) tags for storing information and for transmitting it to dedicated scanners via radio signals. Information contained in RFID tags is protected by encryption.

used ICT innovatively to give customers better, faster services and to improve the efficiency of their internal processes. Fifteen years ago most people paid their bills by visiting their local bank; today, 86 per cent of us use online banking services.² In other industries, digitisation has not fundamentally affected how they produce and supply their services to the same degree, even if we have seen some changes. This applies to areas such as the media industry, the health and care sector, and parts of the public sector. In future, these areas will similarly change because of new web-based services and business models.

Value creation potential

In 2011, the research unit of the authoritative news magazine *The Economist* conducted a survey. Eight hundred leading experts and investment fund managers were asked how they thought various scenarios would affect the global economy and, consequently, their investments. Their answers reflected the currently difficult times: all 24 scenarios were assessed as negative, such as continued political unrest in the Middle East, or as unlikely, such as agreement on a new

climate change treaty. There was only one exception – which was both positive and likely – and that was that ‘The internet and social media are a catalyst behind rapid political and economic change around the world.’³ The answers reveal the internet’s significance for the global economy.

According to a University of Groningen study, 50 per cent of European productivity growth is attributed to ICT and internet use.⁴ A McKinsey analysis in nine countries estimates that 21 per cent of GNP growth in 2004–2009 can be attributed to the internet alone.⁵

The EU has launched its *Digital Agenda for Europe* as an important initiative to address the financial crisis through smart, sustainable, and inclusive growth based on ICT. The EU’s digital agenda is one of several so-called ‘flagship initiatives’ linked to the general strategy *Europe 2020*, which responds to the economic crisis. This strategy

² Statistics Norway (2012): *ICT usage in households. 2012, 2nd quarter*

³ Economist Intelligence Unit (2011): *The Search for Growth: Opportunities and risks for institutional investors*

⁴ Ark, Bart van and Inklaar, Robert (2005): *Catching up or Getting Stuck? Europe's Troubles to Exploit ICT's Productivity Potential*, Groningen Growth and Development Centre, University of Groningen

⁵ Pélissié du Rausas, Matthieu et al. (2011): *Internet Matters: The Net's Sweeping Impact on Growth, Jobs, and Prosperity*, McKinsey Global Institute

Box 1.2 Digital Agenda for Europe

The objectives of the EU's 2010 digital agenda (*Digital Agenda for Europe*) are to contribute towards economic growth and to benefit society. The Digital Agenda adopts a long-term horizon, but contains several concrete initiatives intended to contribute towards monitoring, commitment, and action in the short term. Annual reports published as so-called 'scoreboards' are part of the work on monitoring and measuring developments. Norway participates in monitoring the EU's Digital Agenda.

The Digital Agenda for Europe contains 101 initiatives. An interim evaluation (November 2012) shows that 40 per cent of them have been completed, 50 per cent are on schedule, and 10 per cent have been delayed. The European Commission has indicated that two of the main priorities in the future are job creation and economic growth.

ranks ICT on a par with education, innovation, and environmental policy.

ICT and the internet contribute towards value creation in many ways. Every enterprise can be operated more efficiently. Old products can be replaced by new. Better information can help bring together buyers and sellers. Products previously sold only locally can now join the global market. The need for intermediaries such as stockbrokers and record shops is diminishing. The more widely knowledge is disseminated, the more valuable it becomes. Ideas and new services are being provided faster and to wider audiences. Consumers and buyers can choose from a wider array of suppliers and can compare price and quality, thereby increasing competition, and compelling companies to operate more efficiently.

The Government's policy foresees ICT becoming a future source of significant social improvements, and ICT-related growth and productivity will thereby be important for our welfare and prosperity.

Advantages and challenges

Norway's inherent advantages and future challenges must determine its ICT policy. Two of the challenges are that the Norwegian economy is characterised by many small enterprises and that

Norway has fewer industrial actors than do many of our trading partners. The domestic market for these enterprises is quite small, and the distance to the larger markets is great. Wages in Norway are high, which means that we must be highly productive to be competitive internationally.

Norway has some significant advantages we should exploit. We have competent and adaptive public and private sectors. Surveys show that Norway's citizens trust each other and place a high level of trust in public authorities. The population's use of digital media and their digital behaviour show that Norwegians are interested in new technology and are quick to adopt it. Up to 90 per cent of Norwegians have a broadband connection. Labour costs in traditional, labour-intensive industries are relatively high, meaning that we can profit from adopting labour-saving technology. The fact that our finance and telecommunications sectors are modern and efficient simplifies digitisation in other sectors.

The ICT industry is crucial for Norway's value creation because it provides the basis for better and less expensive products in other industries, some of which are presented in this white paper. Therefore, we must ensure good framework conditions that can sustain our strong and innovative ICT industry. In a survey of 2,000 Norwegian business leaders, 76 per cent answered that development of new ICT solutions was increasingly crucial to their competitiveness.⁶ Forty-four per cent of the private sector's total operating costs in R&D are related to ICT.⁷

The Government's goals and ambitions

The Government's primary goal is that Norwegian society take full advantage of the value creation and innovation opportunities that ICT and the internet offer.

It is not a question of *whether* more areas of society will be digitised, but rather *when*. We must therefore identify those areas of society that have the greatest potential for further development and that will face fundamental changes. It is important to ensure that these areas are digitised in an expedient manner.

Norwegian citizens will continue to use an increasingly wider range of new digital services.

⁶ Perduco (2009): *Nordic Business Survey: Report prepared for the Research Council of Norway (VERDIKT)* [Core Competence and Value Creation in ICT]

⁷ Statistics Norway (2012): *Current costs for R&D in the business enterprise sector, by technology field and industry*, 2010

Enterprises and organisations will use technological advances to adapt to market and consumer demands and requirements by producing new and improved products and services. This trend will take place more or less independent of what the state does and how it facilitates these new developments. A policy that actively makes the transition from an analogue to a digital society can also give Norwegian businesses a competitive edge when entering international markets.

The Government wants Norway to be one of the leading markets for ICT-based services, to be a society whose citizens are online and whose market players know they can reach the entire population with their digital offerings. We want a public sector that demands digital services and solutions. We also want high levels of ICT research and ICT education. We want a digitally competent population that can use digital services safely and securely. We want an open and non-discriminatory internet. These, together with good data protection, high security, and trust in ICT systems, will form a sound basis for ICT-based value creation in future.

This white paper covers Norwegian society as a whole. Its policies and initiatives are aimed at individuals, organisations, public agencies, and business and industry. For society to reap benefits from further ICT developments, the ICT industry must supply the right solutions. The Norwegian ICT industry is therefore also a key target group for this white paper.

The Digital Agenda adopts a long-term perspective, as far ahead as 2020. In this white paper the Government proposes the main goals and outlines some specific priority areas. The Digital Agenda covers topics that many ministries, respectively, have responsibilities for. The policy goals and instruments in individual areas are described in more detail in the respective sections of this white paper.

The Ministry of Government Administration, Reform and Church Affairs has overall responsibility for following up and implementing the recommendations in this white paper.

1.2 ICT policy in a dynamic market

The authorities play several roles in ICT policy, and can adopt a wide range of policy instruments. The public sector regulates, assigns rights, and imposes obligations by means of laws and regulations. It allocates funds in some areas and collects taxes and duties in others. The public sector is a

major procurer – and in some cases a supplier – of services. Common to all these roles is that public authorities operate in different markets: markets for ICT products and services, but – perhaps more importantly – markets created and shaped by technological advances.

ICT policy must take into account many different markets and market players with many special characteristics. The technology field is characterised by rapid changes in products, technologies, and suppliers. ICT has been instrumental in bringing about fundamental changes in existing markets such as the music, media, and finance markets. In addition, the global nature of the technology field means that a large proportion of products are produced in large volumes and for global markets, and are therefore reliant on international market conditions. A unified and long-term ICT policy must consider major changes and variations. It will therefore be vital to draw up some fundamental principles for how the state should operate in individual areas, for ICT policy, and for choosing between different policy instruments.

A policy that safeguards future business and markets

ICT can transform existing markets. New businesses may challenge existing ones. Government policy must facilitate the creation of new business activities and ensure that the interests of existing businesses and industries do not prevent further innovation.

Technology-neutral regulation

The authorities should normally not favour some technologies, processes, or production methods over others. Flexible, technology-neutral regulation makes it possible to create healthy competition in all types of markets – including markets that were not envisioned when regulation was being formulated.

Publicly available, international standards must serve as the starting point

Use of open standards creates flexibility and promotes competition. Because Norway is a small market, we must base our work on international standards if we are to benefit from the strong international competition to constantly supply better products at lower prices. Using these standards will give Norwegian actors access to export markets. We will actively participate in the ongoing work on international standardisation and on

supporting open standards. We will take advantage of the public sector's position as a major procurer to promote the use of open standards at the national level.⁸ Proprietary technologies that might restrict market competition should be avoided.

The roles of the public and private sectors should be clearly defined

One premise for successful innovation and enhanced value creation in Norway is that there must be a clearly defined distribution of roles and tasks between the public and private sectors. The framework conditions for private actors seeking to launch new, innovative solutions should be predictable, and a clear distinction should be made between the state's role as public authority and the state's role as owner.

The state should exercise caution in its market regulation

Since ICT markets are undergoing continual development, the public sector must be cautious about intervening in markets in a way that might prevent development and hinder innovation. Direct intervention should be called for only in cases where a market fails to work or develops such that important social values are compromised. The authorities should avoid *ex ante* regulation that would create obstacles to innovation and prevent new markets from developing.

Effective regulation

Public authority based on laws, regulations, and other provisions must be exercised such that available resources are used as effectively and expediently as possible. This entails selecting the regulatory tools best suited to achieving goals and avoiding unnecessary regulation.

The state should be able to contribute towards market development by stimulating demand

We will draw on the public sector's own needs and on its role as a large-scale procurer to contribute

⁸ See *forskrift om IT-standarder i offentlig forvaltning* [Regulations for ICT Standards in the Public Sector]. The purpose of the regulations is to contribute to enabling every state and local authority to adopt IT standards that facilitate and promote electronic collaboration between government agencies and between the public sector and society at large.

towards reaping benefits inherent in new technological solutions in areas that need an influential actor to take the lead. For instance, the public sector can lead in using electronic invoicing in order to ensure faster implementation than would otherwise be the case.

The public sector will work towards achieving an open and non-discriminatory internet

The authorities will work to ensure that the internet continues to be a system that is open and that promotes innovation. The Government will facilitate competition between different developers and between different technologies to ensure sustainable business models and local freedom of choice.

1.3 About this white paper

The Government's white paper on the Digital Agenda for Norway has four sections:

- I *Norway online*. In this section we describe how the Government will facilitate online access and top-notch broadband coverage for the entire population. This is an absolute prerequisite for implementing other initiatives. If citizens are not using the internet, there is no basis for providing digital services. The more citizens online, the more attractive it will be to develop and sell digital services. The high proportion of online users in Norway is thus a competitive advantage which the Government intends to exploit. This section of the white paper describes initiatives for organising good broadband services and for ensuring that these services are actually used.
- II *The digital revolution*. In this section we describe how the Government will facilitate and support value creation and digital reorganisation through favourable framework conditions and by paying particular attention to key areas which we consider to be on the threshold of a digital revolution. These areas have been highlighted because they are important for society and because public ICT policy is crucial for their future development. These criteria mean that some sectors (offshore and seafood, for example) are not mentioned, even though they are large and ICT is crucial for them.
- III *Basis for growth*. This section presents the core elements that must be in place to ensure a successful long-term ICT policy and

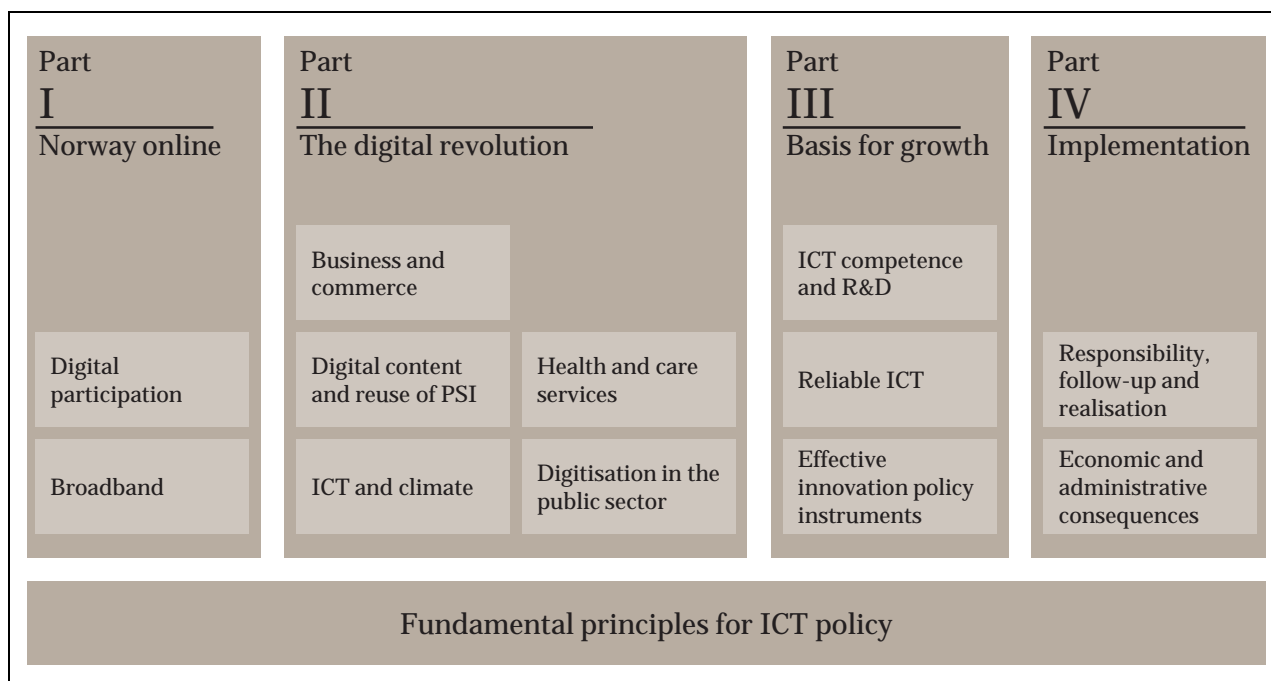


Figure 1.1 The structure of Digital Agenda for Norway

value creation: leading-edge ICT competence, ICT R&D, and cyber security. We describe how we will ensure that Norway possesses the necessary ICT competence and R&D capacity to support digital development, and what policies the Government will adopt to ensure that ICT solutions are secure. This section also describes potential policy instruments for innovation and value creation.

IV *Implementation.* In this section we describe how this white paper will be followed up. We outline the roles and responsibilities for implementing the policy and the economic and administrative consequences of the proposed initiatives.

1.4 The ICT sector

In terms of turnover, the ICT sector contributes significantly to Norway's economy. The rate of value creation per employee is extremely high. Statistics Norway's 2010 figures show that:

- Norway's ICT sector had a turnover of NOK 202 billion, and value creation worth NOK 79 billion, which represents almost five per cent of total value creation in mainland Norway.
- In 2010, the ICT sector employed 74,000 people, which represents nearly 3 per cent of total employment in Norway, and more than the

number of employees in the agricultural and fisheries sectors combined.

- ICT sector employment increased by 8 per cent from 2007 to 2010, a growth rate far higher than that of the economy in general. In the same period, total employment on mainland Norway increased by 2.4 per cent.
- Value creation⁹ per employee in ICT was NOK 1,070,000, which is 50 per cent higher than for the rest of the mainland economy. By comparison, value creation¹⁰ per employee in large industries (such as building and construction, and manufacturing) was around NOK 700,000.
- The ICT sector comprised 11,200 enterprises, and 82 per cent of ICT employees were involved in services, including telecommunications and software manufacturing. The ICT industry, which produces components, hardware, and electronics, accounts for around 5 per cent of total employment in the industry.

It must be emphasized that delimitating this sector from the rest of the economy is difficult. Many sectors not included in the official statistics for the ICT sector nonetheless show significant ICT-based value creation and are often perceived as part of the ICT industry, such as enterprises involved in, for example, media and content production.

⁹ Measured as value added at factor cost

¹⁰ Measured as gross product in the national accounts

Box 1.3 Developments since 2006 and publication of the white paper *An Information Society for All*

Six years ago, the first white paper on ICT policy was submitted to the Storting.¹ The white paper was broad-based, and was intended to facilitate not only growth and value creation, but also inclusive development. Moreover, it expressed a desire to contribute towards a broad public debate on ICT policy.

Six years on, many of the topics that were described then are included in this Government's Digital Agenda. We are still concerned with providing everyone an opportunity to use digital services. We are still concerned with digitisation of the public sector, and with accessibility to and reuse of public sector information. We are still concerned with ICT R&D. Privacy protection and trust continue to be important issues that demand particular attention.

That we still have many of the same items on our agenda does not mean that developments have not occurred or that the field has stood still since 2006; on the contrary, significant developments have occurred:

- In 2006, 69 per cent of households had access to the internet, and 57 per cent had access to high-speed internet (broadband); today 93 per cent have access to the internet, and 86 per cent have access to broadband.
- In 2006, 69 per cent of the population used the internet; in 2012, 95 per cent do. The figure for the oldest of the population (75–79 years) has increased from 16 per cent to 47 per cent.
- In 2006, 62 per cent of enterprises used electronic systems when reporting to public authorities; today 77 per cent do.
- In 2005, the public sector allocated NOK 1.25 billion to ICT research; in 2012, it allocates NOK 1.57 billion.²
- Six years ago, it was decided that all public sector websites should have a universal design. Figures from the quality survey conducted for the Agency for Public Management and eGovernment (Difi), *Kvalitet på nett* [Website Quality], show that in 2006, public sector websites had an accessibility score of 54 per cent; in 2011, the score was 61

per cent. This is a positive trend, particularly considering that the criteria for accessibility have become more stringent yearly. Draft regulations on the universal design of ICT services have been submitted for consultation, to follow up the provisions in the Anti-Discrimination and Accessibility Act. A dedicated supervisory authority will be established in Difi.

- In the wake of the white paper from 2006, a Privacy Protection Commission was appointed with a mandate to evaluate challenges to privacy protection. The commission submitted its report *Individ og integritet* [Individuals and Integrity] in 2011. The Ministry of Government Administration, Reform and Church Affairs established the service slettmeg.no [deleteme.no] on the commission's recommendation. This service is described in more detail in another section of this white paper. The Government has also submitted a separate white paper on privacy protection: Report to the Storting No. 11 (2012–2013) *Personvern – utsikter og utfordringer* [Privacy Protection: Outlook and Challenges].
- In April 2012, this Government presented its eGovernment Programme for the Public Sector. Through this programme, the Norwegian Government has taken stronger steps to enable the public sector to use ICT in ways that free up resources and provide better services to its citizens. For example, NAV (Norwegian Labour and Welfare Service) is implementing extensive reorganisation processes based on ICT.
- The Government has developed a national strategy and action plan for cyber security.

This development cannot be attributed to the Government's policy or intervention alone: much of it is due to new products and services that have emerged in both Norway and abroad, and to a technology-literate population that wants to be involved.

¹ Report to the Storting No. 17 (2006-2007) *An Information Society for All*

² Ministry of Education and Research (2012): *Forskningsbarometeret 2012 – Forskning for forandring* [Research Barometer 2012: Research for Change]

Part I
Norway online

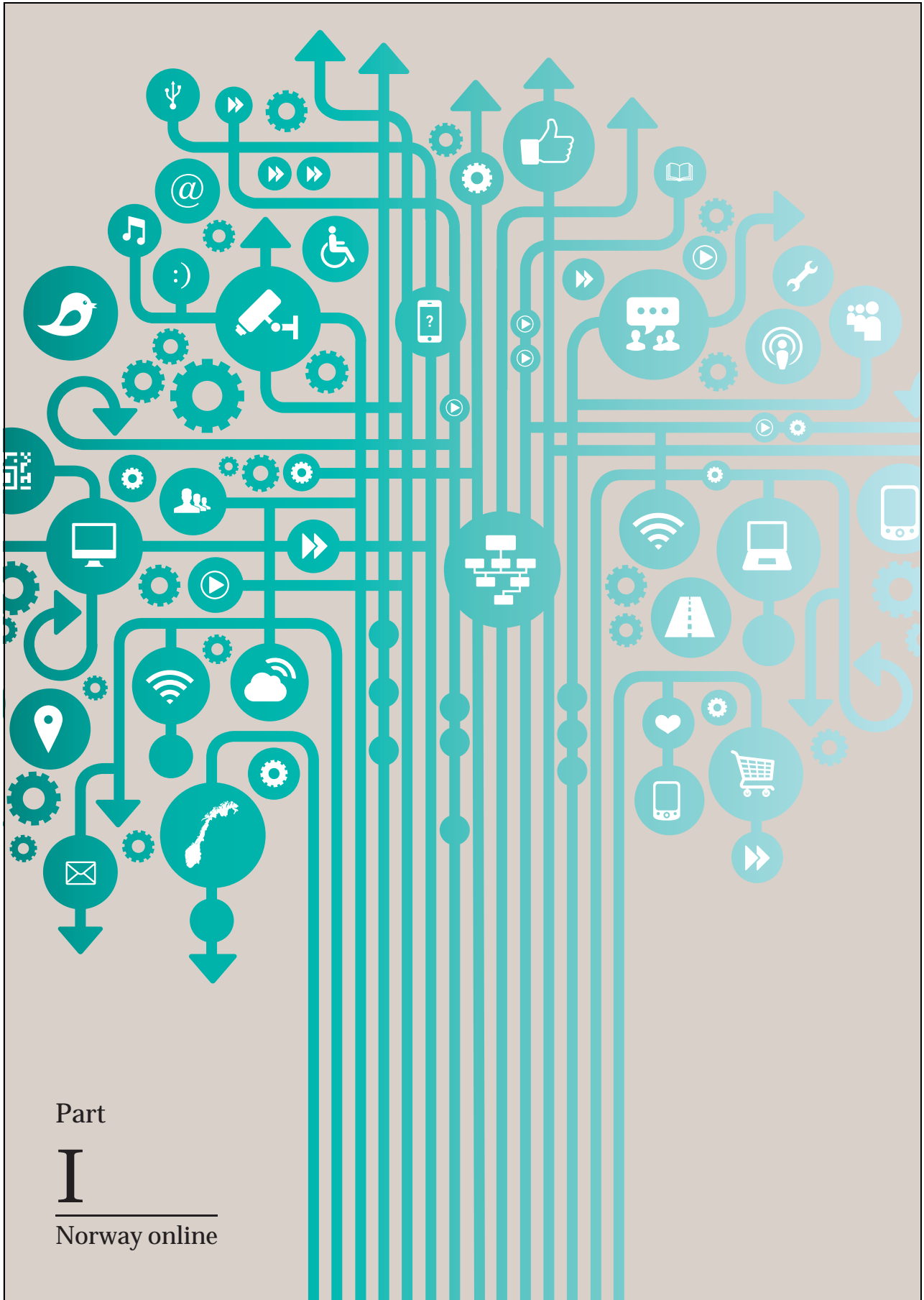


Figure 2.1

2 Digital participation by everyone

A growing number of areas in Norwegian society are based on the premise that its citizens are online. Consequently, if you are not online, you will often feel excluded from society. In Norway, most citizens participate in the digital society and use the internet regularly. This is an advantage for both individual citizens and society. There are, however, individuals who for various reasons are not online. The Government wants to help everyone wishing to use the internet to have the opportunity to do so. This white paper therefore outlines clear goals for digital participation by everyone.

Widespread digital participation is important not only for individuals; it also represents a competitive advantage. If a large proportion of the population is online, the market for digital offerings can grow and thus make Norway an attractive market for digital goods and services. It would also give Norway a head start in offering digital goods and services that would be unprofitable to offer in markets with lower levels of digital participation. An active policy on digital participation is therefore crucial for ensuring that ICT can contribute towards value creation and growth in society. Compared to other markets, Norway's level of digital participation is high, and we are well placed to capitalise on this advantage.

The Government's goals for digital participation are:

- Everyone who wishes to use digital tools and services should be able to do so.
- Provisions will be made to ensure relevant training opportunities for groups that need them.
- Within five years, the number of citizens not online will be halved, from 270,000 to 135,000.
- The education system will provide individuals with sufficient qualifications to continue developing their digital competence and keep pace with technology developments.
- Employees will be able to use digital tools and develop their digital skills at work.
- The population will have sufficient skills to use the internet safely and securely.

2.1 Use of ICT by the Norwegian population

Along with Iceland, the Norwegian population has the highest level of internet usage in Europe. Norway also scores highest (along with Iceland) in terms of internet and computer skills:¹ as much as 86 per cent of the Norwegian population use the internet daily.² Over 90 per cent uses the internet at least once weekly. By comparison, 68 per cent of the EU's population use the internet weekly, though of course considerable variations exist between countries.

According to Statistics Norway, 93 per cent of Norwegian households have access³ to the internet at home;⁴ in 2003 the figure was 55 per cent. For the EU overall (27 countries), 73 per cent of households have access to the internet at home (2011); in 2004 the figure was 41 per cent.

Norway ranks highest in Europe and the rest of the world in terms of internet usage in several areas. For example, 86 per cent uses online banking services compared to up to 80 per cent in the other Nordic countries and 37 per cent in the EU overall. Other areas where the Norwegian population is active are in the buying of goods and services via the internet, contact with public authorities, and participation in social networks.

E-mail communication and web searches for goods and services are the most common types of use for 90 per cent of households. Almost as many read news online, and a growing number also uses the internet to listen to radio or watch TV.⁵ In

¹ European Commission (2012): *Digital Agenda Scoreboard 2011*

² Statistics Norway (2012): *Internet usage in the past three months. Percentage of population, by gender, age, education and employment situation. 2012, 2nd quarter*

³ By 'access' is meant that they state they have a computer or similar device connected to the internet at home.

⁴ Statistics Norway (2012): *Percentage with access to different ICT, by household type and household income. 2012, 2nd quarter*. These figures apply for households where at least one person is aged below 75.

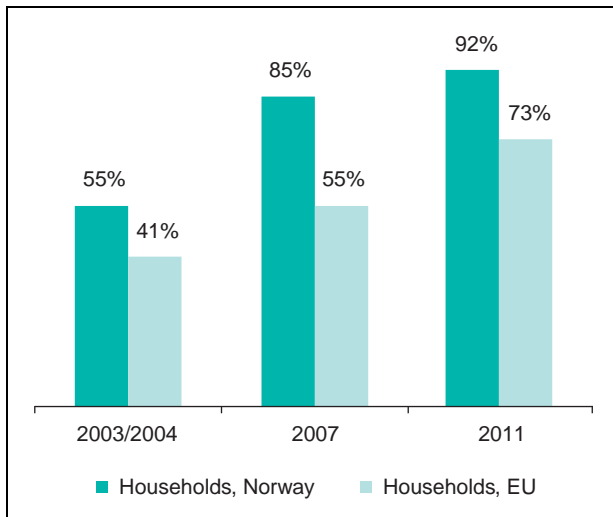


Figure 2.2 Internet access in households. EU and Norway

Source: Eurostat: Information Society Statistics

all, 63 per cent used social networks. This area is characterised by a wide disparity between age groups: for example, 90 per cent of persons aged below 35 used social networks, whereas only 20 per cent aged 65–74 did likewise.⁶

⁵ Statistics Norway (2012): *ICT in households. 2012, 2nd quarter*

⁶ Statistics Norway (2012): *Norwegian Media Barometer 2011*, Table 19

Our lifestyles are changing. Young people aged 16–24 daily spend on average one hour 20 minutes of their leisure time on computer games and other types of computer use, and 30 minutes on socialising with friends.⁷ From 1980 to 2010, the time spent daily on socialising by young people decreased by one hour. Face-to-face socialising is partly being replaced by social interaction via mobile phones, tablets, and computers.

2.1.1 Non-users of the internet

Approximately 3,500,000 Norwegians aged 16–79 are online, representing 93 per cent of the population. A total of approximately 270,000 persons aged 16–79 did not use the internet in the previous three months. The Government wants to halve this figure over the next five years. Through learning about the population's digital competence and current trends, the authorities can adopt a policy that ensures that everyone who wants to can participate in the best possible way.

Digital participation is measured variously. Figure 2.4 shows how many used the internet during the previous three months. This measurement is easily obtained from responses in surveys. However, this number measures digital participation

⁷ Vaage, Odd Frank (2012): *Tidene skifter. Tidsbruk 1971–2010*, SSB Tidsbrukundersøkelsen 2010. [Times Change: Time Use 1971–2010], Statistics Norway Time Use Survey 2010

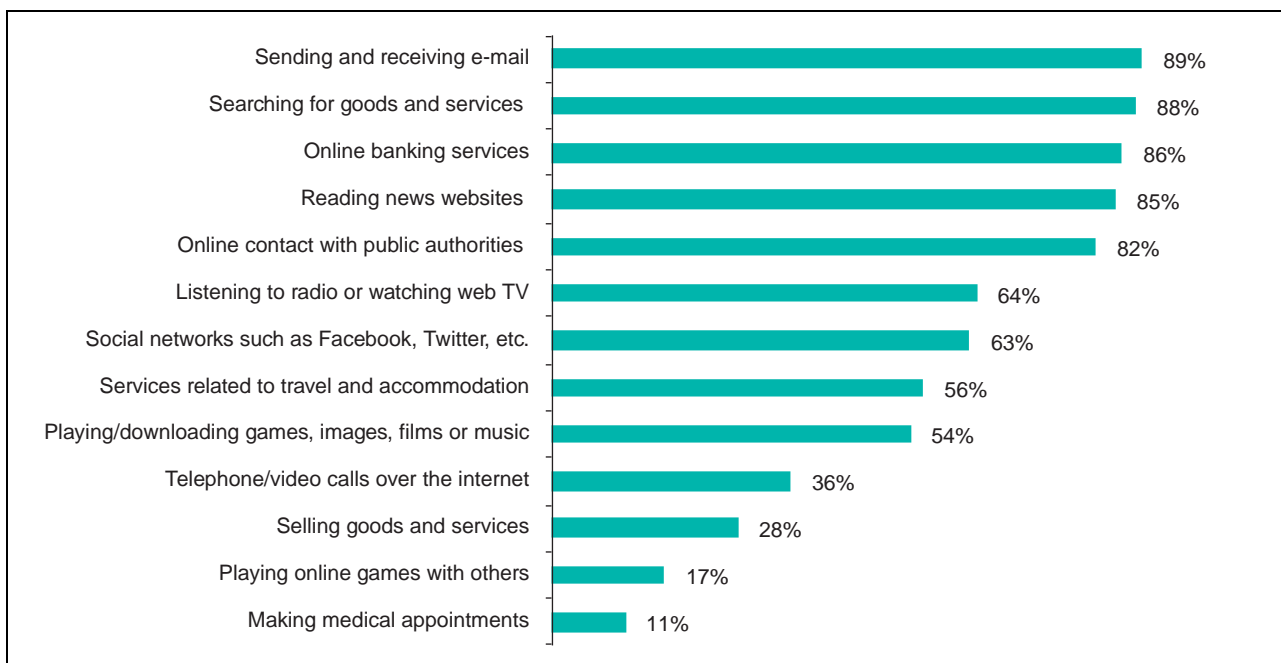


Figure 2.3 Internet use for different purposes, 2012

Source: Statistics Norway: ICT usage in households. 2012, 2nd quarter

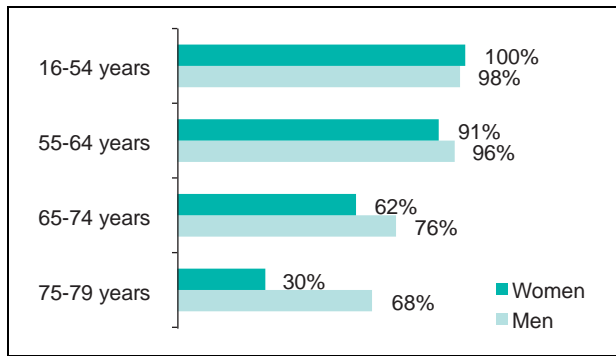


Figure 2.4 Percentage of internet users, by age and gender, 2012

Source: Statistics Norway: ICT usage in households. 2012, 2nd quarter

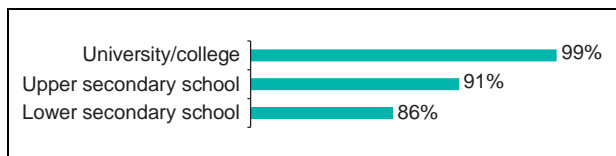


Figure 2.5 Percentage of internet users, by level of education, 2012

Source: Statistics Norway: ICT usage in households. 2012, 2nd quarter

or knowledge at a rather basic level, and no distinction is made between those who used the internet only a few times and those who used it daily during that period.

The statistics reveal consistent differences between groups in terms of how many are online.

Age

Age is the key explanatory factor for digital participation. Almost all respondents aged 16–54 (99 per cent) used the internet during the previous three months. The percentage of respondents aged 55–64 is also very high (93 per cent). Among respondents aged 65–74, 69 per cent was online. This shows a clear majority of seventy-year-olds, though far from all. It is when we come to the group aged above 75 (75–79) that the percentage of users decreases (to 47 per cent). The group over 79 is not captured by official statistics, but the percentage of internet users in this group is also small.

The differences we see today will gradually decrease because those who have become used to using the internet will likely continue to do so.

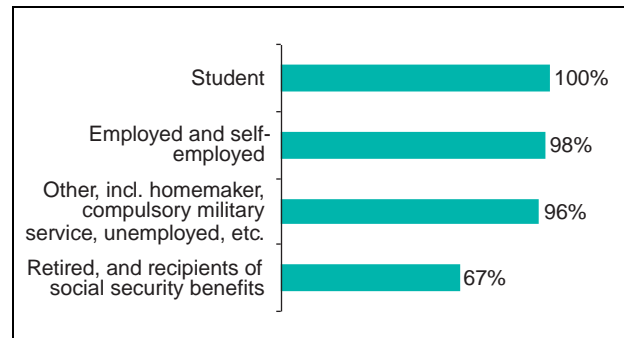


Figure 2.6 Percentage of internet users, by employment situation, 2012

Source: Statistics Norway: ICT usage in households. 2012, 2nd quarter

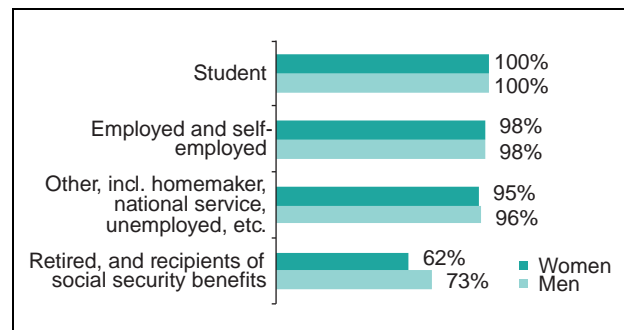


Figure 2.7 Percentage of men/women in different employment situations using the internet

Source: Statistics Norway: ICT usage in households. 2012, 2nd quarter

Education

Education and internet use correlate. In all, 99 per cent of respondents with higher education have recently used the internet. Use among respondents with only lower-secondary education is slightly lower (86 per cent).

Employment situation

Practically all employed and student respondents used the internet during the previous three months: 98 per cent and 100 per cent, respectively. Retired respondents or recipients of social security benefits used the internet far less frequently.

Among respondents aged below 55 and excluded from working life, 4.8 per cent did not use the internet during the previous three months. By comparison, the proportion of employed and student respondents who did not use the internet during the previous three months is less than 1 per cent.

Gender

Although no notable differences in internet use exist between genders, fewer women than men excluded from working life tend to use the internet.

Income and children

In all, 98 per cent of households in Norway with a gross income above NOK 600,000 have access to the internet. The figure for households with a gross income below NOK 200,000 is 82 per cent. All (100 per cent) households with children have internet access, while the corresponding figure for households without children is 90 per cent. These statistics indicate a correlation between several explanatory factors. For example, most respondents in households with high incomes will be employed, and most adults in households with children will be young adults.⁸

Summary of differences

The Government wants to see digital participation by everyone. To achieve that goal, we need sound knowledge about the current situation, and the statistics on digital participation show some clear trends. In the large groups, there are few who do not use the internet.

- Almost all employed people and students use the internet.
- Almost everyone with higher education uses the internet.
- Almost everyone aged below 55 uses the internet.

In total, almost 270,000 people aged 16–79 did not use the internet during the previous three months. Among these are:

- 27,000 aged below 55
- 38,000 aged between 55 and 64
- 67,000 men aged above 65
- 132,000 women aged above 65

Three quarters, approximately 200,000, of internet non-users during the previous three months are aged above 65. The remainder consists mainly of individuals excluded from working life. It is easy to become excluded and less able to participate in society if one is neither receiving educa-

tion/training nor taking part in working life. Possibilities to develop one's digital skills will also be poorer. In other words, disparities in digital skills correlate closely with social factors. More information is needed about which conditions characterise groups not online.

2.2 Digital competence

The statistics that show internet usage during the previous three months reveal only basic usage. Use of the internet once or more during a period of three months says little about actual digital competence. 'Digital competence' is a very broad term. The Government's policy for digital competence should not only enable citizens to go online; it should also help them become competent users.

Digital competence entails the ability to relate to and use digital tools and media safely, critically, and creatively. It is about possessing knowledge, skills, and attitudes. It has to do with the ability to perform practical tasks and to communicate, find, and process information. Digital judgement, which entails data protection, source criticism, and cyber security, is a key component of digital competence.

Digital services are used to different degrees and in different ways, depending on a person's life situation. People's digital competence depends on their needs and circumstances. It should not be necessary to possess a particularly high level of competence to use the most basic and useful online services, whether they be from public or private providers. Norwegian internet users should, however, possess sufficient knowledge and capability to use digital services creatively, safely, and innovatively. Competence is not a static phenomenon; it must change as technology changes. The EU has highlighted digital competence as one of eight key skills essential for lifelong learning.⁹

Digital products and services are changing rapidly, and keeping track of new developments is demanding. Some find coping with increasingly advanced equipment difficult, whereas others find it an added source of motivation.

2.2.1 Digital judgement and cyber safety

Previously, internet threats were primarily associated with hackers, or with cyber criminals who

⁸ To see the differences according to income and whether there were children, the statistics for *internet access at home* are most appropriate. By 'access' is meant that one has a computer or similar device connected to the internet. The figures in the text were previously linked to actual use.

⁹ European Commission (2006): *Key Competences for Lifelong Learning – European Reference Framework*

illegally gained access to computer systems by cracking passwords and access codes. Today, it is far more common for users to be tricked into downloading malicious software or disclosing personal information that can be used in scams. Anti-virus programmes and firewalls can help prevent such incidents, but it is becoming increasingly important for users to be able to recognise trusted websites and senders. This requires both knowledge about what threats exist and the ability to distinguish between genuine and fake e-mail correspondence and websites. The ability to use the internet safely is often referred to as *digital judgement*.

Besides having sufficient knowledge, digital judgement is also about reflecting on which information about yourself and others you can publish on the internet, how to handle copyrighted material, and how to express yourself online. Social media and social networks invite users to share private pictures and information that can sometimes challenge data protection. Many who published content online have subsequently regretted doing so. Some people are unaware of the rules, while others discover that their personal details have been published online by others, intentionally or unintentionally. Developments in social media also clearly illustrate the issues associated with freedom of expression, censorship, and media regulation in general. These issues are discussed in reports submitted by the Privacy Protection Commission and the Media Responsibility Committee.¹⁰ A broader outline of data protection and cyber security has been presented to the Storting in a separate white paper.¹¹ A national cyber security strategy has also been published.¹²

Safety also entails being protected from media content that may be harmful to minors. Children and young people should be ensured freedom of expression and freedom of information within a framework that safeguards them against potentially harmful media content. The Norwegian

Media Authority's work to assess films aimed at persons under the age of 18, the provisions laid down in the Broadcasting Act concerning the protection of children, and Norway's participation in the EU programme Safer Internet are all elements of such a framework.

NorSIS

Two of the tasks of NorSIS (Norwegian Centre for Information Security) are to raise awareness about cyber threats and vulnerabilities and to provide information on concrete initiatives. The primary target group is small and medium-sized enterprises in the public and private sectors. NorSIS should also accommodate citizens' needs for information, as far as possible. All the material published will be made openly available.

NorSIS is also responsible for operating the deletion service *slettmeg.no* (*deleteme.no*). The purpose of this service is to provide advice, guidance, and assistance to people who feel their privacy has been violated on the internet or who for other reasons want to have personal data that has been published on the internet deleted or corrected. Priority is given to vulnerable social groups, such as children and young people. In 2011, this service handled more than 6,100 enquiries concerning deletion of unwanted or offensive content published on the internet. In many cases, citizens sought help with deleting user accounts (profiles) registered with various online services.

Norwegian Media Authority

Safe use of social media for children and young people is a cross-sectoral issue. The Norwegian Media Authority is responsible for coordinating efforts in this field, in dialogue with authorities, the voluntary sector, and industry bodies. The Norwegian Media Authority has developed an action plan for children, youth and the internet,¹³ outlining priority areas and proposals for measures to ensure the safety of children and young people using the internet. The Norwegian Media Authority's Online Safety Network has operative responsibility for implementing the action plan.

¹⁰ NOU 2009: 1 *Individ og integritet. Personvern i det digitale samfunnet* [Official Norwegian Report on individuals and integrity, and data protection in the digital society] and NOU 2011: 12 *Ytringsfrihet og ansvar i en ny mediehverdag* [Official Norwegian Report on freedom of expression and responsibility in a new media world]

¹¹ Report to the Storting No. 11 (2012–2013) *Data Protection: Outlook and Challenges*

¹² Ministry of Government Administration, Reform and Church Affairs, Ministry of Justice and Public Security, Ministry of Defence, and Ministry of Transport and Communications (2012): *Cyber Security Strategy for Norway*

¹³ Norwegian Media Authority (2012): *Tiltaksplan 2012-13 Barn, unge og Internett* [Action Plan for Children, Youth and the Internet], Norwegian Media Authority, Online Safety Network

Nettvett.no

Nettvett.no is a website containing information, advice, and guidance on safe internet use for consumers, and small and medium-sized enterprises. It provides information on how to use e-mail, chat sites, online banking services, and social media as well as information on spam, viruses, file sharing, and internet security threats.

Nettvett.no, established by the Norwegian Post and Telecommunications Authority and commissioned by the Ministry of Transport and Communications, is operated in cooperation with other authorities, the ICT industry, and user representatives.

2.3 Learning arenas

Much digital competence is acquired through informal arenas and private internet use. Children and young people teach their grandparents to use online services, people ask each other for help when they have difficulty understanding something, or learn from personal experience. But to acquire more formal knowledge, or for groups where informal learning is inadequate, we need other arenas. It is therefore important to develop adequate and relevant training for those who need it.

2.3.1 Learning arenas in the municipalities

Kindergartens and schools

It is essential that schools be capable of preparing pupils for living and working in a society based on ICT. The ability to use digital tools is one of the five basic skills defined in the National Curriculum for Knowledge Promotion in Primary and Secondary Education and Training. The basic skills, including using digital tools, are integrated into the competence aims in all subjects from primary through to upper secondary education. In kindergartens, too, digital tools are considered an important source of play, communication, and information.

Teachers must possess the necessary competence in using ICT in their teaching. Attention should also be given to ensuring that ICT is used appropriately in educational activities in kindergartens. Many newly qualified and experienced teachers find that they lack the pedagogical competence to teach ICT. Only 40 per cent of teacher-training graduates said they learned how ICT

could be used in teaching.¹⁴ Among leaders and educational supervisors in kindergartens, around 45 per cent either said there was a strong need or said there was a very strong need to raise competence levels in *the teaching of ICT in kindergartens*.¹⁵ Pupils' use of digital tools in schools has shown positive trends in all areas. However, some challenges remain, particularly regarding wide variations between schools and between pupils.

Box 2.1 Norwegian Centre for ICT in Education

The Norwegian Centre for ICT in Education is responsible for disseminating high-quality research and practice-based knowledge about ICT and learning. The Centre assesses new technologies and digital media and analyses their pedagogical potential. It disseminates, provides guidance on, and adapts knowledge about using ICT in education. The Centre is tasked with promoting development of ICT in teacher-training programmes for teachers and pre-school teachers, and in their continued and further education.

The Centre has more than 70 web-based guides, reports, and fact sheets for kindergarten staff, teachers, school leaders, school owners, and IT personnel. Important services and projects initiated by the Centre include the portals utdanning.no, ovttas.no, dubestemmer.no, and personvernskolen.no, and the authentication system Feide (common electronic ID).

The Centre is also responsible for following up the Report to the Storting No. 17 (2006–2007) *An Information Society for All* in its areas of responsibility, and for acting as a driver of eGovernment in the education sector.

Source: More information: www.iktsenteret.no

¹⁴ Wilhelmssen, Janne, Hilde Ørnes, Tove Kristiansen, Jens Breivik (2009): *Digitale utfordringer i høyere utdanning* [Digital Challenges in Higher Education]. Norway Open University's ICT Monitor, Norgesuniversitetets skriftserie nr. 1/2009

¹⁵ Gotvassli, Kjell-Åge, A.S. Haugset, B. Johansen, G. Nossun, H. Sivertsen (2012): *Kompetansebehov i barnehagen. En kartlegging av eiere, styvere og ansattes vurderinger i forhold til kompetanseheving* [Competence needs in the kindergarten: A survey of the assessments of owners, leaders and staff regarding raising of competence levels]. Trøndelag forskning og utvikling rapport 2012:1

It is essential that ICT in schools be based on the idea of school as an arena for inclusion and diversity. The Norwegian Centre for ICT in Education will contribute to ensuring that ICT solutions used in schools are equally available to all pupils (see also the chapter 2.4.1 on universal design of ICT).

For more than a decade, the Ministry of Education and Research has implemented a series of initiatives to enhance digital competence in schools. In 2010, this issue was made one of the main areas of responsibility for the newly established Norwegian Centre for ICT in Education. There has also been strong commitment to providing teachers with further education in recent years, exemplified by the national strategy for further education, entitled *Kompetanse for kvalitet* [Competence for Quality]. The school owners (municipalities, county municipalities, and private stakeholders) decide which teachers and subjects/areas they want to prioritise before applications are forwarded to the Norwegian Directorate for Education and Training. It is therefore essential that school owners and leaders possess sufficient knowledge about the competence needs of their schools. The Norwegian Centre for ICT in Education has developed two tools, *School Mentor* and *Teacher Mentor*, to map the strengths and weaknesses of schools in terms of their pedagogical use of ICT.

The Norwegian Centre for ICT in Education also runs its own project aimed at promoting the development of digital competence in the kindergarten sector and in pre-school teacher training. Digital competence in kindergartens involves integrating ICT into kindergarten activities in relevant, secure, and motivating ways. The Centre serves as an initiator, coordinator, and information resource, and also initiates research and mapping projects in this field. One example of this is the reported entitled *Småbarns digitale univers* [The Digital Universe of Young Children], published in 2012. This report shows that young children use a wide range of digital media and that kindergartens therefore have an important role to play for children in this area. The Centre also develops various resources for use by kindergartens.

The Ministry of Education and Research has prepared a booklet entitled *Temahefte om IKT i barnehagen*¹⁶ [ICT in the Kindergarten] to increase knowledge about using digital tools in teaching activities. This is a valuable resource for

kindergartens, and surveys show that kindergartens already use digital media extensively, most often digital cameras, which are used to document everyday life in kindergartens, in collaboration with the children.

Adult education and training

Under the Education Act, adults who have the need are entitled to primary and lower secondary education, and municipalities are responsible for providing it. Adults can choose to earn a certificate by taking full primary and lower secondary education or by simply taking specific subjects. Vox (Norwegian Agency for Lifelong Learning) cooperates with municipalities on developing educational programmes in basic skills for adults. Municipalities can receive free guidance in adult education, training in basic skills, suggestions on suitable learning arenas, and free training courses for teachers of adult students.

We note that many adults do not yet use the internet (270,000 aged 16–79), and immigrants from Asia, Africa, and South America are over-represented in this group. Many of these people live in low-income households or are excluded from working life. Immigrants constitute a diverse group of people who can be offered competence-raising opportunities in several arenas. Schemes such as public education programmes or courses organised by NAV or employers are also important for immigrants. Under the Introduction Act, most newly arrived immigrants have the right and obligation to tuition in Norwegian language and social studies. The revised curriculum in Norwegian language and social studies, implemented in autumn 2012, stipulates learning outcomes for digital competence, such as practical experience in using digital tools. These initiatives will contribute towards raising this group's level of digital competence.

2.3.2 Voluntary, public and private organisations

Non-profit organisations can play a key role in making digital skills training available to specific groups.

Elderly citizens constitute another group having specific needs for ICT training. That said, Norway is at the forefront internationally regarding digital participation by the elderly.¹⁷ As more and

¹⁶ Ministry of Education and Research (2006): *Temahefte om IKT i barnehagen* [ICT in the Kindergarten]

¹⁷ Digital Agenda for Europe (2012): Digital Agenda Scoreboard: EU/Eurostat/SSB

Box 2.2 Seniornett

Seniornett is a voluntary interest organisation that promotes participation by senior citizens (aged 55+) in the digital society. The organisation was founded in 1997 and today has 160 affiliated associations or clubs around Norway. The clubs provide guidance and training for senior citizens. In 2011, around 25,000 senior citizens received training in digital skills.

Seniornett arranges an annual SeniorSurf Day at around 400 venues throughout Norway, in voluntary centres, libraries, senior citizens community centres, and schools. The organisation publishes a newsletter three times a year containing useful articles on ICT. Today Seniornett has approximately 7,000 members and around 850 volunteers working in the clubs. It receives funding from both public and private sources.

Source: More information: www.seniornett.no

more people retire from jobs that involve using ICT, we can expect a rise in the percentage of elderly citizens who actively use digital tools and services. Nonetheless, much remains to be done until this group's level of participation is as high as the rest of the population's; so the need for training remains.

The Ministry of Government Administration, Reform and Church Affairs grants subsidies to Seniornett Norge, an NGO for senior citizens, so it can offer ICT training courses for the elderly. Such training can be arranged in, for example, senior citizens' community centres or libraries. Seniornett also cooperates extensively with private sector partners who want to promote digital participation so that the markets for digital products and services grow.

The Adult Education Association has around 400 member organisations and receives subsidies for training activities from the Ministry of Education and Research via Vox. Many of these member organisations offer courses in digital literacy via the Adult Education Association or one of its member organisations. Distance learning institutions provide training via a range of online media.

Non-profit organisations also contribute towards promoting digital participation, some through cooperation with private partners. For example, the Norwegian Red Cross cooperates with a leading software company to provide ICT courses for women immigrants.

Box 2.3 Vox

Vox (Norwegian Agency for Lifelong Learning) is a national agency for competence policy, focusing particularly on adult learning. Part of the Ministry of Education and Research, Vox is tasked with promoting participation in society and working life and providing information on adult learning.

Vox develops methods and mapping tools based on the competence goals for adults' basic skills, and assists with establishing continuing and further education programmes for teachers and instructors.

Vox administers subsidies to adult education associations and independent distance learning institutions. It also administers the *Programme for Basic Competence in Working Life*, and follows up the curriculum and Norwegian language tests associated with programmes in Norwegian language and society for adult immigrants.

Source: More information: www.vox.no

Municipalities can also promote digital literacy outside the schools. Public libraries are important arenas for this. The project entitled *Digital kompetanseheving i biblioteket* [Developing Digital Skills in Libraries], organised by the Norwegian Archive, Library and Museum Authority (now the National Library of Norway), looked at more structured ways of using libraries as arenas for learning digital skills. Cooperating with a range of local partners – both companies and non-profit organisations – proved to be crucial for success. A booklet offering guidance to libraries in providing computer training has been developed as part of the project.¹⁸

2.3.3 Working life

Working life constantly demands higher levels of digital competence while simultaneously developing the competence levels of those who use ICT on an everyday basis. The Government wants ICT to be an essential part of competence development in order to include people in working life. It is also important that labour-force participants

¹⁸ Vox (2010): *Dataopplæring i biblioteket – en veiledning i hvordan man kan bruke biblioteket som læringsarena* [Digital training in the libraries: A guide to using the library as a learning arena]

have opportunities to develop their digital skills in the workplace.

The statistics for internet usage during the previous three months indicate a close correlation between labour-force participation and use. A survey published by Vox indicates a clear correlation between skills level and labour-force participation for more advanced levels of ICT competence. In all, 80 per cent of employees say they are experienced ICT users; the corresponding figure for unemployed citizens is 66 per cent.¹⁹

The programme entitled *Program for basiskompetanse i arbeidslivet* [Programme for Basic Competence in Working Life] is an aid scheme aimed at companies to enable employees to improve their basic skills in areas such as reading, writing, arithmetic, and basic ICT. The programme provides some of the funding for these initiatives, and in 2012 it approved applications totalling NOK 106 million. The main goal for 24 per cent of the applicants was to improve digital skills, and ICT is used as a tool in many of the programme's other courses. Some county municipalities also run

smaller training schemes for jobseekers, in partnership with NAV. Vox cooperates with NAV to improve its advisors' basic skills, with a view to enhancing the quality of its training schemes. This programme is administrated by Vox on behalf of the Ministry of Education and Research.

An evaluation of the Programme for Basic Competence in Working Life shows that its courses generally reach groups with the lowest level of basic skills and those who would otherwise have few opportunities for workplace training. Most employers involved say that the training motivated many of their employees to start using new technology and that participants now use computers more than previously.²⁰

Norway is taking part in a large-scale international survey to gain more knowledge about which skills and competence are required in modern society and working life (see box 2.4). This survey will provide us with vital information to guide our future work.

¹⁹ Vox (2011): *Digital kompetanse i befolkningen* [Digital Competence in the Population]

²⁰ PROBA samfunnsanalyse (2012): *Evaluering av Program for basiskompetanse i arbeidslivet* [Evaluation of Programme for Basic Competence in Working Life], Rapport 2012–08

Box 2.4 PIAAC survey

The Programme for the International Assessment of Adult Competencies (PIAAC) is the most comprehensive international survey of adult skills and competencies ever undertaken. The survey is a collaborative project between governments, an international consortium of organisations, and the Organisation for Economic Cooperation and Development (OECD).

The aim is to measure the skills and competencies required for individuals to participate in society and working life. In Norway the survey is financed by the Ministry of Education and Research, the Ministry of Labour, and the Ministry of Government Administration, Reform and Church Affairs, and is conducted by Statistics Norway.

The survey involves measuring respondents' (16–65) skills in reading, numerical comprehension, and problem-solving (using modern technological aids). The survey also studies participants' use of their skills in everyday and working life. It is the first time citizens' skills in, and

use of, ICT are surveyed, along with their personal assessments of how much they use these skills in the workplace. The survey will reveal correlations between basic skills, continuing and further education, and work experience, and to what degree participants have acquired skills used in working life and in society. The project will also provide a basis for conducting research on a range of issues in different areas of society. The international dimension is useful for revealing differences between countries and for providing insight into positive and negative experiences from other countries regarding the significance of education and employment for productivity and growth.

Once the results are published in October 2013, Norway will be able to draw comparisons with countries like Denmark, Sweden, Finland, France, Poland, the United States, Japan, and Australia. More than 20 countries worldwide are participating in the survey.

Source: More information: www.oecd.org/piaac

2.3.4 Arenas for individuals excluded from working life

Basic skills among adults who are excluded from working life is an issue for both education and labour-market policy. Training is therefore provided by the labour-market authorities (NAV) in partnership with education authorities. Training is given either in the form of labour-market training or through the regular education system, and may be linked to an adult education association or other, private provider. Employment schemes are adapted to individual needs and capabilities, and are designed per the current labour-market situation and policy guidelines.

The initiatives should contribute towards:

- improving qualifications and work skills

- improving opportunities for normal employment
- producing a qualified workforce
- preventing and mitigating the negative effects of unemployment
- preventing exclusion from working life

NAV offers training to both ordinary jobseekers and individuals with reduced work capacity, with the aim of making them better qualified for employment.

NAV develops activity plans for individuals requiring help with finding employment. The jobseekers are consulted throughout the process. If digital competence is needed to improve a jobseeker's capacity to work, this is taken into account when developing an activity plan.

Box 2.5 Initiatives

1. *Everyone online*

The Ministry of Government Administration, Reform and Church Affairs will lead an initiative aimed at halving the number of internet non-users by 2017.

2. *Relevant and targeted training programmes*

Through dialogue with other relevant ministries, the Ministry of Government Administration, Reform and Church Affairs will assess training programmes aimed at groups that need them, and will consider models used in other countries. The Ministry will continually monitor developments in this area and consider action to respond to changing needs.

3. *Knowledge about digital participation*

The Ministry of Government Administration, Reform and Church Affairs will measure developments in the population's digital participation, and will consider developing a set of national indicators of digital participation. These indicators will be harmonised as closely as possible with those used by the OECD and the EU.

4. *Digital competence in specific immigrant groups*

The Ministry of Children, Equality and Social Inclusion will consider the need for surveys on the digital skills of immigrants and explore appropriate initiatives.

5. *Digital competence in the schools*

The Ministry of Education and Research will consider whether and how general digital competence, training in digital skills, and pedagogical use of ICT in curriculum subjects can be developed within the current framework to prepare pupils for digital society and working life. The Government will, within existing budgetary constraints, consider new and adjust existing initiatives per knowledge about teacher training and continuing and further education.

6. *Employees' digital competence*

The Programme for Basic Competence in Working Life is a scheme aimed at providing employees with basic skills in digital competence, reading, writing, and arithmetic. This programme is administered by Vox. The Ministry of Education and Research will continue this programme.

7. *Following up on the PIAAC survey*

In cooperation with the Ministry of Education and Research and the Ministry of Labour, the Ministry of Government Administration, Reform and Church Affairs will follow up on the results from the PIAAC survey of adults' digital competence from a working-life perspective.

8. *Digital competence, data protection, and cyber security*

In cooperation with other ministries, the Ministry of Government Administration, Reform and Church Affairs will provide citizens with the necessary knowledge, safety and understanding they need to protect their identity, privacy and financial assets online. This can be achieved through public information campaigns, support and guidance initiatives, and surveys to track trends.

9. *Protecting children against harmful media content*

In January 2013, the Ministry of Culture issued draft legislation concerning the protection of minors against harmful images, and will continue to work on this issue

10. *White paper on Data Protection*

The Ministry of Government Administration, Reform and Church Affairs will follow up the Report to the Storting No. 11 (2012–2013) *Data Protection: Outlook and Challenges*.

2.4 Accessibility

Genuine digital participation by everyone requires that services be designed and prepared such that most people can use them. A computer or tablet connected to the internet provides access, but unless the service is, for example, adapted for the visually impaired, it will not be accessible by everyone.

2.4.1 Universal design of ICT

Universal design involves designing or adapting buildings, outdoor spaces, ICT, etc. so that their normal functions can be used by most people, including individuals with disabilities. Creating solutions which everyone can use avoids having to design special adaptations for different groups. To reach the widest possible market, suppliers of

Box 2.6 Anti-Discrimination and Accessibility Act, section 11

Section 11 of the Anti-Discrimination and Accessibility Act stipulates requirements for universal design of ICT solutions. These requirements will be specified in regulations through establishing internationally recognised standards and guidelines. Initially, regulations will cover web solutions and self-service solutions. Requirements will apply to both private and public enterprises.

hardware and software are constantly simplifying their products and making them more user-friendly. Suppliers of widely used online services or, for example, the ticket machines and self-service checkouts we use in everyday life, will reach larger groups of users when their products are universally designed.

Universally designed ICT solutions can, for example, make it possible for the visually impaired to enlarge text on websites or to adjust the contrast to enhance readability. Standard functions make it possible to have text on a website read aloud, and blind people can use Braille displays. Universally designed ICT solutions also mean that users with physical disabilities can use alternative pointing equipment or keyboards. Adaptations like these are particularly helpful to users with various types of disabilities, but they can also help improve accessibility for the elderly and for the large group of Norwegians with reading and writing difficulties. Many products we use today, such as TV remote controls, were originally designed for groups with special needs.

To a large extent, universal design requirements for ICT have already been incorporated into Difi's quality criteria for public-sector websites.

Difi works on improving the quality of public sector websites. One key element in this work is the annual quality assessment of 700 government and municipal websites, which has now been carried out for ten years. The purpose of the quality criteria and assessment is to draw attention to aspects such as accessibility, user-friendliness, and provision of useful services.

2.4.2 More public online services, and plain language

The Government's digitisation programme has determined that digital communication should be the general rule in all communication with the public sector. Applications, invoices, requests for appointments, notifications of decision, and various types of reporting should be processed via digital communication as long as users have not exercised their right to refuse.

Accessibility also has to do with ensuring that individuals can understand the content of services they use. Thirty-three per cent of Norwegians find it difficult to complete official forms. The digitisation programme emphasizes ensuring that online self-service systems in the public sector are understandable and easy to use. Users who have a need will be given help and guidance through wizards or through direct contact via live chat or telephone support. Each agency is responsible for ensuring that users receive the help and guidance they need.

It must be easy for users to locate the digital service they seek. Public administration should be clearly structured and should describe itself using terms and phrases that make it easier for citizens to know which agency they are dealing with. If users need to deal with multiple agencies concerning a specific matter, the agency they contact should provide guidance on the entire process and inform them about who they should contact next.

The Government will, via the agencies, communicate how to use digital services and the benefits they offer citizens using them.

Box 2.7 Initiatives11. *Regulations on universal design of ICT systems*

The Ministry of Government Administration, Reform and Church Affairs will put forward proposals for regulatory requirements for universal design of ICT systems. Difi will act as supervisory authority. Regulations will enter into force in 2013.

12. *Universal design in the circular on digitisation*

The circular on digitisation issued by the Ministry of Government Administration, Reform and Church Affairs emphasizes that

agencies should plan their web solutions so as to satisfy universal design requirements.

13. *Plain language in public sector web solutions*

The public administration should use clear and understandable language. Wording in key acts and regulations must be simplified, and civil servants must be provided assistance with formulating letters, forms, and web solutions that are clear and understandable. This matter will be followed up by the Ministry of Government Administration, Reform and Church Affairs and the agencies.

3 Broadband – among the best in Europe

Broadband access is a prerequisite for digital value creation and participation. Several studies show that access to and use of broadband have positive effects on both employment and value creation. A well-developed broadband network is vital for Norwegian citizens, public agencies, voluntary organisations, and a competitive business sector.

The Government has set an ambitious broadband policy for Norway, and will therefore:

- continue work on facilitating broadband with sufficient capacity to meet future needs in education, health, business and industry, and households throughout the country
- work towards making Norway among the best in Europe in terms of broadband coverage and usage
- continue allocating targeted funding worth at least NOK 150 million per year until all households (100 per cent) have a good basic quality of broadband service
- set coverage requirements in spectrum auctions in the 800 MHz band for mobile broadband to ensure 98 per cent of households

receive coverage equivalent to an average data transfer rate of at least 2 Mbit/s

- provide Norway with fixed and mobile broadband networks that are secure, robust, and of good quality
- facilitate for Norwegian broadband networks to promote diversity in the services offered to users
- facilitate net neutrality

Broadband access in Norway: Current status

Today, almost all households in Norway can connect to a broadband network (Figure 3.1). The Government has created subsidy schemes for the rollout of broadband services in areas considered commercially unviable by the market.

The proportion of the Norwegian population with high-speed broadband has grown rapidly in recent years, though the majority subscribes to broadband speeds lower than those offered. Around 14 per cent of households do not subscribe to broadband, despite having the possibility.

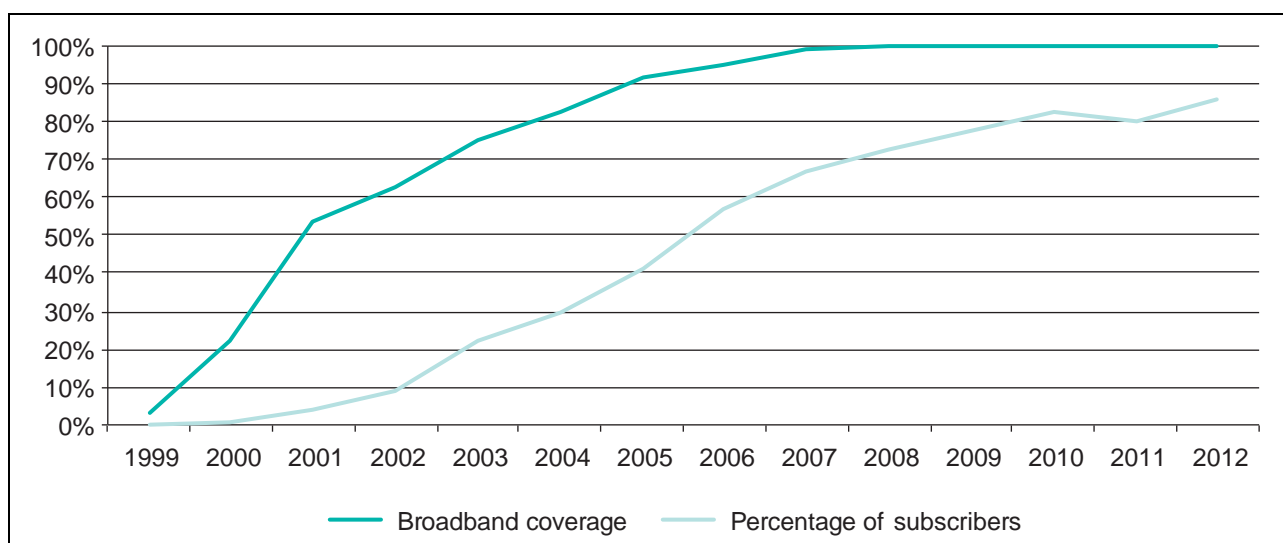


Figure 3.1 Proportion of households with basic broadband

Sources: Nexia (2012): *Bredbåndsdekning 2012* [Broadband coverage 2012], report commissioned by the Ministry of Government Administration, Reform and Church Affairs; Nexia (2012): *Bredt nok?* [Broad enough?], report commissioned by the Norwegian Post and Telecommunications Authority; Statistics Norway: ICT in households, 2003–2012, 2nd quarter

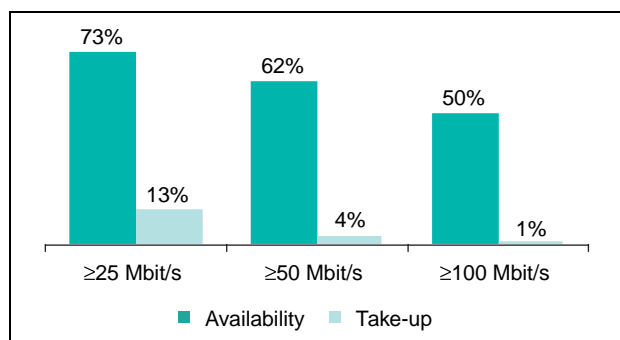


Figure 3.2 Broadband availability and take-up for different speeds, 2012

Sources: Nexia (2012): *Bredbåndsdekning 2012* [Broadband coverage 2012], report commissioned by the Ministry of Government Administration, Reform and Church Affairs; Statistics Norway: The internet survey, 2012, 2nd quarter

Two thirds of Norwegian households have access to broadband capacity of at least 25 Mbit/s, yet only around 13 per cent actually opts for such high speeds (Figure 3.2).

In practice, everyone in Norway has access to broadband covering at least normal, basic internet

usage, such as e-mail, online banking, and public online services. Although most of the population has good broadband coverage, and although most subscribe to broadband speeds lower than those available, some subscribers want access to faster speeds than those currently offered. The demand for higher broadband speeds will likely grow in the near future; enterprises will need higher speeds when, for example, conducting video conferences and other location-independent communication, which in turn can facilitate more effective methods of working and collaborating. Private users will need more capacity to view videos or TV via broadband, as well as to, for example, take online education courses. Furthermore, many families will have more users sharing the same broadband connection. Both private individuals and enterprises will use more cloud services to, for example, store photos and videos online. Providing the entire country with access to these services demands good and reliable broadband capacities in all regions. Furthermore, online users expect high levels of security and internet access 24 hours a day.

Table 3.1 High-speed broadband: Applications and content

Bandwidth (symmetrical) ¹	Example applications and content delivered in real time
500 kbit/s–1 Mbit/s	Voice over IPE-mail Basic web browsing Music streaming Video, low quality
1 Mbit/s–5 Mbit/s	E-mail with large attachments Remote surveillance IPTV, medium quality Music streaming, high quality
5 Mbit/s–10 Mbit/s	Telecommuting IPTV, medium quality (multiple channels) Video, high quality Gaming Medical applications, file sharing and remote diagnosis (basic) Remote education Building control
10 Mbit/s–50 Mbit/s	Telemedicine Education services (high-quality video) IPTV, high quality (2–3 channels simultaneously) Gaming (complex) Telecommuting with high-quality video Remote surveillance, high quality Smart building control

¹ By 'symmetrical' is meant a broadband service with equivalent upload and download speeds.

Source: Commerce Commission New Zealand (2012): *High-Speed Broadband Services Demand-Side Study*

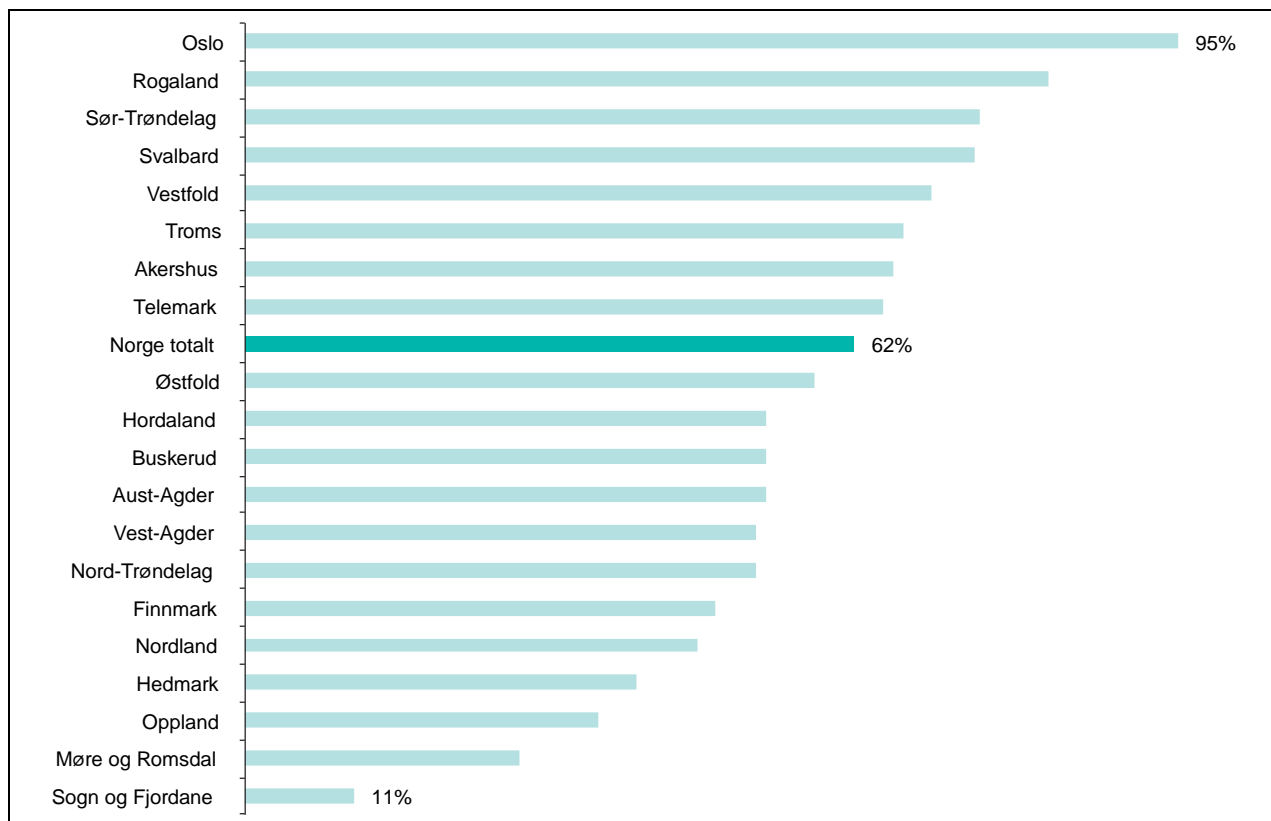


Figure 3.3 Broadband coverage, bandwidth 50/10 Mbit/s, by county (2012)

Source: Nexia (2012): *Bredbåndsdekning 2012* [Broadband coverage 2012], report commissioned by the Ministry of Government Administration, Reform and Church Affairs

Table 3.1 shows broadband capacity demands for different services and content. It is important to emphasize that assigning some services to a specific speed category can be difficult because user experience depends on both user expectations and technical conditions such as screen resolution.

With its unevenly distributed population, long distances, and challenging natural environment, Norway is not an easy country in which to deploy broadband. Because rolling out broadband in sparsely populated areas costs more, and because competition to do so is often lacking, most broadband service providers do not consider such areas commercially viable. In other cases, broadband speeds in these areas will not be increased until long after speeds are increased in other parts of the country (Figure 3.3).

Norway is a rich country with relatively equitable income distribution. Broadband subscription rates are therefore moderate relative to most people's incomes (around 1 per cent of the average Norwegian annual income), and most Norwegians are both willing and able to pay for broadband access.

Strong popular demand means that broadband services are quickly developed on the basis of various technologies; more areas are connected to high-speed broadband, and a growing number is also receiving access to mobile broadband.

3.1 A market-based and technology-neutral broadband policy

A key element in Norwegian broadband policy has been that commercial suppliers should roll out broadband according to the needs of inhabitants and industry: in other words, a market-based broadband policy. Supplemented by public funding for rollout in the less profitable areas, this market-based broadband policy has given most areas in Norway a broadband infrastructure with good coverage and high-speed capacity. Although Norway is an expensive and challenging country in terms of broadband deployment, we have achieved good results with moderate use of public resources. The market-based broadband strategy has therefore proven successful and will continue

Box 3.1 Broadband and value creation

Many studies show that broadband access contributes to growth and employment.

- A 2008 study from Statistics Norway shows that high-speed broadband increases productivity. High-speed broadband is defined as 2 Mbit/s or above.¹
- Researchers at Chalmers University of Technology in Gothenburg recently concluded that doubling broadband speed would contribute to 0.3 per cent growth in gross domestic product (GDP).²
- In 2012, OECD published a report on a review conducted of several studies on the relationship between internet access and multiple economic indicators, including studies showing a positive relationship between broadband usage and growth in GDP.³
- An OECD analysis examined the relationship between deployment of broadband infra-

structure and economic growth in a sample group of OECD countries. The analysis showed that broadband rollout and diffusion had a positive impact on the countries' GDP growth. According to the study, an increase of 10 percentage points in broadband penetration led to GDP per capita growth of 0.9–1.5 percentage points.⁴

- In 2012, Vista published a report which concluded that publicly funded deployment of high-speed broadband in rural areas was not economically justified based on a cost-benefit analysis. The report emphasized that the situation was nuanced and, in some studies, unclear. Vista also studied added benefits of higher broadband speeds and concluded that these were limited, particularly for upgrades to speeds of 20 Mbit/s and above.⁵

¹ Marina Rybalka (2008): *SSB Økonomiske analyser 5/2008 – Hvor viktig er IKT for utvikling i næringslivet: produktivitetsanalyse* [How important is ICT for developing business and industry? A productivity analysis]

² Ibrahim Kholilul Rohman and Erik Bohlin (2012): *Does broadband speed really matter for driving economic growth? Investigating OECD countries*

³ Kretschmer, T. (2012): *Information and Communication Technologies and Productivity Growth: A Survey of the Literature*, OECD Digital Economy Papers, No. 195, OECD Publishing

⁴ Czernich et al. (2011): *Broadband Infrastructure and Economic Growth*

⁵ Vista Analysis (2012): *Samfunnsøkonomisk nytte og lønnsomhet av høyhastighetsbredbånd i distriktene* [Economic benefit and profitability of high-speed broadband in rural areas], Rapport 2012/11

to guide the Government's future broadband policy.

3.1.1 A technology-neutral broadband policy

The Government will practise a technology-neutral policy to ensure healthy competition between technology platforms. Because technologies and usage patterns change at a very fast pace, the Government cannot choose between technologies; it must instead defer to commercial actors who know more about the costs and needs involved.

3.1.2 Facilitating cost-effective deployment

Deploying conveyance routes (civil works infrastructure) constitutes the largest cost component in rolling out broadband networks. 'Conveyance route' is a generic term for an installation used to

lay cables and power lines; examples of such conveyance routes are masts, ducts, and trenches. In some locations, broadband deployment is unduly expensive due to poor coordination between infrastructure owners or to costly planning processes. By improving access to existing conveyance routes and establishing new ones, deployment costs can be significantly reduced and modern broadband services offered to more subscribers.

Other measures can make deployment more cost-effective, a key one being establishment of common standards for exchanging information on cables and lines to provide network providers with better information on the location of existing and new cabling. This work has already begun, and is headed by the Norwegian Mapping Authority.

Another measure is to consider simplifying regulations for digging on public land, which is currently regulated by various pieces of legislation at both national and municipal levels. The

Ministry of Transport and Communications will issue regulations pursuant to the Public Roads Act concerning cabling under and along roads,¹ and the authorities will continue to encourage stakeholders to resolve challenges through standardisation.

Some municipalities have already established systems for coordinating digging activities, and these can contribute towards, for example, sharing costs for establishing new conveyance routes between infrastructure owners. In cooperation with other ministries and stakeholders, the Ministry of the Environment and the Ministry of Government Administration, Reform and Church Affairs will consider the need for systems to coordinate digging activities in areas where no such systems currently exist.

In some cases, it is neither possible nor desirable to establish parallel conveyance routes. Under the Electronic Communications Act, Telenor, as a provider with a strong market position, is required to give other providers access to premises, masts, etc. (co-location), in specific markets. The Norwegian Post and Telecommunications Authority will monitor how the regulations facilitate effective deployment.

3.1.3 Mobile broadband

The Government will work towards achieving good and future-oriented mobile broadband services. Good mobile broadband services are contingent on access to necessary frequency resources. Frequencies are shared resources that must be managed effectively and in society's best interests. The Government has announced that frequencies that were freed up when the analogue TV network was shut down (the 790–862 MHz band, often referred to as the *digital dividend*) will be used for mobile broadband services. Certain technical features of this frequency band make it well suited for cost-effective establishment of mobile broadband with good coverage.

Through a frequency assignment process (spectrum auction), the Government will contribute to the rollout of mobile broadband with high levels of quality and coverage. Requirements will be set for a specified share of the band to cover 98 per cent of the population within five years, at a minimum average data transfer rate of 2 Mbit/s. A report from Nexia² estimated that the public sec-

tor would incur costs for broadband coverage exceeding 95 per cent. Including coverage requirements in the spectrum auction would mean that these costs would materialise in reduced auction revenues. Nexia estimated establishment costs for increasing coverage from 95 per cent to 98 per cent at around NOK 200 million. The total net cost depends on how much carriers expect subscription revenues and operating costs to increase.

Cost-effective rollout of mobile broadband is contingent on developers' obtaining permission to install transmission equipment on sites with good radio coverage. This will also ensure that transmitters are located as unobtrusively as possible and reduce the number of transmitters needed to establish satisfactory coverage and quality of service. Gaining access to public buildings and property to install mobile communication equipment is therefore crucial to reach national competition and diffusion targets for mobile telephony and broadband. In many cases, the alternative to installing equipment in centrally located buildings is to install either more transmitters on private buildings or more masts in order to achieve equivalent coverage. The Government will therefore facilitate better access to public buildings and property for installing electronic communication equipment.

3.1.4 Facilitating competition

The authorities will facilitate competition between developers and between technologies through effective market regulation. The broadband market is subject to regulations that are part of the common European regulatory framework for electronic communication. In Norway, this regulatory framework was implemented through the Electronic Communications Act and its associated regulations, and gives authorities power to impose obligations on providers with significant market power. The Government will continue to facilitate a well-functioning broadband market and enforce legislation in such a way as to promote sustainable competition, support different business models, and enable providers to continue deployment.

In 2012, the Norwegian Post and Telecommunications Authority undertook a new analysis of the wholesale broadband access markets. Several

¹ Regulations pursuant to the Public Roads Act, section 32 concerning deploying and relocating cabling under and along public roads

² Nexia (2012): *Full bredbåndsdekning i ulike varianter* [Full broadband coverage in different varieties], Memorandum prepared for the Ministry of Transport and Communications

obligations have already been imposed on Telenor with regard to the copper-based access network. The Norwegian Post and Telecommunications Authority is considering regulations that may also regulate Telenor's fibre network so as to give other broadband providers access to the fibre infrastructure.

The authorities will also enable more providers to establish their own networks and thereby stimulate market competition. One such example is regulation of the rates providers must pay each other (termination rates).

The Norwegian Post and Telecommunications Authority and the Norwegian Competition Authority are formal cooperation partners, and the Norwegian Competition Authority serves as a key adviser to the Norwegian Post and Telecommunications Authority. The Norwegian Competition Authority also supervises general competition in the market by, for example, supervising mergers, acquisitions, etc.

3.1.5 Public subsidies

Since 2006, the state has contributed more than NOK 1 billion towards broadband rollout in areas with no commercial broadband service, NOK 370 million of which came from budget allocations to the Ministry of Government Administration, Reform and Church Affairs and NOK 756 million of which went to the county municipalities from budget allocations to the Ministry of Local Government and Regional Development. These resources have probably contributed to deployment of around 100,000 new broadband access points. For 2012, NOK 123 million was allocated to the municipalities and county municipalities for regional policy measures, and the county municipalities receive other regional development funding that may also be used for broadband rollout. The Government has proposed that the Ministry of Local Government and Regional Development's budget earmarks for broadband rollout be continued in 2012.

In 2011, the Ministry of Government Administration, Reform and Church Affairs created a temporary state subsidy programme for broadband rollout. The programme, worth NOK 15 million and known as Høykom Infrastruktur 2011 (High-Speed Communication Infrastructure 2011), is administered by the Research Council of Norway. The programme funds were allocated in 2012.

The Government will develop further initiatives facilitating market-based rollout of broadband services. However, rolling out broadband with sufficient bandwidth to meet demand is not commercially viable in some areas. The need for public subsidies will therefore continue in areas where rollout of acceptable market-based services is not commercially viable. The Government will monitor market trends closely and continually assess the need for more policy instruments. This requires in-depth knowledge about usage patterns, needs, and services available.

The Government's ambition is that all households (100 per cent) should have access to broadband services of a good basic quality. Budget allocations worth at least NOK 150 million per year will be continued until this ambition is realised. These resources will target areas currently without broadband and will be based on deployment activities being undertaken by commercial actors.

3.1.6 Secure and robust networks

Despite the unusually high number of failures and incidents in 2011, security and uptime levels for Norwegian telecom networks are generally high compared to those of other countries. Users who need additional security may buy such services in the market, and the authorities also buy services to enhance network security. The Norwegian Post and Telecommunications Authority and the Ministry of Transport and Communications are considering further measures to make networks more robust.

Box 3.2 Initiatives

14. *Facilitating cost-effective deployment*

The Government will facilitate deployment of conveyance routes that are as cost-effective as possible to promote profitability in broadband rollout. This work will entail:

- contributing to relaxing regulations for digging on public land
- effectively supervising compliance with co-location regulations (shared use of premises, masts, etc.)
- assessing the need for systems to coordinate digging activities in areas where none currently exist
- contributing towards establishing national regulations, standards, and procedures for registering, managing, and exchanging information on cabling (geo-data) for both existing and new conveyance routes
- facilitating access to public buildings and property to install electronic communication equipment

15. *Broadband for all*

The Government's ambition is that all households (100 per cent) should have access to broadband services of good basic quality. Annual funding of at least NOK 150 million will continue until this ambition is realised, and these resources will target areas currently without broadband. Deployment activities will be undertaken by commercial actors.

16. *Frequency allocations for mobile broadband*

The Ministry of Transport and Communications and the Norwegian Post and Telecommunications Authority will assign frequency resources from the 790–862 MHz band to improve mobile broadband services. Requirements will be set for a specified share of the band to cover 98 per cent of the population within five years, at a minimum data transfer rate of 2 Mbit/s.

17. *Competition in the broadband market*

The Government will facilitate competition in the broadband market through effective market regulation.

18. *Enhanced knowledge of the broadband market*

The Ministry of Government Administration, Reform and Church Affairs will enhance its knowledge about commercial rollout of broadband in relation to end-user needs. The need for initiatives will continually be assessed, including the need for state subsidies for rollout in areas without satisfactory commercial services. The Government will initiate dialogue with the industry on this issue through consultations, meetings, and hearings.

19. *Secure and robust telecom networks*

Together with providers, the Ministry of Transport and Communications and the Norwegian Post and Telecommunications Authority will consider more ways to increase network security and preparedness.

3.2 Net neutrality

In some countries, subscribers are not fully able to choose how they will use their internet connection. The Government considers it an important principle that internet users be free to choose which services and content they want to use; this principle is known as 'net neutrality.'

Net neutrality should ensure that the internet service provides open and non-discriminatory access to all types of communication and distribution of content. Net neutrality is a vital prerequisite for democracy, free access to information, and protection of consumer rights, and should not be regulated by broadband or internet service providers. This principle is particularly important in a small and sparsely populated country like Nor-

way, where some areas are served by only one, or very few, internet service provider. The principle of net neutrality applies to both fixed and mobile broadband. Wherever the choice of provider is limited, providers must offer freedom of choice.

3.2.1 Guidelines on net neutrality

In 2009, the Norwegian Post and Telecommunications Authority published guidelines on net neutrality (see box 3.3). The guidelines were developed by a working group headed by the Norwegian Post and Telecommunications Authority and comprising representatives of internet service providers, content providers, industry organisations, and consumer protection authorities.

Box 3.3 Net neutrality

According to the Norwegian Post and Telecommunications Authority, net neutrality can best be defined in three principles describing how traffic should be handled by internet service providers:

- Internet users are entitled to an Internet connection with predefined capacity and quality.
- Internet users are entitled to an internet connection that enables them to:
 - send and receive content of their choice
 - use services and run applications of their choice
 - connect hardware and use software of their choice that do not harm the network
- Internet users are entitled to an Internet connection that is free of discrimination with regard to type of application, service or content or based on sender or receiver address.

Source: Norwegian Post and Telecommunications Authority (2009): *Om nettnøytralitet* [About net neutrality]

Most broadband service providers in Norway endorsed the guidelines on net neutrality, and subsequent evaluations showed that all actors reported that the guidelines worked as intended. Attention has recently focused on net neutrality in connection with mobile internet. We have seen examples abroad of mobile broadband service providers blocking out competitors using broadband to provide telephony services (broadband telephony). The Norwegian guidelines on net neutrality apply to both fixed and mobile networks, and we have not seen similar cases in Norway.

Sale of broadband, TV, and telephony in bundles

Broadband, TV, and telephony can be supplied via the same infrastructure and are often sold in bundles, so-called ‘triple play’ services. This strategy is popular for providing multiple services from one provider. For example, many cable TV companies require consumers to buy TV signals to gain access to high-speed broadband, and some telephone and fibre optic companies require consumers to buy internet access to receive TV signals and telephony.³ Bundled sales can challenge the principle of net neutrality because they make it difficult for consumers to freely choose providers of individual communication and TV services. On the other hand, bundling enables consumers to deal with only one service provider and give providers greater security for their infrastructure investments.

The Norwegian Post and Telecommunications Authority and the Ministry of Transport and Communications are monitoring developments in this area and will, if necessary, consider regulatory measures should the guidelines on net neutrality prove inadequate.

Box 3.4 Initiatives

19. Net neutrality principles

The Government will continue to defend the principle of net neutrality, monitor national and international developments, and, if necessary, consider regulatory measures in the Norwegian market.

³ Consumer Ombudsman (2011): *Forbrukerutfordringer ved koblingssalg av bredbånd, TV og telefoni* [Consumer challenges related to bundling of broadband, TV, and telephony]

Box 3.5 Technology trends: From automation to hyper-digitisation

So far, digitisation has worked at a fundamental level by making existing work processes more efficient. In future, digitisation will generate changes that are of an even more fundamental nature; for example, processes will be performed in totally new and automated ways. But so-called 'hyper-digitisation' will also occur, transforming entire industries; in fact, this has already begun in sectors such as tourism, finance, and media. During the next five years, hyper-digitisation will become a reality for even more industries and for much of the public sector.

At any given time, numerous minor and major technology changes are taking place, and four major technology trends in particular will drive future developments, either alone or in combination:

- Cloud services
- Social media, linked with communication, collaboration, and content management
- Mobile solutions
- Smarter use of information ('big data')

Cloud services

The analyst firm Gartner believes that cloud services will revolutionise data processing in the same way as global supply chains have revolutionised manufacturing. Whereas cloud services long ago penetrated the personal and private spheres, they have yet to do so in the corporate and economic spheres.

Cloud services can be publicly accessible services (public cloud) or restricted to specific enterprises or groups (private cloud). Industrialised cloud services will represent the biggest game changer in the history of ICT service provision.

For the public sector, it will be crucial to have the capability to manage and influence cloud service providers by, for example, harmonising market offerings and legislation. The maturing phase is expected to take 3–5 years, and during that time, legislation governing data protection is just one of several issues that will need clarification.

Social media, communication, collaboration, and content management

Social media and collaboration create simple and creative collaboration solutions between people and between people and applications. To fully exploit these possibilities, work processes must be changed and adapted to new tools. Trends are also influenced – and perhaps accelerated – by developments in mobile solutions. Gartner expects use of social media to create significant increases in productivity and service levels, and to affect – and often enrich – people's working lives.

Mobility and mobile solutions: Bring your own device (BYOD)

ICT usage will increasingly take place via mobile devices such as laptops, smartphones, and tablets. By

2015, Gartner estimates that development projects for mobile solutions will outnumber projects targeting PCs by a ratio of 4:1; in 2011, this ratio was around 1:1. From 2015, mobile solutions will be more closely integrated with traditional, more well-established technologies. Introduction of the HTML5 web standard is expected to significantly reduce current challenges posed by mobile devices using multiple competitive operating systems (such as Android, iOS, and Windows). Mobility is closely linked to cloud services.

We will see a trend whereby enterprises will begin to adopt consumer technologies; a trend Gartner calls 'consumerisation.' Using their tablets, smartphones, ultrabooks, or new varieties of these technologies, employees can work wherever and whenever they want. The expectation is that far more enterprises will allow their applications to be used on equipment owned by employees or that employees will use applications not pre-approved by their employers.

Smarter use of large data sets ('big data')

The volume of accessible digital information is growing rapidly. Automated and intelligent use of accessible information is commonly referred to as 'big data.' The public sector in particular generates vast volumes of information that can be used for purposes for which it was not originally intended. Managing large data sets is gradually becoming the norm, and offers significant innovation potential if we manage to exploit this diversity of information in cost-effective and automated ways.

Digitisation has caused the volume of digital information owned by organisations to grow by 40 per cent yearly. Gartner estimates that unstructured content, such as e-mail, presentations, and reports, accounts for 85 per cent of enterprises' source data, yet is rarely used in ways that realise its significant, inherent assets.

Large data sets are growing because an increasing number of physical objects are being connected to the internet, a phenomenon often referred to as the 'internet of things.' These can be large, valuable objects such as cars, freight containers, or refrigerators, but they can also be cheap, mass-produced consumer items such as light bulbs or sports shoes. Such objects can also transmit and receive data streams of information such as geographical location, temperature, and other measurements.

Towards 2020, the number of objects connected and the volume of data traffic they generate are expected to increase dramatically. According to Gartner, the internet of things holds promise for improving national infrastructure, for example, by optimising traffic management on road networks deployed with sensors or by providing better overviews in long and complex production chains in the health and care services sector. Gartner views this field as immature, but expects significant developments towards 2020.

Source: Gartner. As part of the preparatory work for this white paper, the Ministry of Government Administration, Reform and Church Affairs commissioned the analyst firm Gartner to write a report on technology trends. The views presented here sums up Gartner's analysis.

Part II
The digital revolution

4 Business and commerce

The ICT industry is a vital source of value creation in Norway. Even more important, however, is how the rest of the economy uses ICT products and services to innovate, improve efficiency, and ensure prosperity. In a survey of 2,000 business leaders in Norway, 76 per cent said that development of new ICT systems was increasingly important for competitiveness.¹

Annual administrative costs to business and industry for complying with statutory requirements are estimated at NOK 54 billion. Costs for complying with statutory reporting requirements are estimated at NOK 15 billion. The Government has set ambitious simplification goals to reduce administrative costs by NOK 10 billion by the end of 2015.

Because Norway is a small country located on the outskirts of the European market, it is vital that Norwegian enterprises and consumers can participate inside the EU's digital market and other international arenas.

The Government wants the Norwegian business sector to conduct business digitally, use digital payment systems, and use ICT in efficient and innovative ways – including cloud computing services. Norway is particularly well placed to achieve these goals because, since manual labour is expensive, introducing technology and processes that reduce the need for manual labour will improve profitability. Furthermore, the Norwegian population is mature in using technology and digital payment systems.

The Government's goal is to digitise Norway's business sector as much as possible:

- The Government will facilitate digital systems to improve the efficiency of business processes and cross-border trade.
- The public sector will take the lead in developing digital systems to serve citizens, organisations, and business and industry.

- As far as possible, efficient, electronic payment systems will be offered as an alternative to paying in cash.

4.1 Digital business processes

Two key contributions towards simplification are transition to electronic reporting and development of adequate electronic services for business and industry.

Two factors that particularly improve efficiency are reuse of product and payment information in commercial processes (enquiries, orders, invoices, payments) and less dependency on physical documents. For enterprises to adopt digital systems, however, they must perceive them as simple and secure.

Most Norwegian companies have few employees and resources; more than 460,000 companies have fewer than ten employees,² and few of them have digitised their business processes so far. In other words, significant potential exists for improvement.

4.1.1 ICT-based simplification

The Government has emphasized that work on simplification must be consolidated and rendered concrete. The aim is to design the regulatory framework so as to avoid burdening Norwegian enterprises with unnecessary costs and inconvenience and to ensure that public services underpin value creation in the Norwegian economy. Government regulations and information requirements should safeguard society's needs without requiring enterprises to use resources unnecessarily.

The Government has set one specific goal for simplification: costs incurred by enterprises for complying with statutory reporting requirements and regulations should be reduced by NOK 10 billion by the end of 2015. The Government has

¹ Perduco (2009): *Nordic Business Survey (NORBUS)*: Report prepared for the Research Council of Norway (VERDIKT)

² Statistics Norway (2013): *Enterprises, by size and economic activity*

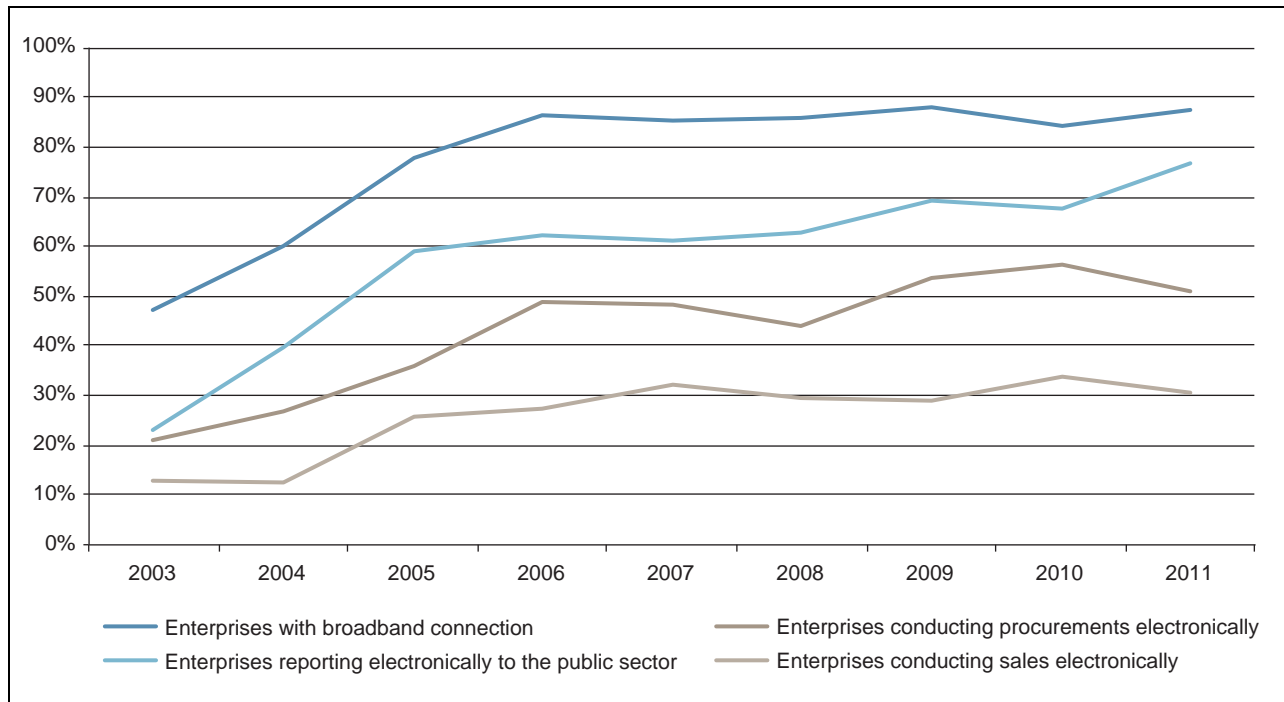


Figure 4.2 Level of digitisation in Norwegian companies

Source: Statistics Norway: ICT usage in industry, 2011

already conducted a survey to identify information requirements in business sector legislation. Between 2006 and 2009, the annual cost of resources spent on administrative activities was estimated at NOK 54 billion. The knowledge and experience gained from this survey are being used to achieve the simplification goal.

In the Norwegian economy, 99.5 per cent of enterprises have less than 100 employees, yet regulations that apply to large enterprises often apply to small ones, too, despite their limited resources. Small enterprises will therefore benefit most from simplification initiatives.

In April 2012, the Government presented a simplification strategy for small and medium-sized enterprises, which also addressed the entire business sector.³ The Government has already launched several initiatives to facilitate simplification for Norwegian business and industry:

- EDAG (electronic dialogue with employers), a new and comprehensive scheme for reporting on employment and wage matters, will be established. The main purpose is to simplify reporting processes by not requiring employers to repeatedly submit the same information.

Once the scheme is established, analyses estimate annual savings for employers of around NOK 500 million.

- The Government has also proposed amendments to the Bookkeeping Act, the Securities Trading Act, and the Estate Agency Act. One such proposal is that enterprises should be free to choose how they store bookkeeping data, and to store them electronically. The Bookkeeping Act's requirement to prepare specified reports of accounting information will be relaxed.
- The Government is undertaking extensive work on further developing Altinn, a common electronic platform for public digital services and a web portal for the business sector. Altinn facilitates use of the same components to perform different services provided by different agencies.
- Since October 2011, the Government has encouraged enterprises and business federations to make concrete proposals for simplification initiatives on the website enkleregler.no. More than three hundred suggestions were received and forwarded to the appropriate ministries for consideration, and many suggestions are being followed up. The website will also be used actively in future simplification processes.

³ Ministry of Trade and Industry (2012): *Små bedrifter – store verdier. Regjeringens strategi for små og mellomstore bedrifter* [Small enterprises – great value: Government strategy for small and medium-sized enterprises]

Box 4.1 RFID and the internet of things

RFID (radio-frequency identification) tags are miniature electronic circuits that communicate via a wireless connection, and are used in objects such as passports, electronic tickets, and highway toll passes in cars.

The question of RFID tags replacing bar codes in the retail industry has long been discussed, but so far their use and benefits are mostly enjoyed by supply chain elements not directly visible to consumers. The tags are often used on pallets and packaging processes for monitoring inventory and for fast and efficient registration of warehouse goods.

An increasingly popular expression is *the internet of things*, which alludes to the growing trend whereby goods and objects are equipped with RFID tags with an assigned IP address that can communicate via the internet. These tags are often connected to various types of sensors that indicate the status or location of tagged objects. These objects can thus communicate with each other, and previously manual processes can be automated. For example, a shop shelf can monitor inventory levels and automatically order more stock from the warehouse when needed.

4.1.2 New invoicing requirements

Electronic invoicing and payment can mean significant savings for enterprises. Several sectors, such as banking, transport, and grocery retailing, have already made significant progress in so-called 'B2B' (business-to-business) communication. For example, major players in the Norwegian grocery retail sector now require all their suppliers to use electronic invoicing systems.

The Government will stimulate widespread use of digital business processes. In autumn 2012, the Ministry of Government Administration, Reform and Church Affairs issued a circular to all government agencies instructing them to require their suppliers to use invoices and credit notes that comply with *Elektronisk handelsformat*⁴ [electronic commerce format] (EHF); see Standardisa-

⁴ Difi (2009): *Implementeringsveileder Elektronisk handelsformat. Faktura og Kreditnota* [Guidance on implementing electronic commerce format. Invoices and credit notes], updated 2011

tion Regulations.⁵ This requirement applies to all new contracts entered into from 1 July 2012.

EHF is an open format, which means that all finance and accounting systems can develop interfaces necessary to transmit electronic invoices to public agencies.

The public sector is also establishing a new digital infrastructure for transmitting EHF invoices and other business documentation, which will consist of access points for exchanging electronic invoices and other commercial documents in Norway. An access point is a service provider that can receive and forward commercial messages, such as invoices, in a standardised way, regardless of which formats senders and receivers use. Introducing electronic invoices is important for improving public sector efficiency, but it will also strengthen the Norwegian business sector's competitive and innovative capabilities.

The Norwegian Government Agency for Financial Management (DFØ), which receives invoices on behalf of many public agencies, has seen a notable increase in the number of electronic invoices since 2010, when electronic invoices accounted for only 5 per cent of all invoices received by DFØ; in 2012, the proportion of electronic invoices increased to around 13 per cent and continues to grow. It is reasonable to assume that private enterprises that do not submit electronic invoices to public agencies, do not submit them to other private enterprises, either. Requiring electronic invoices in the public sector might therefore encourage the private sector to require them, too.

The Norwegian public sector will also provide electronic invoicing services to private individuals so that those wishing to do so may have invoices forwarded directly to their online bank. Public agencies will also offer arrangements to deduct payments electronically, wherever possible. The Government will initiate steps to make electronic invoices the standard format in the public sector.

4.1.3 Cross-border trade

As enterprises are increasingly expected to conduct cross-border business transactions, digitisation will enhance efficiency in international trade. Although much has already been done to digitise trading documents such as customs declarations, transit procedures, and prior notifications of exported and imported goods, much work

⁵ Small suppliers can use web-based systems (web-based invoicing portals) to issue invoices to public agencies

Box 4.2 PEPPOL

PEPPOL (Pan-European Public Procurement Online) is an EU-funded project aimed at facilitating electronic cross-border procurement processes within Europe. This is currently a difficult task, partly because national technical systems are designed for use in the respective countries only, and because common standards have not been established in all areas. PEPPOL will ensure that small and medium-sized enterprises can offer their goods and services electronically, regardless of which EU country they are based in. The project will be led and coordinated by Difi (Agency for Public Management and eGovernment), Norway, and is jointly financed by the EU and 17 procurement agencies and industry partners from 11 countries. It will primarily address public procurements, but private sector enterprises will also be able to use the standards developed.

The project will ensure that national eProcurement systems in Europe today can interconnect and communicate via a common infrastructure and can cover the entire process from ordering to payment, thereby giving small and medium-sized enterprises access to a large market with more potential public sector customers.

Source: More information at: www.difi.no/anskaffelser/elektronisk-handel/e-handelssamarbeid-peppol

remains. Certificates of origin, medical certificates, and other important documents are still distributed as scanned copies of originals, which means the next step in the chain must re-register or reinterpret the information. A growing number of freight forwarders, banks, and other third parties are implementing digital systems, but because individual stakeholders often manage these systems, information cannot be reused throughout the supply chain, from raw-material supplier via producer to end customer.

The lack of standards and the current differences between national business models have impeded interoperability and electronic information flow in cross-border trade. Significant work therefore remains before procurement processes and cross-border trade are fully digitised.

Because the lack of standardisation negatively affects competitiveness, the EU is paying consid-

erable attention to this issue, one result of which is *Digital Agenda for Europe*. The aim of the Government is that Norwegian companies should operate without paper documents – including documents for cross-border business transactions and processes – by 2020.

International trade agreements

Through the World Trade Organisation (WTO), Norway works to create good international framework conditions for trade. Work is ongoing on the *Work Programme on Electronic Commerce*. This work is partly conducted by the WTO's Council for Trade in Services, whose members discuss principles for electronic commerce. These principles concern improving efficiency and exploiting opportunities offered by electronic commerce, while safeguarding consumer rights and data protection. The Information Technology Agreement, which involves 70 participant countries representing about 97 per cent of world trade in ICT products, is being revised. Ongoing negotiations concerning a new list of ICT products that may be imported duty-free by member states are expected to conclude in early 2013. Work is also ongoing on trade obstacles other than tariffs under this agreement, and discussions have begun on an agreement for services in which ICT is expected to be a key component.

Guidance for enterprises

New EU directives and initiatives may have significant consequences for Norwegian enterprises conducting cross-border trade, and information and guidance are therefore clearly needed. Enterprise Europe Network is an advisory network for business and industry, with offices in around 50 countries. In Norway, these advisors are affiliated with Innovation Norway, Nofima (Norwegian Institute of Food, Fishery and Aquaculture), IRIS (International Research Institute of Stavanger), and Norut (Northern Research Institute). The advisors specialise in regulation, technology transfer, research projects, business cooperation, and market access in Europe, and provide their services free of charge.

SOLVIT is an online problem-solving network where EU and EEA member states cooperate in solving problems arising when public authorities fail to apply internal market law correctly. SOLVIT centres in Norway, Iceland, Liechtenstein, and in all EU member states handle complaints from both citizens and businesses, and are committed

Box 4.3 Initiatives**20. *Electronic dialogue with employers (EDAG)***

The Government will develop a new, common reporting system for employment and wage matters that will no longer require employers to repeatedly submit the same information.

21. *Altinn*

The Government is undertaking extensive work on further developing security and electronic identification (eID) systems in Altinn. In 2013, priorities are to improve the testing regime, develop competencies, and adjust the system to ensure stability and robustness.

22. *Simplification for business*

The Ministry of Trade and Industry will continue work on the simplification programme for the business sector, focusing on integrating simplification measures across ministries. The Ministry has created a secretariat to liaise with the business sector and other stakeholders.

23. *Paper-based documents in the business sector*

In cooperation with Ministry of Trade and Industry and other relevant ministries, the Ministry of Government Administration, Reform and Church Affairs will review legislation to remove obstacles to digital business processes and digital collaboration with the public sector.

24. *Submitting electronic invoices to public agencies*

In its circular concerning digitisation, the Ministry of Government Administration, Reform and Church Affairs instructs public agencies to require suppliers of goods and services to submit their invoices and credit

notes electronically in electronic commerce format (EHF). This requirement applies to all new agreements. The Ministry of Government Administration, Reform and Church Affairs recommends that public agencies use the access-point infrastructure administrated by Difi for processing electronic business documents.

25. *Electronic invoicing to be the standard*

The Ministry of Government Administration, Reform and Church Affairs will invite the financial sector to assist with establishing electronic invoicing as the standard for public sector invoicing.

26. *Cross-border digital commerce*

The Ministry of Government Administration, Reform and Church Affairs will actively participate in international initiatives to establish digital collaboration across national borders, thereby seeking to ensure that Norwegian enterprises and citizens enjoy the same opportunities as others to participate in such collaboration.

27. *Following up PEPPOL*

Difi will follow up PEPPOL project results by participating from 2013 in a new project, Pilot A, under the EU framework programme Basic Cross-Sector Services. The aim of this project is to further develop and roll out solutions from existing PEPPOL components and new e-commerce components.

28. *Guidance on international trade for enterprises*

The Ministry of Trade and Industry will continue providing guidance services for enterprises through the Enterprise Europe Network and SOLVIT.

to providing concrete solutions within ten weeks. SOLVIT is part of the national administration; it provides its services free of charge. In Norway, the Ministry of Trade and Industry acts as the national SOLVIT centre.

4.2 Consumer e-commerce

In 2011, Norwegians purchased goods and services over the internet worth around NOK 22 billion.⁶ The number of Norwegians who shop online has increased yearly. Surveys conducted in

the second quarter of 2012 showed that 76 per cent had ordered goods or services online during the previous year.⁷

One reason for the growth in e-commerce is the high level of consumer trust in payment security. According to TNS Gallup figures, Norwegian consumer trust in online payment security has remained stable at around 90 per cent for the past

⁶ PostNord (2012): *E-handel i Norden 2012* [Nordic e-Commerce Report 2012], survey conducted by TNS SIFO

⁷ Statistics Norway (2012): *ICT in households. 2012, 2nd quarter*

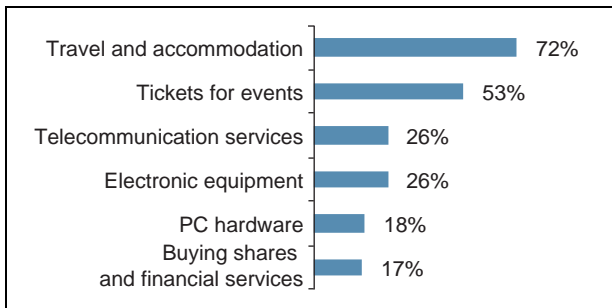


Figure 4.3 Types of goods and services bought by Norwegians online in 2011

Source: Statistics Norway: ICT usage in households. 2012, 2nd quarter

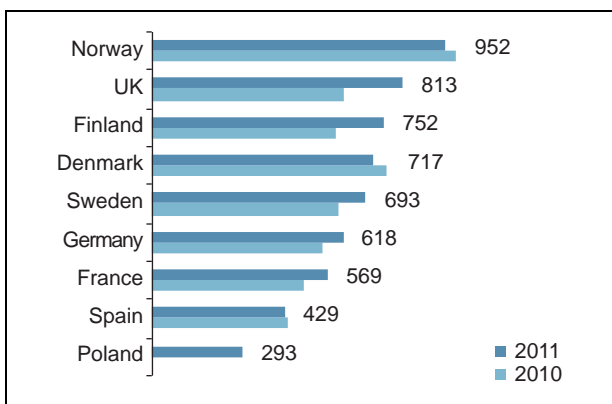


Figure 4.4 Average online consumption the previous six months (euros, per e-shopper)

Source: DIBS E-commerce Survey 2011: *A Comprehensive Study of European E-commerce*

three years,⁸ which is significantly higher than in other European countries, where 35 per cent of internet users felt insecure about paying online.⁹

Increased use of digital business models, of new services, and of new providers creates a need to continually review and adapt current legislation, because data protection, consumer rights, and intellectual property rights are continually being challenged in new ways.

4.2.1 E-commerce, eID, and eSignatures across national borders

E-commerce across national borders within the EU has not yet been fully embraced; only 3.4 per

⁸ TNS Gallup: (2012): *InterBuss Q2 2012*

⁹ European Commission (2012): *A coherent framework for building trust in the Digital Single Market for e-commerce and online services*, Commission Communication to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions

Box 4.4 Directive on consumer rights

In 2008, the European Commission proposed a consumer rights directive based on the principle of full harmonisation, meaning that member states could not grant better rights than those contained in the directive. The proposal was controversial because several aspects of Norwegian consumer rights would be weakened; for example, Norway could no longer maintain the five-year complaint period for 'durable' goods such as refrigerators or computers. The Norwegian Government acted to have the proposed directive modified to prevent the overall level of Norwegian consumer protection from being undermined, and when it was passed in 2011, most of the disputed issues were omitted. The scope of application in the final directive was significantly narrower than that of the original proposal and, from the Norwegian perspective, improved in many aspects; for example, Norway could maintain the five-year complaint period for home appliances and similar products. Overall, the directive did not impair the level of Norwegian consumer protection.

cent of European retail sales transactions are conducted online.¹⁰

According to the EU, greater safety and security for both enterprises and citizens are the main prerequisites for stimulating the e-commerce market. Another key requirement is that electronic authentication and electronic signature (eSignature) systems work across national borders. The 1999 directive on eSignatures resulted in new regulations in all EU/EEA countries, but because they are not harmonised, conducting cross-border transactions electronically remains difficult.

On 4 June 2012, the European Commission proposed a common legal framework for electronic ID, electronic signatures, and other related trust services.¹¹ These amendments seek to

¹⁰ European Commission (2012): *A coherent framework for building trust in the Digital Single Market for e-commerce and online services*, Commission Communication to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions

¹¹ European Commission (2012): *Proposal for a Regulation of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the internal market*, COM/2012/238 final

improve electronic collaboration between businesses, citizens, and public authorities across national borders within the EU/EEA and thereby stimulate economic growth in the internal market.

The legislative proposal applies more broadly the current directive on eSignatures and the obligations of electronic trust service providers through, for example, annual audits. It also facilitates mutual recognition of national eID schemes.

Today's regulations governing electronic signatures will be strengthened, and new regulations will be introduced governing electronic seals, electronic time stamps, electronic documents, electronic delivery services, and website authentication.

The Government will follow up the EU proposal for new regulations on eID and eSignatures.

4.2.2 Norwegian consumer interests

Norway wants to influence the EU's position in areas of importance for us. For example, certain Norwegian regulations on consumer protection are more stringent than those in the EU. Full harmonisation of EU consumer regulations might impair Norwegian consumers' rights, not least in the area of e-commerce and distance commerce. Both the Norwegian Consumer Council and the authorities play a key role in monitoring EU proposals and protecting Norwegian consumer interests as much as possible.

Box 4.5 Initiatives

29. *Updating consumer protection legislation*

The Ministry of Children, Equality and Social Inclusion will monitor technology developments closely, and, in cooperation with the Ministry of Justice and Public Security, will continually assess the need for amendments to consumer protection legislation. The Ministry will also closely monitor the EU's harmonisation plans to safeguard Norway's high level of consumer protection.

30. *Common legal framework for electronic ID and electronic signatures*

In cooperation with the Ministry of Government Administration, Reform and Church Affairs, the Ministry of Trade and Industry will follow up the recent EU proposal for legislation on eID and eSignatures.

4.3 Digital payment transactions

Digital payment transactions are payment transactions conducted using payment cards, online banks, mobile phones, or other electronic means of payment. Norway is one of the countries where digital payment services are most used. In 2011, Norwegian banks handled payment transactions worth almost NOK 2 billion (excluding ATM transactions), 98.7 per cent of which were processed electronically. Norway also ranks among the leaders worldwide in payment card usage. On average, 4 million Norwegian payment card transactions are processed daily. Measured in Norwegian kroner, usage has more than doubled in the past 10 years, while the number of transactions has tripled.¹²

4.3.1 Digital transactions used most

The Norwegian payment system is essentially based on two means of payment: cash and bank deposits. Cash (bank notes and coins) is so-called 'legal tender,' meaning that all consumers may demand to pay in cash.

The transition from cash payments to electronic payment systems has been crucial for developing long-distance commerce and for the financial markets. It is vital for a small, open economy like Norway's to have well-functioning and efficient electronic payment and settlement systems.

Use of electronic payment systems in the retail sector has also expanded considerably, particularly in Norway. The likely explanation for this trend is that Norwegian banks were quick to develop an efficient payment system (the Bank-Axcept debit card system) and began pricing their manual services so that digital options cost customers less.

The transition from cash to electronic payment systems has had a positive impact; growth in online retail commerce was contingent on electronic payment systems in the retail sector. Efficient and secure electronic payment systems have been a key contributor to e-commerce, at the expense of physical retail outlets.

Reduced use of cash will sometimes reduce the risk of crimes for profit. Moreover, using payment cards is often more cost-effective than using cash, because cash is expensive to produce and distribute. The most common means of electronic

¹² Norges Bank (2012): *Årsrapport om betalingssystem 2011* [Annual Report on Payment Systems]

payment are debit cards, credit cards, and credit transfers (regular giro payments) via online or mobile banking services. In other areas, such as buying and selling second-hand goods and making instant payment transfers between private individuals, cash remains the most popular means of payment.

In 2010 and 2011, the Government proposed new legislation to facilitate development of new digital payment systems.¹³ In 2010, the Storting passed – in accordance with the Government’s proposal – a new chapter (chapter 5) in the Payment Systems Act to ensure that new market players were given access to digital payment systems on non-discriminatory terms. In 2011, the Storting passed new regulations on electronic money (e-money) institutions to lower the cost of establishing such undertakings and thereby facilitate development of new digital payment systems.

The Government considers it important to continue promoting growth of secure and simple payment systems for all kinds of transactions. Adequate digital alternatives to cash payment can help increase the proportion of digital payment transactions. However, technology development must not be facilitated at the expense of trust, security, and stability in existing payment systems.

4.3.2 New services based on payment information

Consumers today have limited access to information about their own payment transactions, which are stored electronically with the payment recipient, the payment service provider (the bank), and in the consumer’s online bank.

Some banks can ‘tag’ or sort payments according to the type of business from which purchases originate, and can give customers a better overview of their consumption patterns. Other market players offer customers detailed, electronic information on individual purchases (so-called ‘point-of-sale’ information). The proposed regulations for cash register systems,¹⁴ currently under

review by the Ministry of Finance, offer retail outlets the possibility to provide customers electronic receipts for their transactions.

The Government will consider whether payment information should be made available for reuse, subject to customer consent. Adequate security systems must be developed before banks and shops can be instructed to give third parties access to transaction details stored in their systems. Distribution of risk and liability is another issue that needs resolving. Systems allowing differentiated access to information must be provided so that, for example, customers can grant access to third parties to retrieve information on accounts and transactions but not to other banking functions.

We envisage that making transaction information available for reuse will generate innovation and competition in services using such information. Customers can choose to share their information with new market actors, such as information service providers whose products are better than those provided by their bank, or obtain better overviews than those provided by chain store customer loyalty cards.

4.3.3 Mobile payments in the future

Many Norwegian bank customers today use mobile banking services for checking their bank balance or transferring money between accounts, but few use mobile devices as a means of payment. Whereas many countries have already begun to use mobile devices for conducting payment transactions, Norway has yet to do so.

Near-field communication (NFC) is a technology for very short-range wireless communication, typically down to only a few centimetres. NFC is based on RFID. An increasing number of mobile phone manufacturers are launching models that support NFC. NFC can be applied, for example, as virtual wallets in mobile phones. The phone is filled with digital cash for use in making small payments, not unlike electronic cards used on transport services or in workplace canteens. To reduce loss in case of theft, users can set limits on single or all transactions. Payments are made by briefly touching the payment terminal with the mobile device (‘touch and go’).

¹³ Prop 84 L (2009–2010) *Endringer i lov om finansieringsvirksomhet og finansinstitusjoner (finansieringsvirksomhetsloven) mv. og enkelte andre lover (samleproposisjon)* og Prop 139 L (2010–2011) *Endringer i betalingsystemloven og finansieringsvirksomhetsloven mv. (gjennomføring av EØS-regler som svarer til direktiv 2009/44/EF og direktiv 2009/110/EF)* [Prop. 84 L (2009–2010), a bill to amend the Act on Financing Activity and Financial Institutions (Financial Institutions Act), etc., and other acts (consolidated proposition), and Prop. 139 L (2010–2011), a bill to amend the Payment Systems Act and the Financial Institutions Act, etc., (implementation of EEA regulations corresponding to Directive 2009/44/EF and Directive 2009/110/EF)]

¹⁴ Directorate of Taxes (2012): *Nytt regelverk for kassasystemer. Utredning om endringer i bokføringsregelverket* [New Regulations for Cash Register Systems. Report on Amendments to Bookkeeping Regulations], Commissioned by the Ministry of Finance

Box 4.6 NFC City

Telenor and DNB are cooperating with certain retail outlets in Majorstua, a district of Oslo, in a project entitled NFC City. Around 200 customers have been provided with mobile phones equipped with NFC technology and wallet functionality. Although the project is not yet completed, preliminary evaluations indicate that both merchants and customers are very satisfied with the system. The project is supported by VERDIKT, the Research Council of Norway's programme for core competence and value creation in ICT.

So far, few merchants have invested in payment terminals that can handle NFC, partly because the system of 'chip and PIN' in Norway works so well. However, the Norwegian Financial Services Association estimates the cost of upgrading terminals to support NFC as negligible, and we therefore expect NFC technology to become more widespread in the near future.

One security issue with NFC technology is that communication between tag and scanner is not subject to encryption requirements, leaving such communication vulnerable to attacks such as tapping, data modification, and fraud.

One market still lacking adequate digital payment systems is digital content aimed at children. Young people are large consumers of music and films, products increasingly being sold online. Online game producers are also opting to sell their products via internet links on their consoles rather than via physical carriers. Few young people, however, possess a credit card. Simple payment systems that require no credit card but that are linked to, for example, a mobile phone, might contribute to more use of legal channels when young people acquire entertainment products.¹⁵

The EU has published a green paper on card and mobile payments.¹⁶ In Norway, we must monitor trends and consider measures if it proves difficult to find payment solutions that can be used by all mobile phone users to pay for all types of prod-

ucts and services. Expanding mobile payment systems is contingent on standards and mutual agreements ensuring that customers can use their mobile phones in all retail outlets, regardless of phone type or service provider.

4.3.4 Single Euro Payments Area (SEPA)

Because each country has its own payment system and these systems cannot communicate with each other, cross-border payments are normally far more resource-intensive than are domestic payments. Consequently, cross-border payments require more manual transactions, and are more costly and time-consuming for customers. EU member states are Norway's key trading partners, and an efficient payment system that works well across national borders would create significant opportunities for the Norwegian economy.

SEPA (Single Euro Payments Area) is a European banking industry project to make cross-border payments in euro as simple and as inexpensive as domestic payments in euro. SEPA, introduced in early 2008 with the launch of credit transfers (regular giro payments), covers the entire EEA and Switzerland, and provides a common legal framework and technical standards for services such as direct debits (account withdrawals), credit transfers, and card payments. At year end 2011, the SEPA system for card payments was supported by 90 per cent of all payment cards in the EU.¹⁷ However, transition to SEPA's direct debit and credit transfer instruments has taken longer than expected; so to speed up this process, the EU has passed regulations requiring that transition to these instruments be completed by 1 February 2014.

Norwegian banks participate in developing SEPA and use the instruments in cross-border payments conducted in euro.

¹⁵ Ministry of Culture (2011): *Høring – endringer i åndsverkloven (tiltak mot ulovlig fildeling og andre krenkelser av opphavsrett m.m. på Internett)* [Consultation: Amendments to the Copyright Act (measures against illegal file sharing and other violations of copyright law, etc., on the internet)]

¹⁶ European Commission (2012): *Green Paper: Towards an integrated European market for card, internet and mobile payments*

¹⁷ Norges Bank (2012): *Årsrapport om betalingssystem 2011* [Annual Report on Payment Systems].

Box 4.7 Initiatives**31. Secure and stable payment systems**

The Government will work to ensure that technology developments do not compromise trust in, or security and stability of, payment systems. Payment system failures, even for short periods, have serious consequences for society and can harm trust in, and therefore use of, electronic means of payments. The Government will therefore facilitate the growth of secure and simple payment systems for all kinds of transactions.

4.4 Cloud computing

Whereas software previously was stored locally on users' computers or enterprises' servers, it is now supplied via the internet. This is known as 'cloud computing.' Examples of cloud computing services are office support programmes supplied via web browsers, such as e-mail or word processing. It can also be the storing of files and data or the processing of large data sets on remote computers with online access. Because cloud service providers have large data centres, they can take advantage of the economies of scale and the flexibility these offer, and customers make considerable savings by not having to own their own servers.

4.4.1 Types of cloud computing

Three types of service can be supplied by cloud service providers:

- *Software as a service*: applications such as text processing or e-mail delivered via a browser.
- *Platform as a service*: platforms whereby an enterprise uses cloud computing to develop its own applications and then supplies them to customers via the internet.
- *Infrastructure as a service*: infrastructure whereby customers use their own software programmes but buy storage space and processing power from a cloud service provider.

The key feature of cloud computing is the business model, which is based on pay-per-use, whether it be e-mail accounts, storage space, or processing power. Because customers pay only

for what they use, cloud computing is beneficial for enterprises requiring large amounts of computer power for short periods, such as when running annual or monthly tasks such as payroll and invoicing. By taking advantage of cloud services' inherent flexibility, enterprises do not have to scale their systems to handle peaks in their computing requirements.

The combination of pay-per-use, flexibility, and scalability offers particular advantages to new enterprises, whether they need systems for communication or desktop applications, or want to develop and operate applications for their own customers. By using cloud computing they can avoid high entry costs, such as investment in hardware and software licences, and they can easily scale their systems to handle more employees or customers as they expand.

Cloud computing represents huge potential savings, not only for enterprises but also for public administration and individuals, as the need for owning installations or infrastructure is reduced. In 2012, the EU therefore launched a strategy for using cloud computing, outlining the opportunities and challenges it represents for public authorities.¹⁸

The European Commission's strategy for cloud computing put forward three main actions:

- standardisation
- secure and fair contract terms and conditions
- establishment of a European cloud partnership to drive innovation and growth

Norway will closely monitor EU policy in this area. This issue is also being addressed at Nordic level, under the auspices of the Secretariat to the Nordic Council of Ministers, and Norway participates there, too.

4.4.2 Cloud computing challenges

Because cloud service providers are large market players that mostly supply standardised services, customers generally must sign standard agreements that may conflict with Norwegian requirements, such as those governing data security in the Personal Data Act.

Under those requirements, personal data may normally be stored inside the EU/EEA area, with enterprises in the United States adhering to the safe harbour privacy principles, or in other countries which the European Commission considers

¹⁸ European Commission (2012): *Unleashing the Potential of Cloud Computing in Europe*, COM (2012) 529 final

to have acceptable levels of data protection. The safe harbour privacy principles are intended to ensure that personal data is handled in compliance with the EU's directive on the protection of personal data. Because customers using cloud computing systems do not know the exact location of their data at any given time, processing personal data can present legal problems. The Norwegian Data Protection Authority has produced a guide on protecting data in connection with cloud computing services.

In 2012, the Data Protection Authority reviewed the use of cloud services in the municipalities of Narvik and Moss, and subsequently published guidelines for using such services:

- A thorough risk and vulnerability analysis must be carried out in advance. Enterprises must ascertain what can go wrong and what the consequences would be.
- Enterprises must use data processing agreements that comply with Norwegian regulations. Norwegian enterprises are responsible for ensuring compliance with statutory requirements.
- The use of cloud services must be regularly audited, meaning that a third party must conduct security audits on behalf of the enterprise and ensure that data processing agreements are complied with.
- Data processing agreements must be enforced, and suppliers' general data protection declarations must not conflict with them.

Because the Bookkeeping Act sets requirements governing geographical location of data storage to ensure that tax authorities can access data during

audits, data storage via cloud services can present challenges. In 2010, new regulations pertaining to the Bookkeeping Act were introduced, permitting electronic storage of vouchers in specific EEA countries outside Norway (Denmark, Iceland, Finland, and Sweden).

The Government believes that cloud services can provide public and private sector enterprises with flexible and reasonably priced solutions, and therefore wants to facilitate secure and predictable use of such services within the Norwegian statutory framework.

Box 4.8 Initiatives

32. Considering cloud computing services in procuring ICT operating services

The Ministry of Government Administration, Reform and Church Affairs will consider initiatives to encourage public agencies to consider cloud services when procuring ICT operating services.

33. Guidelines on cloud computing services

The Ministry of Government Administration, Reform and Church Affairs will produce guidelines for public and private enterprises wishing to use cloud services. This work will involve clarifying relevant regulations and developing specifications and standard agreements for use in procuring such services, as an alternative to the standard agreements currently used by cloud service providers.

5 Digital content and reuse of public sector information

Digitisation and the internet have transformed many industries, particularly those of media, entertainment, and culture. These industries are based on managing content well suited for digitisation, such as books, films, and music; hence, the term *digital content*.

The transition to a digital-media and digital-content economy has created – and will continue to create – growth and new jobs. Simultaneously, jobs related to the traditional media formats will disappear. However, studies show that for each job that disappears because of the internet economy, 2.6 new jobs are created.¹

Norway was amongst the first countries to experience revenues from digital music sales exceed revenues from conventional music sales,² and is well placed to become a key market for digital content. Practically everyone can connect to broadband internet, and most citizens are now online.

The Government wants to see Norwegian stakeholders take advantage of the significant growth opportunities which digital content represents. The EU's Digital Agenda estimates a four-fold increase in digital content revenues. However, experiences from online accessibility in the music industry show the importance of striking the right balance between listeners' interests and artists' intellectual property rights and financial interests.

Another area considered to hold significant potential for innovation and value creation is reuse of public sector information (PSI). The Government wants Norway to lead in using and creating value from digital content, and will establish framework conditions to stimulate innovative digital services and digital business models to facilitate this. PSI should, as far as possible, be accessible for reuse and value creation, and publicly funded content should, as a rule, be made publicly accessible.

5.1 Public sector information: Accessibility and reuse

The Government wants as much PSI as possible to be made accessible in ways that facilitate easy reuse. Facilitating reuse of data means making it easier to reuse them in new contexts. Public agencies can facilitate this by quality assuring data, arranging them in logical structures, and publishing data sets in standard file formats along with supplementary documentation. Adapting data and making them accessible must be done in such a way as to safeguard security and data protection.

Accessibility of PSI could help achieve several goals:

- *Development of new services.* Information about geographical conditions, meteorological conditions, and water levels are examples of PSI that could form the basis of new services. Standardisation of data formats and software has made it possible for private stakeholders to use raw data in innovative products and services. We have already seen examples of how PSI is well suited to developing simple applications for mobile phones and tablets.
- *Democratic control.* Information is a crucial prerequisite for decision making, participating in debates, and influencing social developments. Access to cases and processes provides possibilities to monitor how bureaucrats and politicians use their positions and society's resources. For example, anyone may use Electronic Public Records to request access to public sector documents. But not only documents can be used to exercise democratic control; data are also being increasingly used in investigative journalism. For example, the Storting's information service, data.stortinget.no, provides overviews of how representatives vote on different issues. By processing public sector data sets, the press or others can, for example, reveal irregularities in systems or procedural rules.

¹ McKinsey & Co. (2011): *The Impact of the Internet on the French Economy*

² IFPI (2012): *Digital Music Report 2012 and Recording Industry in Numbers, 2012 edition, country page: Norway*

Box 5.1 Electronic Public Records

Electronic Public Records (OEP) provides an overview of all documents sent and received by public agencies. Users may search OEP and request access to specific information, and unless such information is exempted from public disclosure, they are granted access. The purpose of OEP is to make the Norwegian public sector more open and accessible to users. OEP was developed and is owned by the Ministry of Government Administration, Reform and Church Affairs.

The usage rate for OEP is very high; in 2011, it received nearly 16,000 requests for access in one month.¹

¹ Difi (2011): *Brukerundersøkelse for Offentlig elektronisk postjournal* [User Survey on Electronic Public Records], Rapport 2012:5

Source: More information at: www.oep.no

- *Improving efficiency in the public sector.* Public sector data are used by all public agencies, so making them openly accessible will save unnecessary use of resources on data collection and improve efficiency.

5.1.1 Legal framework for making data accessible for reuse

Norwegian regulations require public agencies to make information accessible for reuse.

These regulations are based on the EU's PSI Directive from 2003, which was intended to harmonise how member states practise reuse of PSI. A main goal was to unlock the potential of PSI for innovation and value creation by the private sector. The directive was implemented in Norway through enforcement of the Freedom of Information Act, which gives citizens broad access to public sector documents and databases. This law also permits reuse of information to which access is granted.

An important goal for the regulations governing reuse is that access to information should be granted on equal terms; it is generally not permitted to discriminate between comparable cases nor grant exclusive rights to reuse information.

Another goal is to ensure that the costs of access and reuse remain low and predictable;

under the Freedom of Information Act, the general rule is that charges cover actual costs. Reasonable profit is permitted when information is produced or processed exclusively to meet external parties' requirements. Geographic information and land register information are exempted from the regulations. Nevertheless, Government policy is that as much PSI as possible should be made accessible free of charge or at prices not exceeding the cost of making material accessible.

Most public agencies are subject to provisions governing reuse of PSI, which are now part of the Freedom of Information Act. Some activities, such as research at universities or programming activities at the Norwegian Broadcasting Corporation (NRK), are covered by the Freedom of Information Act but are exempted from the reuse provisions. Public agencies that are not covered by the Freedom of Information Act may still be covered by the reuse provisions: For example, public agencies that are not obligated to disclose data under the Freedom of Information Act must still comply with its provisions governing equal treatment once access to information is granted.

5.1.2 Publicly funded content must be made publicly accessible

Publicly funded content should, as a rule, be made digitally accessible. Making content accessible can generate considerable benefit, not only financially; for example, if sound and images from concerts are distributed digitally, they can be shared with far more people than merely the concert audience.

Much content that is publicly funded but not publicly owned can also constitute significant value for others: films, publicly funded theatre and concert performances, research findings, TV programmes, and content of museum collections and archives are some examples. These constitute digital content to which the public is not necessarily *entitled* to have access. However, there is nothing to prevent making this type of content accessible – or reusable – provided clearance is obtained from rightholders. For example, contracts can be worded such that public authorities are granted the right to distribute content for enjoyment by a wider audience. The Government also wants to stimulate accessibility to and reuse of content which the public sector is not legally required to make accessible, so as to achieve greater social return on public investment.

Box 5.2 Archives, libraries, and museums on the internet

Bokhylla.no

Bokhylla.no, a service provided by the National Library of Norway, contains works published during four decades (1690s, 1790s, 1890s, and 1990s). Books still protected by copyright can be read online, and books no longer covered by copyright (normally those by authors who died more than 70 years previously) can be downloaded.

Digital Archives

The Digital Archives has digitised 40 million pages of documents such as church registers, electoral rolls, and censuses, most of which are published online at www.digitalarkivet.no. In 2011, members of the public read 105 million pages of transcribed material and 122 million pages of scanned material. The National Archives publishes material from its photographic collection on The Commons, Flickr's online photo collection, where users can download and reuse photos held by the National Archives. These photos have been downloaded more than

150,000 times. Communicating with the public through the Digital Archives has contributed to greater public access to digital, cultural heritage material, and to increased user engagement.

Arkivportalen.no

Arkivportal [Archive Portal], established in 2010, is a national search service providing information on historical documents held in different archives in Norway.

Digitaltmuseum.no

The purpose of DigitaltMuseum [Digital Museum] is to make museum collections more accessible to everyone in connection with studies, teaching, and image searches. The aim is ultimately to publish museums' entire collection data online. By year end 2011, around 983,000 photos and objects, and works of art, design, and architecture had been registered, and 276,000 visitors had viewed them. The site also has its own interface (API) for downloading data from the collection in machine-readable formats.

Archives, libraries, and museums

The Government wants as much as possible to facilitate accessibility to and reuse of public collections held in archives, libraries, and museums. Collections should be made searchable, and content should be presented in a user-friendly way so that users can access photographic material and publications online instead of searching for original material held by those institutions. Entitlement to reuse content to, for example, create new services will depend on issues such as intellectual property rights and data protection.

The Ministry of Culture has encouraged museums (both state-owned and others receiving state subsidies) to make raw data publicly accessible in machine-readable formats wherever such data are considered to be of social value, non-confidential, reusable, and inexpensive to make accessible.

Research results and data

Every year, the public sector spends significant amounts on research, and it is therefore natural to

require research institutions to share their research results with society. Today, research results are mainly disseminated through articles in scientific journals that are costly to subscribe to or to access. In principle, all publicly funded research should be made openly accessible provided no reasons exist not to do so. Open access, by which is meant free electronic access to research articles, will further disseminate research results and contribute towards more effective research through giving researchers better access to relevant literature. The social value of research will also increase when practitioners in different professions, business and industry, and the general public gain better access to research results.

As well as making research results more accessible, the Government will work towards making research data accessible for reuse, and in doing so will follow the OECD's principles and guidelines for access to publicly funded research data. The Research Council of Norway has surveyed publication and accessibility for reuse of research data at universities, university colleges, research institutions, and health trusts. The findings revealed considerable variations between

Box 5.3 Sharing research data: CESSDA and SIOS

Norway leads two European research infrastructure projects aimed at making research data more widely accessible: the Council of European Social Science Data Archives (CESSDA) and the Svalbard Integrated Arctic Earth Observing System (SIOS).

CESSDA is an international organisation for social science databases across Europe, whose main purpose is to improve and stimulate more intensive use of high-quality data in social science research. CESSDA negotiates access agreements and licensing models that permit access to data resources spread across different locations. CESSDA actively promotes development and dissemination of standards for data distribution and management.

The main aim of SIOS is to establish an upgraded observing system for conducting Earth system research through improved research facilities on and around Svalbard. This infrastructure for Arctic research will be multi-disciplinary, multinational, and cover multiple research platforms. More efficient use and sharing of data for future research are key elements in establishing SIOS. Data must be managed in line with the visions for large-scale research infrastructure across Europe, meaning an open access policy based on best practice, as defined by ESFRI¹ and OECD.²

¹ European Strategy Forum on Research Infrastructures, ESFRI (2010): *Strategy Report on Research Infrastructures, Roadmap 2010*

² OECD (2007): *OECD Principles and Guidelines for Access to Research Data from Public Funding*

different institutions and between different fields of research. There are several reasons why publicly funded research data are not made more openly accessible, such as intellectual property rights issues and cost. The Government therefore wants to examine how to facilitate public access to data from publicly funded research activities.

Norwegian Broadcasting Corporation: Programme content

The Norwegian Broadcasting Corporation's (NRK) programme archives constitute an important part of our cultural heritage, and the overall ambition should be to make this material accessible to everyone. NRK is therefore currently digitising as much of its archives as possible. Wherever possible, agreements are made with rightholders of new productions to secure rights to publish material online. Most older NRK programmes cannot be made accessible for reuse because other parties hold the rights to different parts of the productions.

New content to which NRK owns all the rights is being made directly accessible for reuse. For example, it published high-definition film content from the TV programme *Bergensbanen minutt for minutt* [The Bergen Line – Minute by Minute] under a Creative Commons licence and encouraged others to reuse the film material in new ways.

5.1.3 Stimulating reuse

PSI is often raw material, or parts thereof, from which new applications or services are developed.

Although many public agencies administer large volumes of electronic data and information, they differ in the volume they make accessible for reuse. Differences may be due to financial or capacity constraints, or to lack of knowledge about how to proceed or to fear of information being misinterpreted or misused. Moreover, data protection legislation sets restrictions to protect, for example, personal integrity.

Measures initiated by the Government to stimulate reuse of PSI include:

Standard requirements in all allocation letters issued to public agencies

In 2011 and 2012, accessibility to PSI was made a standard requirement in all letters of allocation issued by public agencies, requiring agencies to make existing and appropriate raw data accessible in machine-readable formats. Requirements apply to information that is of social value, reusable, non-confidential, and inexpensive to make accessible. Agencies considering establishing new, or upgrading existing, public services based on raw data must normally make such data publicly accessible in machine-readable formats. Before establishing new public services based on raw

Box 5.4 Creative Commons

Creative Commons licences enable copyright holders to give others permission to reuse their creative work. The copyright holders must first decide how their creative work may be reused, for example whether the work:

- must be credited; in other words, whether the author of the original work must be declared
- may be used commercially
- may be altered or adapted, and whether any new work must be distributed under the same licence

Source: More information: www.creativecommons.no

The idea behind the licences is to create a more liberal and open culture allowing people to reuse and be inspired by other people's work. All content on Wikipedia is licenced with Creative Commons, and publication of images and videos is permitted under Creative Commons licences on websites such as Flickr and YouTube. The licences are managed by Creative Commons, a non-profit organisation.

data, agencies must assess the cost-effectiveness of making raw data accessible in machine-readable formats for others to develop new services. Agencies must report which data sets had been made accessible for 2011 and 2012.

The requirement for accessibility has helped put this issue on the agenda and raised awareness

about PSI, and many agencies have initiated studies to learn which data types can be made accessible and how.

In 2013, the requirement for accessibility stipulated in allocation letters was adopted in similar requirements in the government circular on digitisation.

The screenshot shows the homepage of the Norwegian Environment Agency's website, environment.no. The header includes navigation links for 'ABOUT SOE NORWAY', 'CONTACT US', and 'NORWEGIAN'. Below the header is a banner with silhouettes of people and a globe. A navigation menu contains 'Topics', 'Goals', 'Data', and 'Maps', along with a search bar. The main content area is titled 'Norway' and features a grid of data categories with links to specific datasets:

Air pollution	Climate and ozone	Noise	Water pollution
<ul style="list-style-type: none"> Emissions of long-range transported gases Emissions of long-range transported gases by industry Emissions of particles and carbon monoxide (CO) Hazardous substances to air Heavy metals in moss 	<ul style="list-style-type: none"> Emissions of greenhouse gases Emissions of greenhouse gases by industry Import of ozone-depleting substances 	<ul style="list-style-type: none"> Noise annoyance index Number of persons annoyed by noise Number of persons exposed to noise 	<ul style="list-style-type: none"> Acute pollution Eutrophication in coastal waters Pollution from mines - water quality Riverine and direct inputs to the marine environment
Animals and plants	Hazardous chemicals	Waste	
<ul style="list-style-type: none"> Dyrebestand i fjellet (EN) Predators and damage to sheep and reindeer 	<ul style="list-style-type: none"> Contaminated soil Hazardous chemicals in products 	<ul style="list-style-type: none"> Export and import of waste Hazardous waste Household waste Waste by sources Waste by treatment method 	

Figure 5.1 An example of how public agencies can present an overview of data they administer

Source: Climate and Pollution Agency

Guidelines on making PSI accessible

The Ministry of Government Administration, Reform and Church Affairs has issued guidelines on making PSI accessible, explaining the term 'reuse of public sector information' and instructing agencies how to make their data sets accessible. The intention is to establish principles for making data accessible for reuse and to do so practically, consistently, and efficiently. The guidelines were produced by a reference group comprising the largest public agencies and the Norwegian Association of Local and Regional Authorities.

Data.norge.no

Data.norge.no is a data source catalogue of descriptions of data accessible for reuse: a kind of

directory of public sector data where users seeking to use public sector data can learn which data sets are accessible. Data.norge.no is also intended as a meeting place for stakeholders interested in reusing data and a knowledge base for stakeholders seeking more information.

Difi has linked a data hotel to data.norge.no where public agencies can easily upload small data sets in a format that makes it easy to reuse data.

Norwegian licence for open government data (NLOD)

When data are published for reuse, it is important to explain how they can be used. The Ministry of Government Administration, Reform and Church Affairs has therefore developed the Norwegian licence for open government data (NLOD), a spe-

Box 5.5 Initiatives**34. Provisions in the Freedom of Information Act governing reuse**

In cooperation with the Ministry of Justice and Public Security, the Ministry of Government Administration, Reform and Church Affairs will consider whether to expand the scope of application of reuse provisions in the Freedom of Information Act. In connection with EU's revision of the PSI directive, the Ministry will consider provisions in the Act governing pricing policy for releasing documents and PSI for reuse.

35. Accessibility requirements for PSI in the circular on digitisation

The circular on digitisation issued by the Ministry of Government Administration, Reform and Church Affairs requires public agencies to make information accessible in machine-readable formats. This requirement applies to information that is of social value, reusable, non-confidential, and inexpensive to make accessible.

36. Support for and guidance on accessibility and reuse of PSI

The Ministry of Government Administration, Reform and Church Affairs will further develop Difi's role of providing support and guidance to public agencies seeking to make their data accessible to private actors and others seeking access to PSI.

37. Guidelines on reuse and the Norwegian licence for open government data (NLOD)

The Ministry of Government Administration, Reform and Church Affairs has issued guidelines on making PSI accessible for reuse. It will also monitor use of NLOD and inform public agencies about reuse and NLOD.

38. Making research data accessible for reuse

Commissioned by the Ministry of Education and Research, the Research Council of Norway will study ways of increasing accessibility to publicly funded research data.

39. ICT in public archive institutions

The Ministry of Culture will continue its initiatives for implementing new ICT solutions by the archive institutions so as to make archive material more readily accessible for reuse and dissemination. The National Archives will be assigned national responsibility to establish cooperation within the archive sector concerning digitisation strategies, digital publication systems, and new options created by technology developments.

40. Digitisation of archive documents

The National Archives will commence systematic digitisation of documents by means of transcription or scanning.

41. Språkbanken

Språkbanken – a language technology resource collection for Norwegian – provides digital, language resources for language technology R&D. These resources are freely accessible online, and the collection is continually expanded. Språkbanken is managed by the National Library of Norway.

cial licence for using PSI that makes it easy to specify usage terms for data sets.

Difi support for reusers

Difi has operative responsibility for the Government's work on reuse of PSI and for advising public agencies seeking to make their own data accessible for reuse. Difi also guides stakeholders seeking access to specific public sector data sets and who are unsure about how to find them or how to access unpublished data sets.

5.2 Digital content, media, and convergence

Previously, media products were easily distinguishable from each other: TV and radio content was broadcast over the air, books and newspapers were printed and sold in bookstores, kiosks, and other outlets, and music was distributed via records and CDs and sold in record shops and petrol stations. Today, all these media products – or media content – are accessible online in the form of internet TV and internet radio, e-books, news websites, and music files or streaming services. A gradual transition has occurred between different media and content elements, such as online news websites providing live broadcasts of news and sports events. This phenomenon is known as 'convergence.'

The media and entertainment industry is – and will continue to be – one of the industries most influenced by the internet and digitisation. Conventional media products such as newspapers, films, and games are particularly well suited for digitisation. Digital products offer consumers more diversity and a better, wider choice, and provide industry actors with new ways of diversifying and distributing their products. However, this trend also presents problems; industry actors are challenged to find new and successful business models that appeal to consumers and that still protect the financial interests of rightholders and the industry itself. The Government has appointed a committee to study this issue (see box 5.6).

5.2.1 Regulations

Convergence creates fuzzy boundaries between products and services that previously were regulated separately. Changing technology and consumer patterns are challenging current legislation. Although provisions in the Copyright Act are

essentially technology-neutral, the transition to digital technology created a need to more precisely define rules concerning copying for private use. On the other hand, introducing legal protection for digital rights management (DRM) technology on CDs, for example, was a lesson in the wisdom of waiting and monitoring developments before amending legislation; shortly after this technology was introduced – after much discussion – the record industry abandoned it.

Technology, areas of application, business models, and usage patterns are changing rapidly. The challenge for the authorities is to maintain legislation that is as technology-neutral as possible while simultaneously protecting existing interests.

From press subsidies to media subsidies

Digitisation creates significant opportunities for both media and consumers. Digital media can be far cheaper, more flexible, more up to date, and more adaptable than analogue media, but the current period of transition from analogue to digital presents challenges, too. Enterprises and business models are under pressure; revenue streams from traditional media are failing to shift to new media. Conventional policy instruments must be adapted to have relevance in the new, digital age.

A free and effective media is crucial for freedom of expression, rule of law, and a vital democracy. The media receives state subsidies because editorial content has significant social value and should therefore reach as many as possible. For example, access to broad and diverse media coverage provides a basis for informed citizens and promotes Norwegian language and culture. VAT exemption for print newspapers, in addition to press subsidies for the print media in general, has been a key policy instrument for ensuring such media diversity.

The potential for innovation in the media industry is huge, making it a particularly interesting area in terms of value creation. New products such as smartphones and tablets make possible many new media products. News media and magazines are now experimenting with different formats specially adapted to tablets, often with video clips and other content, to test market willingness to pay for such products.

Developments in recent years have resulted in an increasingly digitised media world. The Government has therefore proposed changes to the press subsidies system by relaxing requirements for subsidy recipients to publish print news-

Box 5.6 Digitisation Evaluation Committee

In 2011, the Ministry of Government Administration, Reform and Church Affairs appointed an independent government committee with a mandate to identify obstacles and barriers to growth in the Norwegian digital economy. The Committee was asked to assess technological, regulatory, financial, competitive, and other obstacles to developing services and creating value online. It was also asked to study incentives and initiatives and to identify problems that might require supranational regulation or other types of policy instruments.

The Committee submitted its report on obstacles to digital value creation, NOU 2013: 2 *Hindre for digital verdiskaping*, in January 2013. The report makes a number of proposals, including:

- *Broadband rollout.* According to the Committee, broadband is part of society's basic infrastructure and is essential to successful digitisation. Sufficient broadband capacity is considered decisive for value creation.
- *Rebalancing intellectual property rights.* The Digitisation Evaluation Committee recommends a broad, evidence-based reform of intellectual property rights. Norway should cooperate internationally on developing intel-

lectual property rights to make them more adaptable to changing technologies.

- *Consolidated digital cultural policy.* A prerequisite for successfully disseminating digital cultural content lies in understanding new market mechanisms. The Committee points out that subsidy schemes intended for content production may also entail cultural or business subsidies, and that this has caused stagnation and delayed rollout of new services.
- *Raising competence.* Competence is built over time, and is important for developing new services, incorporating new technology, and developing society. The level of competence in cyber security is low, and the Digitisation Evaluation Committee fears that this may constitute a threat to Norwegian values.
- *Data sharing.* The Digitisation Evaluation Committee believes that increased data sharing is important for digital value creation, and is an area the Government should more highly prioritise.

The report will be subject to public consultation and debate, and will provide an important platform for further policy development in this area.

papers, though requirements to charge consumers, to have an editor-in-chief, and to sell at least half their circulation via subscriptions will still apply. Proposals have also been made to change the criteria for subsidy allocations so that all publication platforms, including digital publications, are included.

VAT on digital goods and services

Until 1 July 2011, no VAT (value added tax) was charged on digital goods or services purchased abroad. This exemption distorted competition by compelling Norwegian suppliers to charge customers 25 per cent VAT, meaning that music files and software purchased from Norwegian online suppliers cost more than equivalent products purchased abroad. Regulations were needed to ensure Norwegian market players the fairest possible competitive environment, and from 1 July 2011, VAT was also imposed on digital services supplied online from abroad.

5.2.2 Copyright

The fact that digital products can be copied, shared, and distributed to a far greater extent than can analogue products is posing challenges for copyright law, because illegal copying and sharing of copyrighted material means that rightholders are losing revenues.

Copyright clearance

A major challenge for media content like music and films is copyright clearance for distribution, particularly across borders. Traditionally, the media industry has divided markets by region or country, and has sold viewing or distribution rights to different actors in different countries. Establishing transnational services is often difficult, and opportunities in Europe are often limited because of the number of small markets. Consumers, on the other hand, increasingly consider themselves part of a global market, and have diffi-

culty understanding why they cannot access content accessible elsewhere.

In working to create a digital single market, the EU has therefore given priority to collective schemes for clearing rights to audiovisual content,³ and in 2012, the European Commission presented a legislative proposal for a directive on collective management of copyright. The directive is expected to be important for the entire European music and audiovisual services market.

The EU will also present other directives and revisions to directives in areas of significance in this connection, including a new directive on orphan works, making it easier to digitise and make accessible millions of copyrighted works that currently are not accessible because of difficulties in obtaining clearance from rightholders. In Norway and the other Nordic countries, an extended collective licence system has made clearance easier than elsewhere.

Moreover, a large number of works exist that have fallen into the public domain because of the length of time since their originators died (usually 70 years). Such works are no longer protected by copyright and may therefore be reused for digitisation and commercial purposes.

³ European Commission (2011): *Green paper on the online distribution of audiovisual works in the European Union: Opportunities and challenges towards a digital single market*

Revision of the Copyright Act

Many find the Copyright Act and the principles of intellectual property rights complicated. The Ministry of Culture has therefore begun work on completely revising the Act to make it more universally comprehensible.

This work also involves scrutinising how to handle illegal file sharing and other copyright violations on the internet. A consultation paper was published in autumn 2011, and a white paper proposing amendments to the Copyright Act was presented to the Storting in February 2013.

5.2.3 The consumer perspective

Transition to the digital-media economy touches on a number of consumer policy issues. As we have seen, convergence offers more and better services, but people must be well informed of the possibilities and limitations to fully exploit its potential. For example, there may still be uncertainty about what is permitted concerning using music on the internet, so it is important to provide information and guidance on intellectual property rights and other regulations governing content.

The Government will therefore develop improved and more consumer-friendly guidance in this area, including consumer rights when shopping online, tools for secure e-commerce, legal mechanisms for downloading and using content, payment of VAT, and overviews of relevant suppliers of services.

Box 5.7 Initiatives

42. *Following up the Digitisation Evaluation Committee's report*

The Ministry of Government Administration, Reform and Church Affairs will follow up the Digitisation Evaluation Committee's report and recommendations in dialogue with other relevant ministries. The report was issued for public consultation in January 2013.

43. *Subsidy schemes for business and industry*

The Digitisation Evaluation Committee (see box 5.6) identified what subsidy schemes were available to market players seeking to create business activities based on digital content. The Ministry of Government Administration, Reform and Church Affairs will

consider the Committee's proposals and recommendations, in consultation with the Ministry of Trade and Industry.

44. *Revision of the Copyright Act*

The Ministry of Culture will undertake a full revision of the Copyright Act to make it easier for consumers to use copyrighted material legally, while simultaneously protecting rightholders' interests.

45. *Consumer guidance on digital content*

The Norwegian Consumer Council will expand its coverage of digital services on its portal, Forbrukerportalen. This work will include making long, complicated standard agreements more concise and easier to understand.

6 Health and care services

Few sectors mean so much to so many as the health and care sector. More than 75 per cent of all Norwegians are in contact with it every year, and one in four Norwegians seeks medical attention more than five times a year.¹ The Norwegian health sector has more than 300,000 employees,² and in 2011 around NOK 250 billion was spent on health and care.³ Despite its high levels of advanced medical technology and electronic communication, the health and care sector is less digitised than many others. Therefore, significant potential exists for changes that would have positive effects on the sector and its users, in turn creating opportunities for the private sector to supply products and solutions.

Online banking transferred control and decision making from banks to customers; the Government wants the health and care sector to develop similarly.

The Government's goals are that:

- ICT should help citizens gain more control of their own health and offer better opportunities to live safely at home with a high quality of life.
- ICT should be used to achieve high-quality and efficient health and care services.
- ICT should enable the elderly and others to live safely and independently at home, despite impaired health.

6.1 Welfare technology for good and independent living

Elderly citizens represent a growing proportion of the Norwegian population, and Norwegian and European surveys show that most want to live at

¹ Statistics Norway (2001): *Helse i Norge – Helsetilstand og behandlingstilbud belyst ved befolkningsundersøkelser* [Health in Norway: Status of health and available treatment, informed by a population survey], p. 126

² Statistics Norway (2012): *Sysselsatte personer og avtalte årsverk, i alt i helse- og sosialtjenester, etter utdanningsnivå* [Employees and agreed man-years, total for health and social services, by education level]. 2011, 4th quarter

³ Prop. 1 S (2012–2013) *Helse- og omsorgsdepartementet*, draft resolution from the Ministry of Health and Care Services

Box 6.1 Coordination Reform

Through the Coordination Reform, the Government wants to ensure a sustainable, integrated, and cohesive service that provides high levels of quality and patient safety and that is adapted to individual needs. Emphasis must be placed on health promotion and preventive healthcare, habilitation and rehabilitation, user involvement, agreed courses of treatment, and binding agreements between municipalities and hospitals.

Source: Nasjonal helse- og omsorgsplan [National Plan for Health and Healthcare] (2011–2015)

home as long as possible. Most elderly people prefer to live at home until no longer able to do so because of serious illness or reduced capacity. In Norway, for example, 50 per cent of people with dementia live at home, and only half of those receive home care services.⁴

New technology will enable people to live at home and remain self-sufficient and safe, despite illness or reduced capacity. In future, living at home could be a viable alternative to stays in institutions or hospitals.

Welfare technology also entails low-tech aids such as walking frames and toilet chairs, long used in the healthcare sector. In future, we will see increased use of ICT-based welfare technologies such as safety alarms, cooker guards, fall detectors, and different types of mobile health monitoring systems. Homes connected to such technologies are often referred to as *smart homes*.

Welfare technology will be an important focus of R&D and business and industry. Welfare tech-

⁴ Sigrid Aktrun, Lisbet Grut, Torhild Holthe, and Sidsel Bjørneby (2011): *Hvor trykker skoen? Hvordan kan hjelpemidler og velferdsteknologi være en del av en helhetlig omsorgstjeneste for personer med demens* [Where does the problem lie? How can assistive and welfare technology be part of an integrated care service for people with dementia?], pilot project, ALMAs hus

Box 6.2 Welfare technology

‘Welfare technology’ is technology that can help promote safety, security, social participation, mobility, and physical and cultural activities. Welfare technology enhances people’s ability to manage everyday life despite illness or impaired social, mental, or physical capacity. Welfare technology can also help family members and others contribute towards improving accessibility, use of resources, and the quality of services offered. Such solutions can often prevent the need for services or admission into institutions.

Source: NOU 2011: 11 *Innovasjon i omsorg* [Official Norwegian Report on innovation in the care services]

nology can help improve care service quality and efficiency and simultaneously offer users and their families greater safety, independence, and personal autonomy. In future, the demand by municipalities and users for welfare technology will increase, and experiences from Denmark show that welfare technology holds export potential.

Online services, mobile applications, mobile measuring devices, sensors, and smart home solutions will become standard offerings of health

and care services. Services and solutions like these will enable us to cope better on our own. They will enable patients and users to be active participants, gain access to information giving them deeper insight into their situation, and have more opportunities to cope with illness, problems, and physical impairment.

6.1.1 The users: An increasingly technology-literate group

Good healthcare services must be based primarily on health considerations. Public health initiatives must comply with current economic constraints but must also be adapted to users’ needs, wishes, and capabilities. The municipalities’ responsibility for public care services gives them a key role in this area. Fundamental reorganisation of the care services cannot be achieved by public sector roll-out of technology alone; it must result from user demand for and competence in using available technology.

More than half of today’s 70-year-olds have broadband access at home. In 2020, they will be aged around 80, and most will have broadband access at home and be familiar with the internet and digital solutions. Citizens – including the elderly – will increasingly demand round-the-clock access to good electronic services. They will expect good welfare technology solutions to be an integral part of public health services.

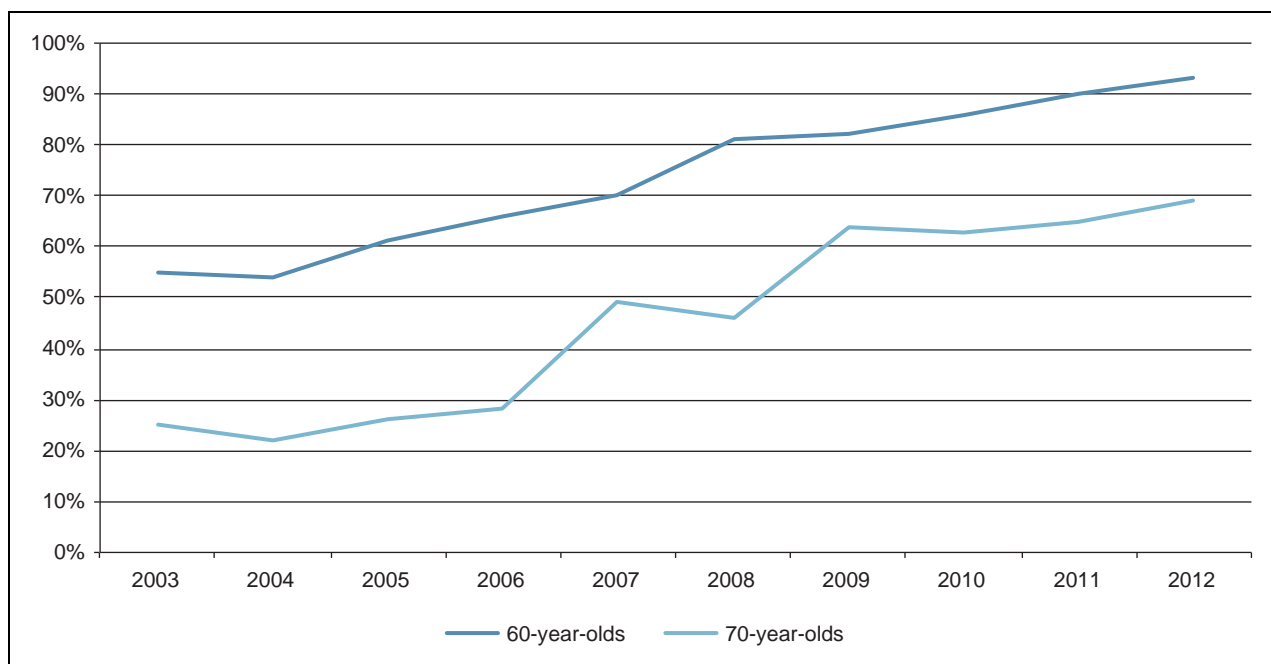


Figure 6.1 Summary of broadband usage by 60- and 70-year-olds

Source: Statistics Norway: ICT usage in households, 2003–2012, 2nd quarter

Healthcare policy can increasingly be premised on home-based technology and on an older generation familiar with using it.

Unlike 10–20 years ago, our homes now contain a high level of digital technology such as computers, telephones, cable TV, smartphones, tablets, burglar and fire alarms, and wireless internet. However, few applications in the health and care sector are designed for home use.

Norway's elderly already use the internet and broadband extensively and are more technology-literate than their foreign peers. The next generation of senior citizens will be even more familiar with new technology. Today, we see young people with reduced capacity using advanced forms of assistive technology. Gradually, the new generation of senior citizens will follow suit.

Through its policy for digital participation and competence (chapter 2), the Government wants to prepare as many as possible for using technology solutions. The Government will emphasize user needs in its welfare technology policy and will shape public policy to facilitate integration of welfare technologies from different suppliers and across the public and private sectors.

6.1.2 Technology: Diversity and standards

The technology needed in welfare services will range from the very basic to the highly complex, increasingly available as cheaper, standardised,

off-the-shelf solutions. For example, robotic vacuum cleaners now cost about as much as a few hours of home-help service.

The technologies needed for radical change based on welfare technology exist, and the conditions for change will improve as technology evolves. Nevertheless, products alone cannot shape good welfare technology solutions; flexible and standards-based ICT architecture is needed so that services and products work optimally. ICT architecture describes how a system is designed, the components used, and how they interact. In its 2012 report on welfare technology,⁵ the Directorate of Health mentions architecture as one of several areas needing standardisation.

Welfare technology solutions can consist of:

- Equipment such as motion sensors for turning on lights, door sensors, fall detectors, sensors that open and close windows and doors automatically, cooker guards, etc. Safety alarms or mobile sensors can also be used to measure, for example, blood pressure or blood sugar levels. In principle, many types of equipment and advanced medical measuring devices can be connected.
- Infrastructure for connecting and controlling different pieces of equipment. Today, infrastructure for smart homes is available based on

⁵ NOU 2011: 11 *Innovasjon i omsorg* [NOU 2011: 11, Official Norwegian Report on innovation in the care services]

Box 6.3 Hagen Committee

In the white paper *An Innovative and Sustainable Norway* (St.meld. nr. 7 (2008–2009)), the Government proposed creating a government committee to investigate innovative solutions to future health and care challenges. This committee, the Hagen Committee, submitted its report in 2011. An issue it highlighted was the potential in the care services to adopt available and develop new technology to enable more people to live at home longer. According to the report, much of the safety and access to health and care services currently provided by nursing homes can also be provided in people's homes using new technology.

In addition to welfare technology, the report mentions telemedicine as a means to improve services and users' circumstances by providing

treatment, supervision, nursing, and technical support for communication, administration, and management. According to the Committee, demand for good housing solutions, activities, and welfare technology from both private households and the municipal care sector will grow, and a large and financially resourceful generation of senior citizens will drive and shape this demand. This situation may create significant opportunities for economic development in this area.

The challenges related to an ageing population are being followed up in the EU through, for example, the European Innovation Partnership on Active and Healthy Ageing. The goal for this initiative is to increase the number of healthy life years by two by 2020.

Source: NOU 2011: 11 *Innovasjon i omsorg* [Official Norwegian Report on innovation in the care services]

open, international standards with which most major electronic equipment manufacturers comply.

- A central control unit to connect everything robustly and without need for specialist expertise or user maintenance. The control unit can hold information concerning building layout, sensor positioning (using, for example, a building information model (BIM); see chapter 7), critical target values for the user, and who to notify (family members, municipality, private service provider, emergency services, etc.) in different situations.
- Lines of communication to, for example, family members or the municipality, normally via a regular broadband connection.

It is important for users that equipment from different suppliers work together. In its report, the Directorate of Health stressed the need for standards to ensure that introduction of welfare technology be successful. Standards ensure that information from different devices is communicated and understood and that equipment from one

manufacturer can be replaced with another's so that users or the public sector is not dependent on specific equipment or software manufacturers.

Standardised information models are particularly important. The standardisation organisations CEN and ISO are cooperating to develop health information standards. Promotion of open, international models will ensure that users can choose equipment regardless of whether it is supplied by NAV, the municipalities, the special health services, or private suppliers. This will also create predictability for private actors looking to develop services and, in turn, benefit users by giving them greater choice.

One issue highlighted by the Hagen Committee (see box 6.3) was the need for a standardised communication platform for private homes to enable people to live at home longer. Eventually, it should be possible to connect such systems to a municipal or regional control centre for secure monitoring and communication. Based on the Hagen Committee's report, the Government will present a white paper to the Storting concerning innovation in the care services.

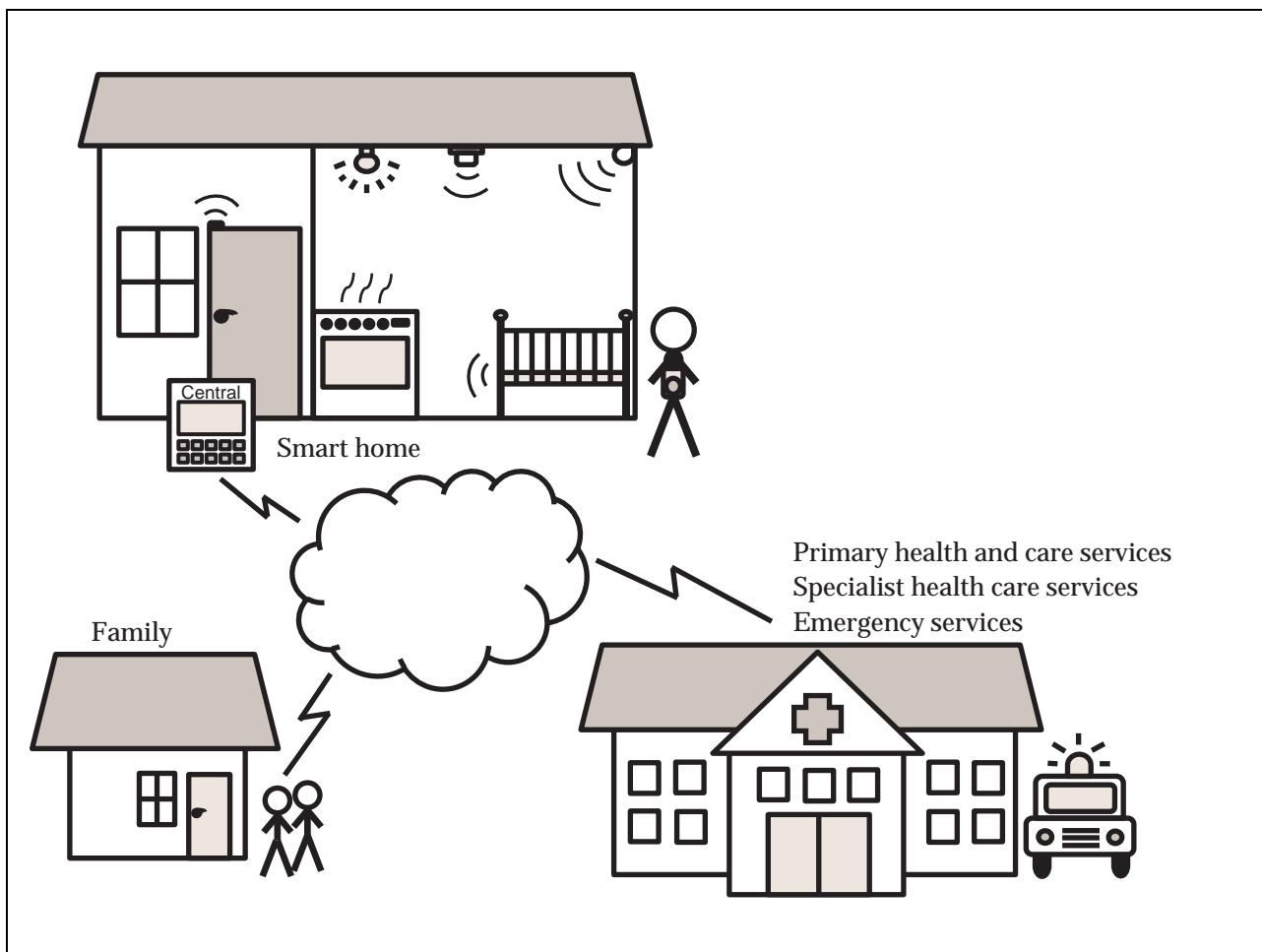


Figure 6.2 Smart home

The smart home concept is not only for private homes. The Government has set requirements, enforceable from 2012, for nursing homes and community care housing subsidised by Husbanken (Norwegian State Housing Bank) to facilitate connection of electronic aids, communication and alarm systems, and other welfare technology. Both nursing homes and community care housing facilities have some experience in using smart home technology. Similar experience from private homes is more limited, but smart home technology is expected to become increasingly relevant in housing development and building quality.⁶

6.1.3 The municipalities: New challenges, new possibilities

A survey shows that around 55 per cent of Norwegian municipalities have adopted welfare technology, most have implemented safety alarms, but few use more advanced types of welfare technology. Differences in technical design and interfaces may be one reason such systems are not more widely used. Uncertainty about data protection regulations may be another. Among the municipalities that have not yet adopted welfare technology, 26 per cent have expressed plans to do so.⁷

There is significant potential for adopting welfare technology in the municipalities. The Norwegian Association of Local and Regional Authorities (KS) has decided to set up KommIT, a programme for coordinating ICT in the municipal sector. KS/KommIT participates in SKATE, the Government's cooperation council for managing and coordinating services in eGovernment (SKATE; see box 8.3).

6.1.4 Business and industry: Innovation opportunities

Welfare technology is a future growth industry in which Norwegian business and industry can participate.

To succeed, even stronger innovation arenas should be developed, and communities with specialist knowledge and experiences must be brought together. KS and the Confederation of Norwegian Enterprise (NHO) have initiated a supplier

development project to encourage public procurement processes to stimulate innovation and value creation in this area.

Greater innovation in public procurement

The public sector can contribute towards stimulating innovation and economic development in welfare technology. The public sector covers more than 80 per cent of health costs in Norway. Through procurement of goods and services and public R&D contracts, the central and local governments have significant opportunities to demand innovation that contributes towards developing enterprises and industries.

The white paper *An Innovative and Sustainable Norway* (St.meld. nr. 7 (2008–2009)) and the white paper on sound procurement (St.meld. nr. 36 (2008–2009)) state that public procurement is an important means of promoting innovation in business and industry and that the Government wants to stimulate innovation in public procurement. This policy has since been followed up in other initiatives.

To achieve general, durable improvements in procurement practices, the Government has designed a strategy to increase innovation effects of public procurement.⁸ Designing public procurements such that they result in more innovative solutions may contribute to cost savings in the public sector. Goods and services will be improved and more efficiently supplied, better services will be provided to citizens, and value creation in business and industry will be enhanced.

The strategy will cover key challenges and propose measures for addressing them. Furthermore, it is important for business and industry to be engaged in meeting the public sector's development needs and that buyers have the necessary tools and competence. One of the goals is to stimulate competition by enabling more potential suppliers to compete in complex procurements.

Work on enhancing cooperation between the public sector and business and industry on procurements will involve several ministries, directorates, and key policymakers.

⁶ Meld. St. 28 (2011–2012) *Gode bygg for eit betre samfunn – Ein framtidretta bygningspolitikk*, white paper on sound buildings for a better society

⁷ Hoen, Hallvard, and Tangen, Une (2011): *Velferdsteknologiundersøkelse* [Welfare Technology Survey], KS Innovasjon og utvikling

⁸ Ministry of Trade and Industry; Ministry of Government Administration, Reform and Church Affairs; Ministry of Labour; Ministry of Health and Care Services; and Ministry of the Environment (2013): *Strategi for økt innovasjonseffekt av offentlige anskaffelser* [Strategy to Increase Innovation Effects of Public Procurement]

Need-based innovation and economic development in the health and care sector

In cooperation with the Ministry of Trade and Industry, the Ministry of Health and Care Services is undertaking a 10-year (2007–2017) initiative for need-based and research-based innovation and commercialisation in the health and care sector. This initiative includes innovation in ICT, medical equipment, and public procurement as well as innovation based on key societal challenges such as chronic disease, ageing populations, and improved coordination between service levels and use of personnel resources.

The health authorities, InnoMed, Innovation Norway, Research Council of Norway, and the Directorate of Health are the key actors in this initiative, and all have endorsed a national cooperation agreement and action plan. In 2011, the regional health authorities published a report proposing national indicators for innovation in the health sector. In 2012, in cooperation with Difi, Innovation Norway, and HINAS (the company responsible for coordinating public procurement on behalf of the Norwegian health authorities), the regional health authorities published a report on increased innovation and innovative solutions in the special health services through public procurements.

This initiative entails consolidating the scheme for public R&D contracts (OFU) related to health,

and encouraging establishment of arenas and meeting places between industry, the health sector, and policymakers.

Although the public sector accounts for most procurement in the health and care sector, we expect users and their families to become increasingly important user groups that will request technology such as tablet computers and digital measuring devices.

6.1.5 Safeguarding data protection

Certain types of welfare technology can challenge data protection because of more possibilities for gathering, storing, and exchanging sensitive medical data such as type of medication, movement patterns, or physiological functions. It is important that the technology contain good mechanisms for data protection in order to protect personal integrity and privacy, and that they comply with information security requirements for these types of data.

Data protection challenges in welfare technology were studied by the Directorate of Health in 2012.⁹

⁹ Directorate of Health (2012): *Velferdsteknologi - Fagrapport om implementering av velferdsteknologi i de kommunale helse- og omsorgstjenestene 2013–2030* [Welfare Technology: Report on implementing welfare technology in the municipal health and care services 2013–2030], (IS 1990)

Box 6.4 Initiatives

46. *Standards for welfare technology*

The Directorate of Health is responsible for ICT standardisation in the health and care sector, and will design a standardisation strategy considering the sector's short-term and long-term ICT needs, such as requirements for uniform terminology, coding systems, and reporting standards. In addition to welfare technology, the strategy will cover telemedicine, mobile systems, and sensor technology.

47. *Public procurements that drive innovation*

In cooperation with other ministries, the Ministry of Trade and Industry will follow up *Strategi for økt innovasjonseffekt ved offentlige*

anskaffelser [Strategy to Increase Innovation Effects of Public Procurement].

48. *Bill on notification and location technology*

The Ministry of Health and Care Services is preparing a bill concerning use of notification and location technology for people with dementia and others in need of care but incapable of consent.

49. *White paper on innovation in the care services*

The Ministry of Health and Care Services is preparing a white paper in response to the Hagen Committee's report, NOU 2011:11 *Innovasjon i omsorg* [Innovation in the Care Services], and plans to present it to the Storting in spring 2013.

6.2 Safe and simple digital health and care services

The Government has had a longstanding commitment to ICT in the health and care sector. In the Coordination Reform, ICT is a key tool for providing effective services throughout the patient pathway. The technology used should make all information accessible when needed, wherever the patient is located. ICT should promote better coordination, better resource utilisation, quality enhancement in all stages of the treatment chain, and increased patient safety. Moreover, digital tools should provide patients with better information. Patients should, wherever possible, actively participate in their treatment, something which innovative solutions in service provision are making increasingly possible. Such solutions can allow patients and users to receive services at home, so-called ‘telemedicine.’ Telemedicine offers solutions for providing medical treatment remotely, for example, when doctor and patient are in different locations. In its most basic form, it involves medical consultations via videoconference, but it can include using sensors to measure a patient’s vital signs. Telemedicine technology can then securely transmit medical data, images, and health details from patient to medical practitioner.

One example of technology that can reduce the number of hospital bed days is the COPD suitcase, an electronic device enabling two-way audio and video communication between patient and lung nurse. Another example is mobile X-ray units in nursing homes, reducing the need to move patients to hospital by instead bringing the service to the patient.

Another goal is to promote active patient participation through informing patients about their personal health and through exchanging information with special health services and municipal health and care services. Involving patients in their treatment and in preventive activities may also have a preventive effect.

6.2.1 Electronic prescriptions

Electronic prescriptions replace paper prescriptions. Instead of physicians handing prescriptions to their patients, they send the information to a central database, a prescription broker. Pharmacies or surgical appliance makers can then download them and dispense the correct medicine/appliance. Patients avoid having to handle paper prescriptions, and the system makes every-

day life easier, reduces costs, and improves service quality. Electronic prescriptions were finally implemented by all the country’s primary physicians and pharmacies in February 2013.

6.2.2 One patient – one record

To ensure best possible treatment, health professionals need fast, easy, and secure access to information, regardless of where the patient is located. Today, patients’ medical records are spread across different systems.

The Government believes that, to reap the benefits offered by information technology, simply improving existing systems is not enough, and wants to facilitate an integrated, common system for the entire health and care sector. The primary goal is one patient – one record. Work on finding a technical solution for this goal is underway. Establishing such a solution would represent a major boost to Norway’s health and care services and offer new opportunities. Both health care workers and suppliers will be involved in this work.

The Health Registries Act will be reviewed to enable medical records to follow patients and users throughout their course of treatment.

6.2.3 Core patient records

Health personnel sometimes need fast access to vital information about patients unable to provide it themselves. The Government will therefore establish a national system of core patient records containing key information such as medication (medication cards), allergies, diseases, and treatment history. The system will safeguard patient integrity and privacy, and information will be accessible only to health care workers who need such information to administer treatment and to the patients themselves. A system will also be established for logging everyone who accesses the records, enabling patients to see who has gained access. Patients will be given the option to decline registration.

6.2.4 Helsenorge.no

The internet has become the most important source of health information for patients and relatives, and many websites, published by both the private and the public sectors, offer information on diseases, prevention, and treatment. However, patients have difficulties finding and understanding the information they need, and more patients and users want access to their medical records.

The services provided by the health and care sector are fragmented, and patients' needs for coordinated services have not always been adequately met. The Coordination Reform is intended to address these challenges. Web-based services can give users better insight into their medical situation. Correct and quality-assured information on health and healthy living may prevent health problems. Software wizards will empower patients by providing assistance with finding information and making correct choices. Today, however, few patients have access to their medical records online.

In 2011, the Directorate of Health established the health portal www.helsenorge.no to provide all health information on one site. The portal also already contains self-service solutions such as 'My vaccines,' 'My user fees,' and 'My prescriptions' and will be complemented with others for making appointments, ordering and applying for reimbursements for patient transport, and renewing prescriptions. Another goal is that www.helsenorge.no should provide electronic communication with health personnel.

The [helsenorge.no](http://www.helsenorge.no) health information portal will help citizens and patients find the right service.

A well-developed health portal with quality-assured information will make searching for health and care services easier. It will also be easier to find services that best suit user needs; for example, where treatment is available closest to home or as soon as possible. These services are reliant on good data flow, basic data, data quality, capacity, etc.

The portal can also serve as a basis for new and innovative services from both the public and the private sectors. Making these services accessible for reuse via www.helsenorge.no will provide a platform for a new type of innovation in the health and care sector. Publishing a summary of useful services may be considered in future.

6.2.5 Norsk helsenett

Norsk helsenett (Norwegian Healthcare Network) was founded in 2004 to create a secure network for electronic coordination within the Norwegian health and care sector and associated services. The network should contribute to achieving the ICT goals stated in the Coordination Reform, and facilitate and drive secure and cost-effective electronic coordination.

Box 6.5 Initiatives

50. *White paper concerning digital services in the health and care sector*

In autumn 2012, the Ministry of Health and Care Services issued Report to the Storting No. 9 (2012–2013) *Én innbygger – én journal. Digitale tjenester i helse- og omsorgssektoren* [One Patient – One Record: Digital Services in the Health and Care Sector]. The white paper emphasizes ICT measures that can contribute to more efficient coordination, better resource utilisation, quality improvement, and – not least – increased patient safety. The Ministry of Health and Care Services will follow up the report. The key measure, a study of alternative systems for core patient records, has already been initiated.

51. *Health services online*

The Ministry of Health and Care Services will further expand the national health portal www.helsenorge.no with more content and new services. Part of this work will be to offer all citizens access to their core records.

52. *Further development of the Norwegian Healthcare Network*

The Government will further develop Norwegian Healthcare Network and intensify the company's work on data security, electronic message exchange, and operating and developing ICT infrastructure. The company will facilitate and drive secure and cost-effective electronic coordination between actors in the sector and assist in work on the one patient – one record initiative.

53. *Facilitating innovation*

The Ministry of Health and Care Services will enable private sector providers to develop services (such as mobile applications) based on information published on www.helsenorge.no.

54. *Improved data quality, and facilitating informed decisions*

The Ministry of Health and Care Services will continue to facilitate informed patient decision making by ensuring that information on quality levels, waiting times, descriptions of services, and contact details is quality-assured and more easily accessible online.

7 ICT and climate

Norway actively practises a national climate policy. The climate problem can be resolved only through coordinated international action, yet most concrete policies are determined nationally. Each country is responsible for pursuing active national policies to reduce greenhouse gas emissions, and in Norway this policy has broad political consensus. We have also set ambitious targets for reducing national emission levels and for transforming Norway into a low-emissions society by 2050.

Although global growth in the use of ICT will itself contribute to *increased* greenhouse gas emissions, it has potential to reduce them.

The Government wants to facilitate:

- Green ICT: reducing energy consumption and emissions created by production and use of ICT.
- Dematerialisation: replacing physical products and activities that emit high levels of greenhouse gases with digital alternatives that emit little or none, or that offer other benefits.
- Smart ICT: using ICT to reduce energy consumption, materials, and emissions in established industries such as transport and retail.

Initiatives exist in all three areas that can contribute to saving energy and/or reducing greenhouse gas emissions, as well as others that can have other positive effects, such as economic development and improved public service efficiency.

Potential reductions in greenhouse gas emissions through ICT

After considering the white paper *Norwegian Climate Policy* (Meld. St. 21 (2011–2012)), the Storting passed the following resolution: ‘The Storting asks that the Government assess the potential for reducing greenhouse gas emissions in Norway through the use of ICT.’

No specific initiatives for ICT were considered in the white paper, but ICT is used in all sectors. The Government’s current policy instruments and the new ones announced in the white paper on climate policy should contribute to adoption of

solutions to reduce greenhouse gas emissions, including ones involving use of ICT.

Use of ICT to reduce energy consumption, material consumption, and emissions in established industry sectors is referred to as ‘smart ICT.’

A particularly interesting aspect of smart ICT to consider is its potential to reduce greenhouse gas emissions in smart power grids and management and monitoring systems for energy supply; in buildings and management systems in buildings; and in transport and intelligent transport systems. These aspects are discussed in more detail in chapter 7.3.

The overall significance of green ICT will depend on individual situations. In some cases, for example, reduced energy consumption will mean lower energy prices and, consequently, increased demand, thereby making expected overall reductions slightly fewer than improvements per unit produced. In other cases, effects of real-time systems for public transport may depend on how well developed the overall public transport system is.

The potential to save energy and reduce greenhouse gas emissions using ICT must be seen in relation to other impacts of increased ICT usage. The use of ICT will have environmental impacts throughout the technology life cycle, some of which are presented here:

- Electric and electronic equipment contains hazardous substances such as heavy metals and organic pollutants that can cause environmental hazards during production and disposal and, to a lesser extent, during operation. Production of electronics is resource-intensive and reliant on, among other things, relatively rare metals. Mining these metals can produce large quantities of waste and chemical emissions.
- Operating electronics has little environmental impact, but does require electrical power.
- Because electronic equipment contains hazardous substances, it is important that scrapped products be processed in dedicated systems. Although such systems are regulated, it is difficult to ensure that all waste is collected and handled in approved waste management systems.

tems and to prevent scrapped ICT equipment from being illegally exported to countries where waste management conditions are hazardous to health and the environment.

Norway is covered by the EU emissions trading system. After the system is expanded in 2013, around 80 per cent of national emissions will be subject to emission allowances or liable to carbon tax. The allowances in the emissions trading system set caps on total emissions. In a well-functioning trading system, emission reductions in one activity will lead to a corresponding increase in emissions elsewhere in the system. Total emissions in the trading system can be reduced only by reducing the total allowance.

In areas subject to general policy instruments, such as the trading system, the general rule is to avoid further regulation. Simultaneously, the possibility to use other, additional policy instruments continues. For example, developing new technology in Norway can contribute to reducing emissions outside the trading system and to faster transition to more environmentally friendly technologies.¹

7.1 Green ICT: Reduced environmental impact from production and use of ICT

ICT accounts for almost 2 per cent of global man-made greenhouse gas emissions² and contributes significantly to emissions of hazardous substances. Because ICT is increasingly used in almost everything around us, ICT consumption will increase. Although ICT equipment is becoming increasingly energy-efficient, growth levels in production and use of ICT are expected to exceed compensation levels offered by today's efficiency improvements. To limit energy consumption from production and use of ICT, we could use more energy-efficient equipment and organise ICT use in more energy-efficient ways. This is the essence of green ICT. Green ICT is also about minimising the negative environmental impacts of manufacture, use, and waste management of ICT equipment.

The full life cycle of ICT equipment is highly significant for energy consumption, waste quantities, and combined use of resources. The overall environmental and climate impact throughout a product's life cycle must be considered when contemplating replacement. Impact will vary depending on how old equipment should be before replacement is viable. From an energy perspective, replacing relatively new equipment may be viable if recent technology developments have dramatically reduced energy consumption, as in the transition from plasma screens to LED.

First-generation environmentally friendly products are rarely optimal. Technology development and research are therefore important, even though first-generation products are not necessarily better than the best of those currently available.

Public procurement legislation stipulates that each procurement take into account life cycle costs and environmental impacts. Sound measurements and reliable standards for climate and environmental friendliness are crucial for helping buyers make informed purchasing decisions.

7.1.1 Green data centres and cloud services

Much of public and large private enterprises' energy costs are for operating local computers and server rooms. Exact figures are difficult to determine because ICT-related energy costs are usually incorporated in enterprises' total energy costs and rarely recorded separately in financial statements. An estimated 3 per cent of US energy consumption is used on data centres, and many Western countries operate with corresponding figures.

Data centres serve as warehouses for multiple computer servers. Their size varies from one room, basement, or hall to multi-storey facilities equivalent to 10 football pitches. *Green* data centres use far less energy and resources than others do by, for example, co-locating multiple data centres in one large facility to achieve synergies in power supply, broadband access, cooling, and more efficient reuse of surplus heat.

Transition to green data centres can reduce power consumption by 15–80 per cent, depending on how energy-efficient a data centre is initially and the extent to which so-called 'virtual servers' (see box 7.1) and cloud computing are used.

Cloud computing has grown dramatically in recent years and is expected to continue to do so, primarily as a means to cut costs (see chapter 4.4). Increased use of cloud services will create a

¹ Meld. St. 21 (2011–2012) *Norwegian Climate Policy*, white paper from the Ministry of Environment

² Giulio Boccaletti, Markus Löffler, and Jeremy M. Oppenheim (2008): *How IT can cut carbon emissions*, McKinsey Quarterly

Box 7.1 Virtualisation

A server is a computer that performs services for other computers in the same network. With server virtualisation, a server that is seen and perceived as one server no longer has to be a physical server; for example, 50 interconnected servers can be perceived by users as 200 servers. Software then enables resources to be used far more effectively.

In cloud data centres, such as Amazon S3 or Microsoft's Azure, data storage and processing resources are distributed across virtual servers in enormous data centres. As well as optimal resource utilisation, solutions are more secure and stable because they are mirrored in multiple geographical locations, and operating and security costs are shared by many customers.

Box 7.2 Innovation Norway in San Francisco

Innovation Norway's San Francisco office promotes Norway as a potential host country for environmentally friendly data centres for ICT companies on the US West Coast. In close cooperation with its regional offices in Norway, Innovation Norway's San Francisco office liaises between American companies and Norwegian specialist communities.

Providing quality-assured information to potential investors is another key task. Offers are legally binding, and preparing estimates and making long-term commitments on energy prices and data provision can be complex. It is therefore important to ensure that interested parties be quickly provided with relevant information so as to build trust between foreign investors and Norwegian data centre stakeholders.

need for more data centres. How enterprises use cloud services depends on the data types to be handled; for example, legislation stipulates how and where personal data may be processed.

Because energy represents such a large portion of data centre costs, enterprises will be highly motivated to find energy-efficient solutions. Significant overlap exists between the political desire for greener ICT and industry's desire to cut costs. Development of the market for green data centres will continue, though it is too soon to say which solutions will eventually prove most competitive.

With its cold climate, strong ICT specialist community, and abundant supply of clean energy, Norway is well placed to host large-scale green data centres. The Government has financed pre-feasibility and reconnaissance studies for such data centres, and has supported several projects via the normal policy instrument system. The Government also actively promotes Norway internationally as a potential host country for green data centres, and Norway has participated in international initiatives for standardisation and facilitation.

In 2010, CERN, the European Organisation for Nuclear Research, considered establishing a green data centre outside Switzerland, and Norway was a candidate. Several ministers held meetings with potential Norwegian suppliers. On behalf of the Norwegian Government, the Ministry of Government Administration, Reform and

Church Affairs held meetings with CERN's management to promote Norway's candidature. In spring 2012, CERN selected Hungary to host its new data centre.

Invest in Norway

To ensure proper processing, effective resource utilisation, and knowledge acquisition and reuse, the Government wants to facilitate a better-organised and more integrated system for managing enquiries from foreign companies considering Norway as a business location. International actors often want to establish relations with public authorities, to be made to feel welcome, and to receive support. To coordinate processing of foreign companies' applications is also more cost-effective than processing them individually, particularly in terms of building networks and competence. The Government has therefore decided to establish Invest in Norway, a professional and robust agency in the public policy instrument system for processing investment enquiries. Invest in Norway should also contribute to faster, more streamlined processing of foreign enquiries regarding establishing green data centres in Norway.

Invest in Norway will serve as a contact point and coordinator, facilitating dialogue between international companies considering investing in Norway and Norwegian authorities and policy



Figure 7.1 Destination Norway. Used by Innovation Norway for promoting Norway in connection with data centres

implementing agencies. Invest in Norway will evaluate potential investments, inform interested parties about framework conditions and support schemes, and forward enquiries to public authorities and relevant local and national actors. Knowledge must be developed and updated on how best to handle such enquiries and on information about areas in which Norway has specialist competence or other competitive advantages.

Innovation Norway has established Invest in Norway in cooperation with SIVA (Industrial Development Corporation of Norway) and the Research Council of Norway. In addition to coordinating with the Norwegian system of innovation policy instruments, Invest in Norway will coope-

rate with corresponding networks abroad. Invest in Norway will have a website containing relevant information about Norwegian business and industry, framework conditions, business opportunities, and contact points. Embedded in the system of innovation policy instruments, Invest in Norway is positioned to offer unique competence, networks, and a broad spectrum of services.

Innovation Norway's international offices will closely cooperate with Norwegian foreign service missions, especially in countries where it currently lacks representation, to assist Norwegian businesses with internationalisation and to handle enquiries about potential investment in Norway.

Box 7.3 Initiatives

55. *Public procurement and green ICT*

Through Difi, the Ministry of the Environment and the Ministry of Government Administration, Reform and Church Affairs will develop procurement guidelines for green ICT,¹ in line with *the environmental policy for public procurements*.²

56. *Official ecolabels*

The Ministry of Children, Equality and Social Inclusion allocates funding to two official eco-labels: the Nordic Swan ecolabel and the EU Ecolabel. The Nordic Swan ecolabel sets labelling criteria for computers, photoco-

piers, printers, audiovisual devices, and toner cartridges, etc. The EU Ecolabel sets criteria for personal and portable computers and televisions.

57. *Coordinating national initiatives on green data centres*

In cooperation with the Ministry of Trade and Industry, the Ministry of Local Government and Regional Development, and the Ministry of Oil and Energy, the Ministry of Government Administration, Reform and Church Affairs will consider initiatives for developing green data centres in Norway.

¹ See Difi's website pages on procurement and environment: www.anskaffelser.no/tema/miljo

² St.meld. 34 (2006–2007) *Norwegian Climate Policy, white paper from the Ministry of the Environment*

7.2 Dematerialisation: From physical products to digital alternatives

Dematerialisation is about replacing physical products and activities that emit high levels of greenhouse gases with digital alternatives that emit little or none.³

Typical examples of dematerialisation are music files or films in digital formats instead of physical CDs or DVDs, or documents in digital formats transmitted electronically instead of paper documents distributed by letter post or courier. Dematerialisation is also about using ICT to create new services that use resources optimally. For example, ICT has enabled simple digital mobile phones to perform the same functions as analogue devices such as music players, radios, and cameras – in addition to those of a regular phone.

Dematerialisation holds significant potential in many areas of society, and public agencies can contribute towards this in several ways, such as facilitating digital self-service solutions. In the health and care sector, technologies such as telemedicine, electronic prescriptions, and digital medical consultations can reduce the need to move patients and thereby have significant effects in areas far from hospitals or doctor's surgeries. The government requirement for electronic invoicing enforced from July 2012 will reduce the volumes of paper invoices and physical transport.

³ The Climate Group on behalf of the Global eSustainability Initiative (GeSI) (2008): *SMART 2020: Enabling the low carbon economy in the information age*

Through its eGovernment Programme from April 2012, the Government established the principle that digital communication should be the general rule for all communication between citizens and the public sector. This entails, for example, digital tax cards and digital invoices, digital letters and forms from agencies such as NAV, the Norwegian State Educational Loan Fund, and the Norwegian Public Roads Administration, and various online self-service solutions. Digital solutions are intended to facilitate easier, more effective communication with public sector agencies, to improve public sector efficiency, and to have positive climate effects. In a 2012 economic survey, Oslo Economics estimated that the public sector (state and local authorities) annually issues around 125 million letters and that public agencies and health authorities receive around 4.5 million invoices.⁴

Transport volumes could also be reduced by using ICT for teleconferencing, videoconferencing, web meetings, etc. These strategies are specified in most environmental management systems, are used by many private and public enterprises, and must be used by all public agencies.

⁴ Direktoratet for forvaltning og IKT (2012): *Sikker digital post fra det offentlige – Vurdering av alternativer for realisering av sikker digital postboks i offentlig sektor* [Secure digital post from the public sector: Assessment of alternatives to realising a secure digital mailbox in the public sector]. Difi rapport 2012:10, Vedlegg 2; Fornynings-, administrasjons- og kirke departementet (2011): *Samfunnsøkonomisk analyse av å innføre elektronisk faktura (e-faktura) i staten* [Economic analysis of implementing electronic invoicing (e-invoice) in the public sector]

Despite such tools, transport levels in Norway and worldwide have not decreased. However, ICT solutions have probably helped reduce *growth* in transportation needs, though by how much is difficult to calculate. ICT tools can also be assumed to increase communication, not just reduce travel activities. New needs and new ways of working have been created, and new policy instruments may be necessary to reduce emissions caused by business travel and to learn how to reduce travel activities overall.

Box 7.4 Initiatives

58. *From physical products to digital alternatives*

Transition from physical products to digital alternatives holds significant potential in many areas in society. The Government will contribute to dematerialisation through:

- The eGovernment Programme, the primary objective of which is digitisation of documents, invoices, and public services.
- Facilitating development and increased use of digital content in the form of text, images, film, audio, and combinations thereof.
- Digitisation in business and industry, such as electronic reporting and new digital services.

7.3 Smart ICT: ICT as a tool for improving the environment

As this white paper shows, ICT has many applications. Nonetheless, the term *smart ICT* describes only ICT uses for reducing energy consumption, material usage, and emissions in established business sectors. This can apply to areas such as transport, retail, and traditional industrial sectors. Smart ICT covers everything from logistics systems for reducing transport needs to component analysis systems for finding the most energy-efficient building solutions. The Climate Group report, *Smart 2020*, shows that using ICT across sectors could reduce global greenhouse gas emissions by 15 per cent by 2020.⁵ Such reductions are contingent on public authorities taking active roles as stakeholders in and facilitators of ICT in society. The Climate Group has prepared a summary of sectors where ICT can help reduce greenhouse gas emissions.

7.3.1 Smart grids

Smart grids are electrical infrastructures designed and operated to achieve more effective power systems based on ICT and on market-based solutions.

- Smart grids can increase security of supply in areas affected by capacity constraints. Grid com-

⁵ The Climate Group on behalf of the Global eSustainability Initiative (GeSI) (2008): *SMART 2020: Enabling the low carbon economy in the information age*

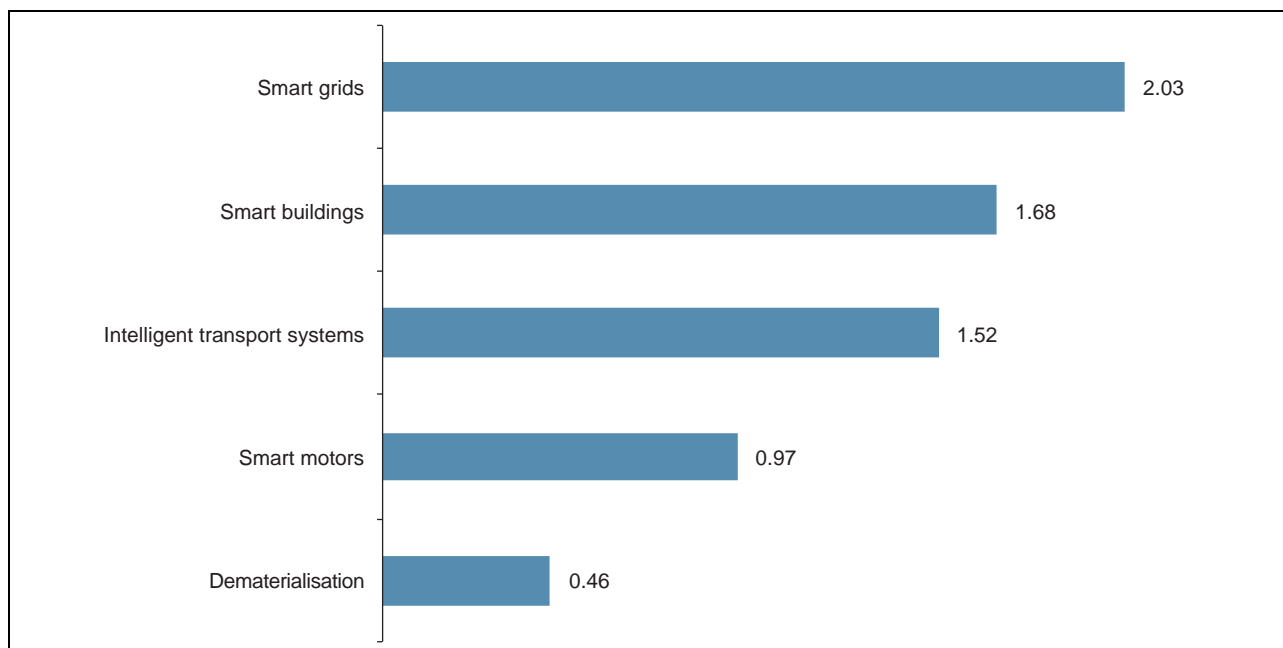


Figure 7.2 Global reductions of greenhouse gas emissions due to smart ICT (gigatonnes CO2 equivalents)

Source: The Climate Group on behalf of the Global eSustainability Initiative (GeSI) (2008) – *SMART 2020: Enabling the low carbon economy in the information age*

panies have better possibilities to manage power consumption in periods when power systems are under pressure, such as grid outages, production interruptions, or demand peaks.

- Smart grids can facilitate integration of additional power from variable renewable energy sources such as solar, wind, and small-scale hydropower.
- Electric and hybrid vehicles can be made more user-friendly through smart methods of fast charging. Large-scale rollout of electric and hybrid vehicles may challenge today's electricity systems. Smart grids can address these challenges and also enable consumers to use their electric cars as power back-up supplies. Some countries, such as Denmark, are conducting trials using car fleets for temporary storage of electricity.

Today's grid designs and systems must be developed to meet future needs in terms of technical solutions and functionality, and R&D in grid design and system solutions is crucial for success. The Government's commitment to R&D and competence-building in smart grids has mainly been addressed by the Research Council of Norway's RENERGI programme (Clean Energy for the Future). The programme, which has run for almost 10 years, will end in 2013 and will be followed by ENERGIX, a new large-scale energy research programme. This programme, which will run for 10 years and has much the same research focus as its predecessor, will develop technology for smarter and more robust transmission and distribution systems.

7.3.2 Energy management and monitoring

In future, use of advanced energy systems in homes will likely become widespread. More people will produce and store their own energy using technology such as solar collectors, heat pumps, and windmills. Returning surplus energy to power grids will also become more widespread. Smart thermostats, sensors, and energy management systems with basic user interfaces, such as mobile phone applications, will make energy management and energy saving easier for average consumers.

In future, use of advanced metering systems (AMS) in the energy sector will increase, and all Norwegian energy customers will have AMS installed by 1 January 2019. Unlike conventional meters, which customers must read and then report power consumption themselves, AMS

registers electricity consumption hourly and automatically transmits consumption data to the grid companies. AMS will also offer customers more detailed information about their energy consumption. AMS provides grid companies with information vital for managing and designing networks, and can also ease the administrative burdens of metering, charging, and invoicing.

Several standards are now in place because of EU standardisation efforts, and these standards can be used in Norway. Because AMS is based on open standards, it is easier to integrate third-party solutions with the grid companies' own. Such third-party solutions can, for example, manage heat pumps, using energy data from power companies, and combine different energy carriers such as electricity, solar energy, or district heating in the best possible way.⁶

Frequent meter reading and data storage may challenge data protection. Detailed statements of electricity consumption can say much about customers' consumption patterns, so it is important that such data be securely transmitted and stored. Data must also be processed in compliance with the agreed purpose and not stored longer than the specified storage time or disclosed to a third party without customer consent.

Consumers own the data concerning their personal electricity consumption, and may share them with selected providers of add-on services that use AMS data to, for example, provide real-time information and statistics on electricity consumption, or that use automated energy management systems based on parameters such as time, usage, temperature, etc.⁷

7.3.3 Smart buildings

Building management accounts for almost 40 per cent of mainland Norway's total energy consumption,⁸ 78 per cent of which constitutes electricity, 9 per cent oil and gas, around 3 per cent district heating, and around 10 per cent bioenergy.

The term 'smart building' is often used in connection with planning and constructing new buildings where construction processes and subsequent maintenance and management are particularly resource-efficient. A goal for smart buildings is

⁶ European Commission (2010): *EU Commission Task Force for Smart Grids Expert Group 1: Functionalities of smart grids and smart meters. Final Deliverable*

⁷ Devoteam daVinci and Thema Consulting Group (2011): *AMS-Tilleggstjenester. Tredjepartsadgang* [AMS add-on services: Third-party access], prepared for NVE

⁸ Figures from Statistics Norway and NVE

that they should use less energy throughout the life cycle than conventional buildings do.

To achieve maximum resource savings, digital tools are necessary throughout the planning and construction processes, from programming and drawing to completed building. Building information modelling (BIM) is based on open, international standards for data storage, terminology, and descriptions of business processes. BIM can make construction processes more efficient, automate building application processes, and facilitate smart application of ICT. When all elements in a building are described using BIM, models can be used to estimate greenhouse gas emissions in connection with choice of materials, floor plans, heating systems, and other elements affecting a building's total emissions. Buildings can thereby be made as environmentally friendly as possible.

The Government has proposed developing a strategy for establishing ByggNett,⁹ which can also form the basis for a register for documenting and storing information on building projects. Such a register could provide construction clients and other actors with easy access to technical data, as well as a basis for making rational decisions regarding management, operation, and maintenance of buildings. In addition to building documentation, a strategy for ByggNett could include facilitating full electronic case processing and integration of BIM.

Through the large public construction clients, Statsbygg and Forsvarsbygg, the state could be a significant driving force behind development of so-called 'sustainable buildings.' Sustainability is determined by both environmental impacts and social and economic aspects of a building's entire life cycle.¹⁰ Part of this work has involved developing an integrated method of calculating greenhouse gas emissions from buildings. In March 2011, Statsbygg launched version 3 of klimagassregnskap.no, a free, web-based model based on BIM standards. Further development is planned to enable even closer integration with models for building information.¹¹ Klimagassregnskap.no con-

tains the following modules: materials, transport, management, and outdoor areas.

Since 2010, Statsbygg has required all new building projects exceeding the EEA thresholds to be implemented using BIM. As of 1 July 2012, the threshold for building and construction projects is NOK 40 million.

Smart management systems in buildings

Smart management systems in buildings are systems whereby ICT is built into buildings' structures so as to monitor and manage buildings as effectively as possible. Examples of such systems are ventilation, heat recycling, heat pumps, alarm systems, telephony, and energy management, including management of own energy production. ICT systems for regulating, managing, and monitoring are key tools for reducing buildings' energy consumption. These systems will work with improved building standards and BIM. The management systems can also be connected to so-called 'smart home solutions' for welfare technology (see chapter 6.1) and used by advance metering systems (AMS) for energy consumption.

Automation of energy consumption using a building management system will reduce energy consumption. On the other hand, it has been shown that buildings whose technical equipment is managed by advanced control systems may use more energy than older buildings with less technical equipment, though their indoor climate is better. An often important parameter for energy consumption in commercial buildings is the human factor, that is, having a technician or caretaker who actively and regularly monitors and calibrates energy consumption.

Climate Cure 2020 studied need-based management of lighting, heating, and related automation beyond current standards for rehabilitation and new building projects for housing and commercial buildings. For housing, the report identified a potential of around 700 GWh for rehabilitation projects and around 200 GWh for new housing. The potential for rehabilitated commercial buildings was around 250 GWh and for new commercial buildings less than 100 GWh. This potential was calculated using empirical data on measures implemented in the respective building categories.

New and creative systems for producing own energy are continually being developed. For example, research is ongoing on systems that can use energy from compressed air produced when someone walks or drives over a surface. This type of energy, for example, can be used for lighting in

⁹ Meld. St. 28 (2011–2012) *Gode bygg for eit betre samfunn*, white paper on sound buildings for a better society

¹⁰ Standards Norway (2011): *NS-EN 15643-2:2011 Bærekraftige byggverk – Vurderinger av bygninger i et bærekraftsperspektiv* [Sustainability of construction works: Assessment of buildings]

¹¹ Statsbygg (2011): *Klimagassregnskap.no/Versjon 3 – En modell for livsløpsberegning av klimagassutlipp fra bygg* [Klimagassregnskap.no: A model for calculating life-cycle greenhouse gas emissions for buildings. Version 3]

areas or buildings with high traffic volumes, such as hospitals. Open, international standards will ensure that future solutions can also be integrated with today's management systems.

7.3.4 Intelligent transport systems

The transport sector accounts for one fifth of Norway's total greenhouse gas emissions and around half of Oslo's. Many countries have introduced so-called 'intelligent transport systems' (ITS) to regulate traffic and to reduce environmental impacts;¹² some examples of ITS for road, air, and sea transport are presented in other sections of this white paper.

ITS entails systems and services using ICT to create more effective, flexible, secure, and environmentally friendly utilisation of transport infrastructure.¹³ ITS is included in the Government's efforts to reach the objectives in the National Transport Plan for traffic mobility, traffic safety, environment, and accessibility.

The EU has estimated that ITS can help reduce journey times by 20 per cent, increase road network capacity by 5–10 per cent, and significantly reduce environmental impacts.¹⁴ Development of ITS sets increasingly higher requirements for standardisation and adaptation between countries. In 2010, therefore, the EU adopted its own ITS directive, which was incorporated into the EEA Agreement in 2011.

In Norway, road, rail, sea, and air transport agencies have actively focused on ITS for many years. For example, ARKTRANS, a framework for developing ITS for different means of transport, has been established to ensure coordination.

The Government wants to stimulate transport innovation through close cooperation between the state and business and industry. A key initiative is to make the transport agencies' data accessible to external actors.

Box 7.5 Smarter road traffic with ITS (SMITS)

Smarter Road Traffic with ITS (SMITS) is an R&D programme run by the Norwegian Public Roads Administration from 2012 to 2017. The programme examines how ITS can contribute to the Norwegian Public Roads Administration's goals for traffic mobility, the environment, universal accessibility, and traffic safety. The programme will also serve to drive national research activities on ITS.

Source: More information at: Norwegian Public Roads Administration, www.vegvesen.no/Fag/Fokusomrader/Forskning+og+utvikling/Smartere+vegtrafikk+med+ITS

Intelligent transport systems: Road and rail

Public transport must have good traffic mobility in urban areas to compete with private cars. Initiatives to achieve this include active signal prioritisation (i.e., giving public transport the green light as much as possible at traffic light junctions) and systems for combining passenger car and train transport, such as intelligent 'park and ride' solutions.

For commercial transport, systems for real-time information on journey times and road conditions, and automatic notification of traffic congestion and unforeseen incidents can make for faster and more predictable transport. Combined with systems for selecting the best route, such data can make driving and distribution routes more effective and thereby increase payload efficiency and reduce empty running and waiting time. Overall, these initiatives will contribute to more environmentally friendly driving behaviour. ITS solutions are used in goods transport to, among other things, track and monitor the location of goods.

ITS can also be used to enhance security in society; for example, sensors can monitor the condition of vital infrastructure, and systems can automatically detect faults and assess fault frequencies and degree of severity.

Intelligent transport systems: Air

In the aviation industry, the greatest climate benefits are derived from replacing old aircraft with new and from implementing measures on-board aircraft themselves;¹⁵ however, much potential for emission reductions also lies in aircraft flight ope-

¹² Statens vegvesen (2007): *ITS-Strategi for Statens vegvesen – Måltrettet, troverdig og effektiv bruk av ITS – på veg for et bedre samfunn* [ITS Strategy for the Norwegian Public Roads Administration. Targeted, reliable, and effective use of ITS: Towards a better society], rapport 7/2007

¹³ Avinor, Jernbaneverket, Kystverket, Statens vegvesen (2012): *Forslag til nasjonal transportplan 2014–2023* [Proposed National Transport Plan 2014–2023]

¹⁴ European Commission (2001): *WHITE PAPER European transport policy for 2010: Time to decide*

rations. ITS can facilitate new technology, revision of inward and outward flight procedures, and reorganisation of airspace so that planes take a more direct route in the landing pattern and on final approach. This method reduces circling and traffic congestion, and thus fuel consumption.

A project has already been initiated in Eastern Norway to increase the number of continuous landings and take-offs. Allocating take-off and landing slots will reduce waiting time during peak periods, both on the ground and in the air, and thereby reduce greenhouse gas emissions. The project will also further develop airspace management over Eastern Norway using modern satellite-based navigation technology.

Norway participates in the *Single European Sky* initiative, one objective of which is to reduce average flight times by 8–14 minutes by 2020 and thereby reduce CO₂ emissions by 1–1.5 tonnes. The EU expects this initiative to reduce the environmental impact of European aviation by 10 per cent.

Intelligent transport systems: Sea

An area where ITS can produce significant benefits is ship traffic management in, for example, ports.

Traffic management can prevent unnecessary port time, waiting time, and empty running, and can significantly contribute to reducing fuel consumption and ship traffic emissions. This is particularly important in a country like Norway, which has high levels of shipping and ship-based transport activities.

Intelligent transport systems and data protection

Similar to the advanced metering systems (AMS) in power grids, ITS has the potential to gather considerable volumes of personal data. Such information can be highly sensitive when systems store data on where individuals are located at any given time. This particularly applies to private individuals using road traffic and public transport systems. Fleet management systems, electronic ticket systems, toll booths, and automatic speed control devices are examples of systems that register where individuals are located.

It is important that gathering and processing data for ITS purposes always be balanced against potential violation of travellers' privacy. The National Transport Plan for 2010–2019 states that all new initiatives must undergo a privacy impact assessment (PIA).

¹⁵ Avinor (2011): *Bærekraftig og samfunnsnyttig luftfart* [Sustainable and Socially Beneficial Aviation], Rapport 2

Box 7.6 Initiatives

59. *Smart grids*

By 1 January 2019, all Norwegian end-users will be provided with advanced metering systems (AMS). The Norwegian Water Resources and Energy Directorate (NVE) is the supervising authority. AMS will have a standardised interface that facilitates communication with external devices based on open standards.

60. *Use of BIM in public procurement*

Statsbygg will set documentation requirements for greenhouse gas emissions calculations for all new building projects, in accordance with Statsbygg's environmental strategy and goals for 2011–2014. Today, the government programmes *Fremtidens byer* [Cities of the Future] and *FutureBuilt* set requirements for calculating greenhouse gas emissions using the calculation tool klima-

gassregnskap.no for pilot and showcase projects.

61. *Strategy for establishing ByggNett*

In cooperation with the Ministry of Government Administration, Reform and Church Affairs, the Ministry of Trade and Industry, and the Ministry of the Environment, the Ministry of Local Government and Regional Development will develop a strategy for establishing ByggNett.

62. *Further development of www.klimagassregnskap.no*

Statsbygg will continue developing the calculation tool klima-gassregnskap.no to achieve, among other things, closer integration with BIM.

63. *Following up initiatives in the ITS strategy*

The Ministry of Transport and Communications will follow up the ITS strategy.¹

¹ Samferdselsdepartementet (2010): *Strategi – Intelligente transportsystemer* [Strategy: Intelligent transport systems]

8 Digitisation in the public sector

Many Norwegian public sector agencies and services are already digitised, and Norway is well underway with providing digital services to businesses. Nonetheless, much remains to be done; a considerable amount of written communication between citizens and the public sector is still conducted on paper, and those who would like to correspond digitally must specifically request to do so. A survey by the Agency for Public Management and eGovernment in 2011 shows that only around 30 per cent of the 100 most used public sector services are fully digitised.

Digitisation programme: Digitising Public Sector Services

Through its eGovernment Programme presented in April 2012, the Government wants to speed up the pace of public sector digitisation. In future, digital communication will be the standard; correspondence regarding applications, invoices, appoint-

ment requests, decisions, and various types of reports will be conducted digitally, thereby enhancing accessibility to services and efficiency in the public sector.

In its eGovernment Programme, the Government set the following objectives:

- The public sector will, as far as possible, be accessible online.
- Web-based services will be the standard means of communication between the public sector and citizens, organisations, and businesses.
- A digital public sector will provide better services.
- Digitisation of the public sector will free up resources needed elsewhere.

The Government's ambition is for Norway to be at the forefront internationally in developing a digital public sector.

Digitisation of public sector services can help make citizens' contact with the public sector a

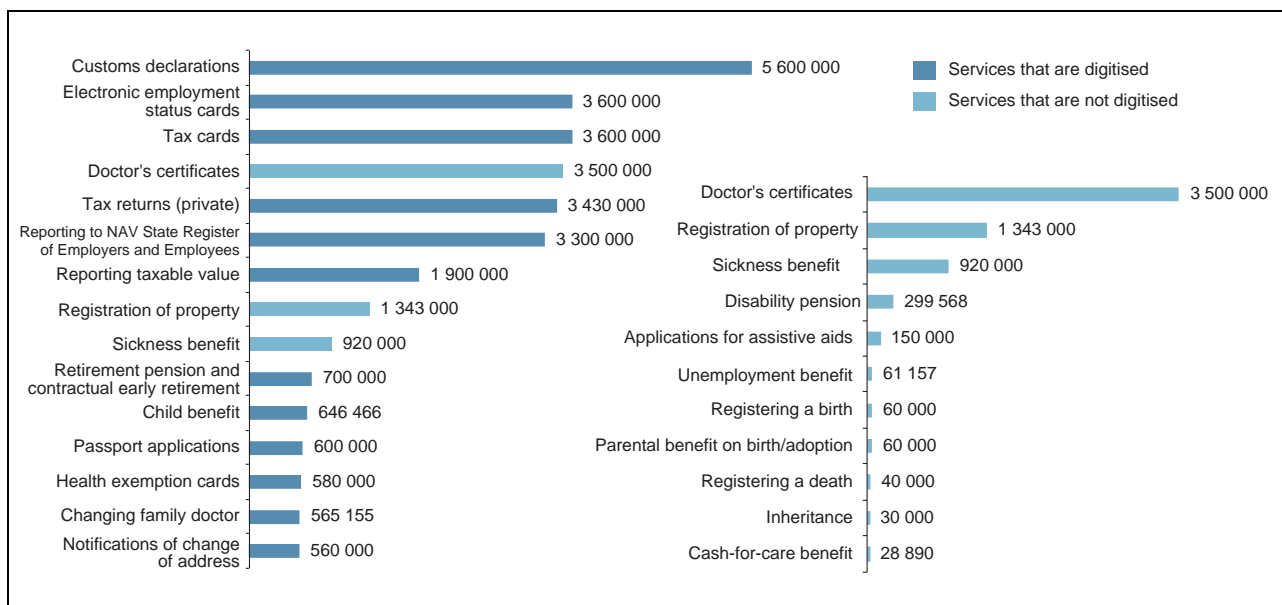


Figure 8.1 The 15 public sector services with greatest annual volumes (except health and care services) and the 11 largest services that are not yet digitised

Source: Difi Rapport 2011:2 – *Digitalt førstevalg – status for elektroniske tjenester i staten med Vedlegg 1 – Tjenestematrix* [Digital by default: Status of electronic services in the public sector, with Annex 1: Services matrix]. The health and care services and municipal services are generally excluded.

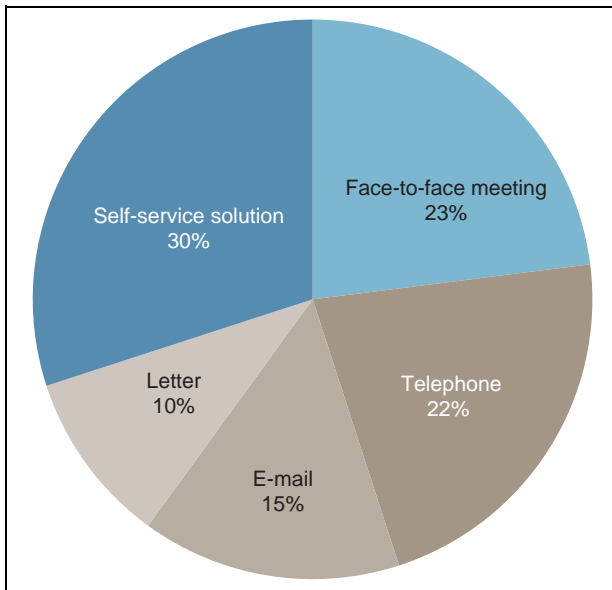


Figure 8.2 Contact with the public sector, by channel of communication

Source: *IT i praksis* [IT in practice]

positive experience. Digitisation will make it easier and quicker for users to deal with the public sector. It will make it easier to coordinate information and deliver unified services; for example, users will no longer have to register the same information repeatedly. Digital services will be available round the clock, and users can access them via their mobile phones or computers at home. Moreover, users will experience faster response times.

Digitisation can lead to a better and more efficient public sector. Increased user accessibility and good digital services will contribute to improvement in the quality of information received. Digitisation will also make it possible to automate processes previously handled manually and thus save time for both the public sector and users.

The public sector is being digitised to provide users with good services and because we want to use public resources effectively. But the public sector is also important for Norway's ICT industry, accounting for more than one third of the total demand for ICT services. It is therefore vital that public agencies be competent customers who contribute to the industry's continued development.

The eGovernment Programme adopts a long-term perspective and will provide the basis for the Government's future work on digitising the public sector. The programme shows how digitisation will be implemented in the respective areas within the public sector. Digitisation will result in improved services for Norway's citizens (see chapter 8.1). Realisation of a digital public sector is contingent on certain premises, such as a common digital infrastructure with technical systems that can be used by the entire public sector (see chapter 8.2). Cross-sector and cross-agency management and organisation of ICT must be improved (chapter 8.3). Laws and regulations must be adapted to facilitate and support digital communication (see chapter 8.4). A fundamental premise for digitisation is that security, robustness, and data protection be safeguarded (see chapter 10.3).

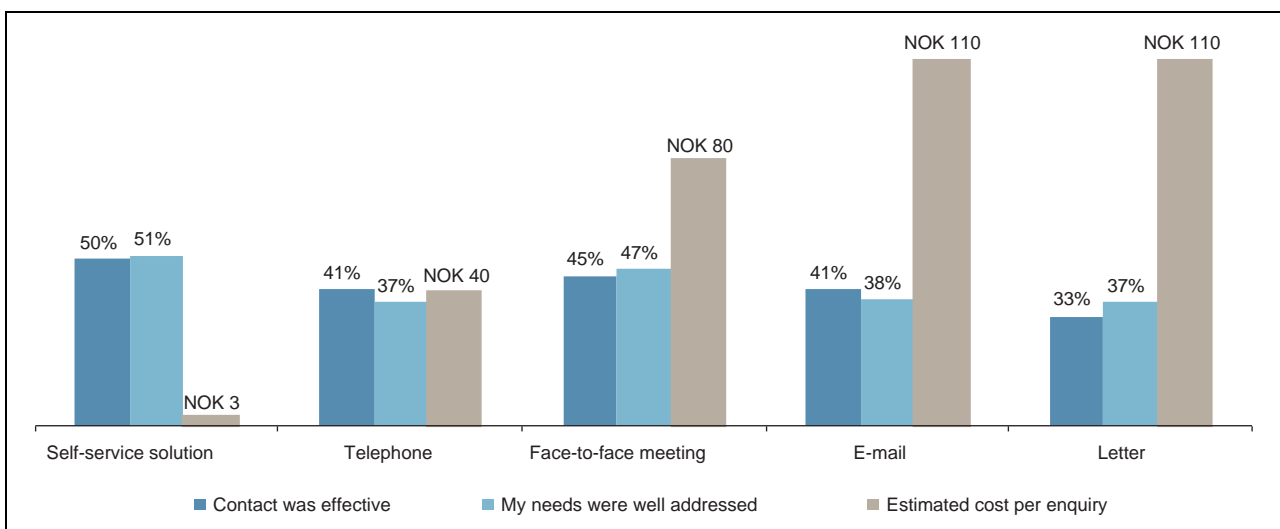


Figure 8.3 Citizens' assessments of contact with the public sector in different channels.

Source: Citizens' assessments of contact with the public sector were obtained from Rambøll (2012) – *IT i praksis* [IT in practice]. Cost estimates for different types of enquiries obtained from Copenhagen Municipality (2009) – *Citizen 2012. Service- og kanalstrategi for Københavns Kommune 2010–2012* [Citizen 2012: Service and channel strategy for the City of Copenhagen 2010–2012]

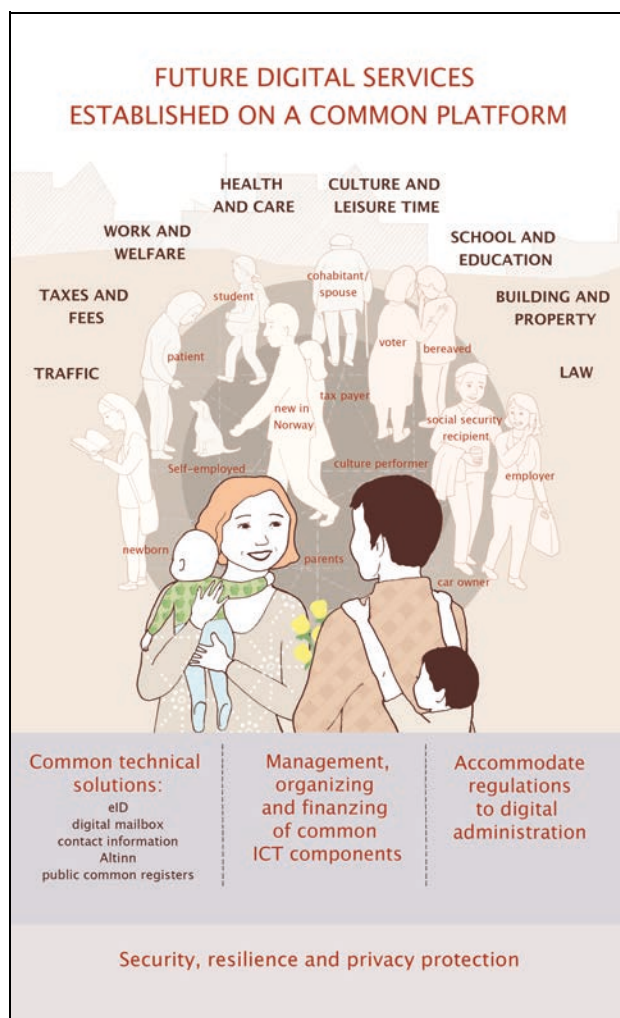


Figure 8.4 eGovernment Programme

Source: Ministry of Government Administration, Reform and Church Affairs (2012): *Digitizing Public Sector Services: Norwegian eGovernment Program*

Broad and strong commitment to ICT in 2013

In 2013, the Government is preparing a broad and strong commitment to ICT in line with the eGovernment Programme. According to Statistics Norway, public sector ICT costs in 2011 amounted to NOK 10.8 billion. In the national budget for 2013, priority was given to digitisation initiatives in NAV (Norwegian Labour and Welfare Service), the police and justice sector, and common systems such as Altinn and EDAG (electronic dialogue with employers).

8.1 Digital services for citizens

The Government wants citizens to have online access to self-service solutions, and has therefore

decided that all public agencies, including public health authorities, must make their forms and reports digitally accessible. This process will take place gradually over the next few years, and the forms that are most used will be digitised first. Consequently, citizens will no longer have to complete forms, applications, and reports in paper form and send them by letter post.

Digitisation can lead to tangible improvements throughout the public sector in the future. The Government holds high ambitions in many key areas affecting citizens and businesses. NAV, the health and care sector, and the justice sector are areas of society strongly committed to digitisation in 2013. The health and care sector is covered in chapter 6 of this white paper.

8.1.1 Digitisation in NAV

The objectives for establishing NAV were work orientation, user orientation, and efficiency improvement: more people in work and activity; a public sector more user-friendly and better adapted to user needs; and a unified and effective public sector. These objectives can be reached only by developing new ICT solutions for NAV, work the Government has already initiated. In future, NAV will develop new procedures and systems for all public services except for pension services, where these have already been introduced.

ICT modernisation in NAV will develop better services for users and facilitate better, more effective follow-up during transition to employment. The programme will contain new solutions for disability pension and sick pay, self-service solutions, increased automation of decision processes, and electronic collaboration with partners. The programme is planned to take 6 years to implement and is divided into three projects. The Storting has approved the first project, which started in August 2012 and is planned to be implemented over 2.5 years. NOK 735 million was allocated to the project for 2013. As developed solutions are gradually commissioned, ICT modernisation will free up resources and compensate for NAV's increased ICT operating costs.

8.1.2 Digitisation in the justice sector

ICT is becoming increasingly important for the justice sector to reach its general objectives of reduced crime, increased safety and security, improved efficiency, and sound legal safeguards. Much has been done to prepare the ground for developing new electronic solutions within the

justice sector, such as identifying essential information flows and work processes so as to organise ICT investments effectively. Because much existing technology is old, it prevents effective electronic collaboration with the police, as was mentioned in the Gjørsv Commission's report, *Report from the 22 July Commission* (NOU 2012: 14). In future, the Government wants to contribute to effective collaboration, good information security, and sound management and decision making information within the justice sector. Registration and quality assurance of information will only need to be done once, and will be shared and reused across policy areas and agencies. In time, paper-based systems for information and case processing will be phased out as far as possible and replaced by electronic solutions.

8.1.3 Digital registration

Norway has a good system for registering rights in fixed property and housing cooperatives. The Norwegian Mapping Authority has responsibility for registration. In 2011, it registered 1.5 million legal rights, and 97 per cent of these were completed in four working days, including postage time.

Registration decisions are recorded in the land register. Entries are made electronically but are based on information contained in paper documents. The Norwegian Mapping Authority files copies of registered documents in the register of mortgages archive.

The Norwegian Mapping Authority is working on establishing a digital archive of the register of mortgages. So far, it has scanned (digitised) registered copies equivalent to 2 kilometres of archive shelving, and scanning of copies equivalent to a further 4 kilometres remains. Today, the Norwegian Mapping Authority scans all incoming documents.

The technical structure of the land register does not meet modern-day requirements; for example, it is divided into separate databases for rights in fixed property and shares in housing cooperatives.

The Norwegian Mapping Authority is restructuring the register to create a technical interface that gives users of digital information equal access to the land register.

Registration will be performed more efficiently if documents are submitted electronically, and the Norwegian Mapping Authority is conducting a pilot project to this end. Initially, the solution facilitated registration and deletion of new mortgage deeds only. However, the pilot project was gradually expanded to facilitate deletion of other mortgage deeds and management of execution liens and bankruptcy petitions from the Enforcement Officer. The solution in the pilot project has been tested by 46 different users, mainly banks and estate agencies.

The pilot solution is considered a success, though it has considerable technical limitations. Large-scale electronic registration will not be possible in the pilot solution. The solution will not be expanded for use by more users.

Box 8.1 Initiatives

64. *Digital services for citizens*

All ministries are responsible for ensuring that underlying agencies, including health authorities, can provide forms, applications, and reports digitally by the first half of 2015. Services with annual submission volumes over 5,000 must be made accessible by the first half of 2014. Services with annual submission volumes over 3,000 must be made accessible by the first half of 2015. Exceptions to this requirement are services where digitisation offers no practical benefits for either users or the public sector, and services that are planned for digitisation during 2015.

65. *Digitisation in NAV*

NAV is conducting ICT modernisation to develop better services for users and to facilitate better, more effective follow-up during transition to employment.

66. *Digitisation in the justice sector*

The Ministry of Justice and Public Security is responsible for ensuring that ICT is used for effective collaboration, adequate information security, and good management and decision information in the justice sector. This will contribute to the justice sector's ability to reach its objectives of reduced crime, increased safety and security, improved efficiency, and sound legal safeguards.

67. *Digital registration*

The Norwegian Mapping Authority will continue the transition to fully digitised registration through, among other measures, restructuring of the land register database and scanning of the register of mortgages.

8.2 Common solutions in public administration

For the most part, digitisation is taking place within the respective sectors. However, technical solutions required to make digital services work are often the same. To avoid different areas of public administration developing their own solutions for more or less similar functions, there is a need for common solutions, so-called ‘common components.’ Important common components currently in use include registers containing information on people, property, and businesses (the National Population Register, the Cadastre, and the Central Coordinating Register for Legal Entities) and other common solutions such as Altinn and the common infrastructure for electronic IDs (eID Gateway).

Users will also benefit from common components through, for example, a common login solution for public services and a common digital mailbox for correspondence from the public sector. Thus, common components will facilitate good and coherent digital services across the public sector.

The national budget for 2013 prioritises several such common projects, such as Digital mailbox, Altinn, and EDAG (see chapter 4.1.1).

8.2.1 Digital mailbox for citizens and enterprises

The eGovernment Programme established the general rule that the public sector should communicate digitally with citizens and businesses. In time, most public agencies will be able to communicate with citizens via their digital mailboxes. Many public agencies and commercial suppliers of digital mailboxes therefore have a key role to play in future. The Government wants citizens to be able to choose between market-based mailbox solutions and to receive correspondence from the public sector in the same digital mailbox they use for other digital correspondence.

Citizens may opt out of the system, but businesses will be required to register. The Government will also work towards enabling the municipalities to communicate with citizens via digital mail.

Citizens and enterprises will be notified via text message or e-mail when new mail arrives in their digital mailboxes. Contact details (mobile phone numbers and e-mail addresses) will be gathered in one place to avoid users having to repeatedly supply such details to different parts of the public sector.

8.2.2 Altinn: A common platform for digital services

The Government’s eGovernment Programme describes how future digital services will be established on a single platform of common technical solutions. Altinn is perhaps the best simplification tool we have, and will play a key role in this platform. The Government is therefore pursuing the successful work on developing the Altinn platform as one of the key tools for providing digital services to private individuals and businesses. In 2013, the Altinn II project, which began in 2008 and developed the new Altinn platform, is in its final phase. To secure and maximise the assets that were created and that are today represented in Altinn, work is ongoing to make the platform more robust and increase usage of existing functionality and services.

8.2.3 Electronic ID (eID)

Electronic identity (eID) enables secure use of digital services. MinID [My ID] is a public eID solution with security level 3 (medium level).

Access to services containing sensitive personal data or requiring signature, however, requires ID with a higher security level (level 4). Currently, citizens can use eID from commercial providers who satisfy requirements for high security levels and who have agreements with the public sector. In November 2012, agreements were signed between the public sector and all three providers of high-security electronic ID operating in Norway (BankID, Buypass, and Commfides). These will give more than 2.8 million citizens access to public digital services requiring high-level security. Due to widespread use of high-level secure ID in the population, the Government expects many new advanced digital services to become available.

The Government also intends to establish a national system of ID cards with government-issued eID and a high level of security. The national ID cards will also contain an electronic ID, and will serve as official ID and valid travel ID within the Schengen Area.

The eID Gateway will be further developed to include electronic signature and encryption. Electronic signature will facilitate communication within areas which currently require handwritten signatures. Encryption ensures that information exchanged with the public sector is not disclosed to unauthorised parties.

8.2.4 Digital document exchange within the public sector

When public agencies exchange documents, they often print and send them by regular mail or courier. The Government wants digital communication to be standard procedure within the public sector. This will save resources currently spent on scanning, postage, and manual labour, reduce postage time, and spare the environment. The aim of the Government, therefore, is that all public agencies should establish a digital system for secure internal exchange of documents. This requires so-called 'enterprise certificates,' a form of electronic ID for enterprises, which in practice enable enterprises to exchange documents digitally and securely. Further work is required to determine which document categories will be exchanged digitally and how the document exchange system should be designed. The system will be designed so as to gradually enable municipalities to be incorporated into the infrastructure. Before that can happen, however, the municipal sector must be coordinated.

8.2.5 Common registers to support a digital public sector

To perform their duties well, many public agencies are dependent on fast, easy access to updated, correct information about people, enterprises,

and property. Such information is held in the National Population Register, the Central Coordinating Register for Legal Entities, and the Norwegian Cadastre, respectively. These three registers constitute key common components.

The National Population Register holds information such as date of birth, marital status, residence permits, and permanent address of everyone who currently resides or has resided in Norway. The Directorate of Taxes has initiated a project to modernise the National Population Register. The register's technical solution, organisation, and content will be evaluated in light of the needs and opportunities created by a digital public sector and digital services.

The purpose of the Central Coordinating Register is to coordinate use of basic data from the business sector so as to avoid burdening businesses by duplicating their reporting obligations. The Register of Reporting Obligations of Enterprises maintains an updated overview of the reporting obligations of businesses. The Government will consider whether electronic business addresses should constitute basic data in the Central Coordinating Register for Legal Entities.

The Norwegian Cadastre is a public register of fixed property containing information on buildings and addresses. This register will be developed so that the information it contains can be used in a digital public sector.

Box 8.2 Initiatives**68. Digital mailbox**

The Ministry of Government Administration, Reform and Church Affairs is responsible for establishing a solution that will enable all public agencies to communicate via digital mail with businesses and with citizens who have not opted out.

69. Digital mail: Opting out and contact details

The Ministry of Government Administration, Reform and Church Affairs will establish a common system to allow citizens to opt out from receiving digital mail from government authorities and from municipalities that communicate via digital mail.

70. Altinn will be further developed and made more robust

The Ministry of Trade and Industry wants to further develop Altinn so that the platform remains a central element in developing public digital services and electronic collaboration in areas where no satisfactory commercial solutions are currently available.

71. High security level for eID

The Government is working towards making secure identification more widely available. The Government also intends to establish a national system of ID cards with government-issued eID and a high level of security. The eID Gateway will be further developed to include electronic signature and encryption.

72. Digital document exchange

The Ministry of Government Administration, Reform and Church Affairs is assessing, based on cost, efficiency, security, and robustness, alternatives for exchanging documents in the public sector.

73. Modernisation of the National Population Register

The Directorate of Taxes has initiated a project to modernise the National Population Register. The Government will consider whether citizens' digital contact information should eventually be incorporated into the Population Register.

8.3 Organising and coordinating for more efficient use of resources

Information is increasingly exchanged between agencies in the public sector. The lack of adequate structures to handle how information is exchanged between agencies has created challenges. Increased digitisation of public sector services necessitates better coordination.

The Government will therefore improve coordination of the ministries' work on ICT development in public administration and consider future organisation of common ICT components. The Government will also require administrators of national common components to safeguard the overall needs of the public sector. In time, it will become necessary to simplify funding models for the national common components.

8.3.1 Digitisation in the municipalities

It must be easy for citizens and businesses to conduct dealings with the public sector regardless of whether the relevant service is the responsibility of central, regional, or local government. The municipalities are responsible for implementing satisfactory digitisation and development initiati-

Box 8.3 SKATE

SKATE (Strategic Cooperation Council for Management and Coordination of eGovernment Services) is a strategic cooperation council for senior managers in selected public agencies. The Government gave the Council a mandate to ensure that digitisation of the public sector is coordinated and that it benefits citizens, businesses, and the public sector. SKATE is a key policy advisor concerning which ICT measures ought to be implemented and how to finance them. SKATE will also advise on future development policy and on administration of the common components in the central ICT infrastructure. The Council currently comprises the directors of Brønnøysund Register Centre, Directorate of Taxes, Norwegian Labour and Welfare Service, Norwegian Mapping Authority, Directorate of Health, National Police Directorate, Norwegian State Educational Loan Fund, Statistics Norway, KS/KommIT, and Difi. The Council is chaired by Difi.

Box 8.4 Cooperation between central and local authorities on geographic information

Central and local authorities cooperate closely on establishing, managing, and making available geographic information. This cooperation is generally referred to as *Norge Digitalt* [Norway Digital] but actually comprises several components, an important one of which is Geovekst, a cooperation project on geodata dating from 1992. Common mapping projects worth around NOK 150 million per year are coordinated via Geovekst. The Norwegian Cadastre, Norway's official property register, is vital for municipal administration, and much of the data held in this register is maintained by them. The municipalities are primarily responsible for making municipal plans and zoning plans digitally accessible, though they do so in cooperation with central government.

Through the Geointegration Project, the central government, the municipalities, and commercial system providers have developed stan-

dards for interoperability between municipal case management systems, recordkeeping systems, and geographic information systems in order to achieve more effective management of planning and building matters. The standards will be maintained through cooperation between KS and the Norwegian Mapping Authority.

This cooperation and the technical solutions developed from it provide the basis for electronic presentation of geographic information and provide new opportunities for openness and involvement. Multiple actors have developed map solutions with options for dialogue and applications for tablets and smartphones.

To strengthen cooperation on society's common infrastructure for geographic information, a national geographic council was appointed by royal decree on 30 March 2012, comprising members from public agencies, municipalities, and the geomatics industry.

ves in their areas of responsibility. It is important for the Government that the public sector be presented in a uniform manner vis-à-vis citizens, organisations, and businesses. It must be easy for municipalities to implement common solutions, particularly the most essential ones of Digital mailbox, eID, Altinn, and the Norwegian Population Register. It is important that the municipalities coordinate their needs so that the state can make it as easy as possible for them to use these solutions. A key step in this direction was taken in 2012, when KS established KommIT to serve as an ICT coordinating body in the municipal sector.

The municipal sector is responsible for a large portion of the services provided by the public sector to citizens and businesses. The public sector also has several important reforms that heavily depend on the municipalities' capacity to perform their duties, such as the Coordination Reform and the NAV Reform. ICT offers opportunities for the public sector to find new ways of performing its tasks as rationally as possible. To achieve this, however, the entire public administration (central government, county municipalities, and municipalities) must cooperate with each other, implement joint initiatives, and develop universal solutions.

8.3.2 Common ICT support functions

To make public agencies more efficient, the Ministry of Government Administration, Reform and Church Affairs is considering establishing new common services, such as the Norwegian Government Agency for Financial Management's payroll and accounting system. A survey conducted by Statistics Norway in 2012 showed that the bigger the business, the fewer the resources used on ICT support services per employee. Work has now been initiated to establish common ICT support functions in the public sector to benefit from the economies of scale these can provide.

8.3.3 Realisation of benefits

ICT can be used for organisation development, process improvement, and services offering significant potential benefits for society. Such potential, however, is not always realised. Financing and benefit realisation of projects across public sectors and agencies are particularly difficult issues because while costs can occur one place, benefits are often realised elsewhere or are realised at different times in different sectors. The Government emphasizes the importance of preparing good benefit realisation plans when planning public sector ICT projects and of following up plans once ICT solutions are implemented.

Box 8.5 Initiatives**74. ICT coordination and the municipal sector**

The Government wants to enable a coordinated municipal sector to use national common components and to encourage good dialogue between central and local authorities concerning ICT.

75. Further development of Norway Digital

The Ministry of the Environment will further develop cooperation between state and local authorities on geographic information (Norway Digital).

76. Technical solutions for geographic information

The Norwegian Mapping Authority will contribute to further development of technical solutions for better integration of state and municipal geographic information.

77. ICT support functions

The Ministry of Government Administration, Reform and Church Affairs has initiated work on assessing establishment of a national common ICT support function.

8.4 Adapting laws and regulations to a digital public sector

When public sector technology and organisation allow for new and more efficient ways to perform tasks, the formulation of relevant legislation should be reviewed. Laws and regulations should facilitate digital communication with citizens and businesses, enable reuse of information, and facilitate automated case management wherever relevant.

In 1999, a project called eRegelprosjektet [eRegulation Project] was launched to remove provisions that impede electronic communication. The project resulted in Ot.prp. nr. 108 (2000–2001) and Ot.prp. nr. 9 (2001–2002), proposing amendments to 39 acts of parliament. The Government is now taking a further step in this direction: having given electronic and paper-based communication equal status, it now wants electronic communication to be the standard and paper-based communication to be the exception to the rule.

8.4.1 Digital communication as standard

In future, the Government will work to amend legislation so that correspondence from the public sector can be sent digitally unless recipients have

opted out (see chapter 8.2.1). Today, sections 16 and 27 of the Public Administration Act, for example, require recipients' express approval before advance notifications or notifications of administrative decisions may be sent electronically. In autumn 2012, the Ministry of Government Administration, Reform and Church Affairs issued a report on these issues for consultation.

The so-called '7-day rule' in section 8 (7) of the Electronic Public Administration Regulations requires public administration to issue a decision in paper format if electronic correspondence concerning an individual decision is not opened within one week. The 7-day rule was removed from the regulations by royal decree with effect from 1 January 2013.

Furthermore, the Government has initiated more extensive and long-term work to examine regulations that constitute obstacles to digital communication, with a view to removing them. New laws and regulations should be formulated so as to support and facilitate digital services and digital communication.

8.4.2 Reusing and sharing information across the public sector

Regulations will facilitate digitisation. Furthermore, laws and regulations will enable information submitted to one public agency to be reused by others to a larger extent. This presupposes a legal basis for processing and requires examining and taking account of data protection issues. There is also a need for closer examination of laws and regulations with a view to enabling the public sector to use information in public registers more effectively, such as that contained in the National Population Register. Reuse of information must protect the privacy of individuals.

Box 8.6 Initiatives**78. Amendment of the Public Administration Act**

The Ministry of Government Administration, Reform and Church Affairs intends to propose amendment of the Public Administration Act. The amendment entails replacing the requirement for consent to use electronic communication with a right to opt out. The amendment also entails a legal basis for, through regulation, establishing digital mailboxes, contact details, and an opt-out register.

Part III
Basis for growth

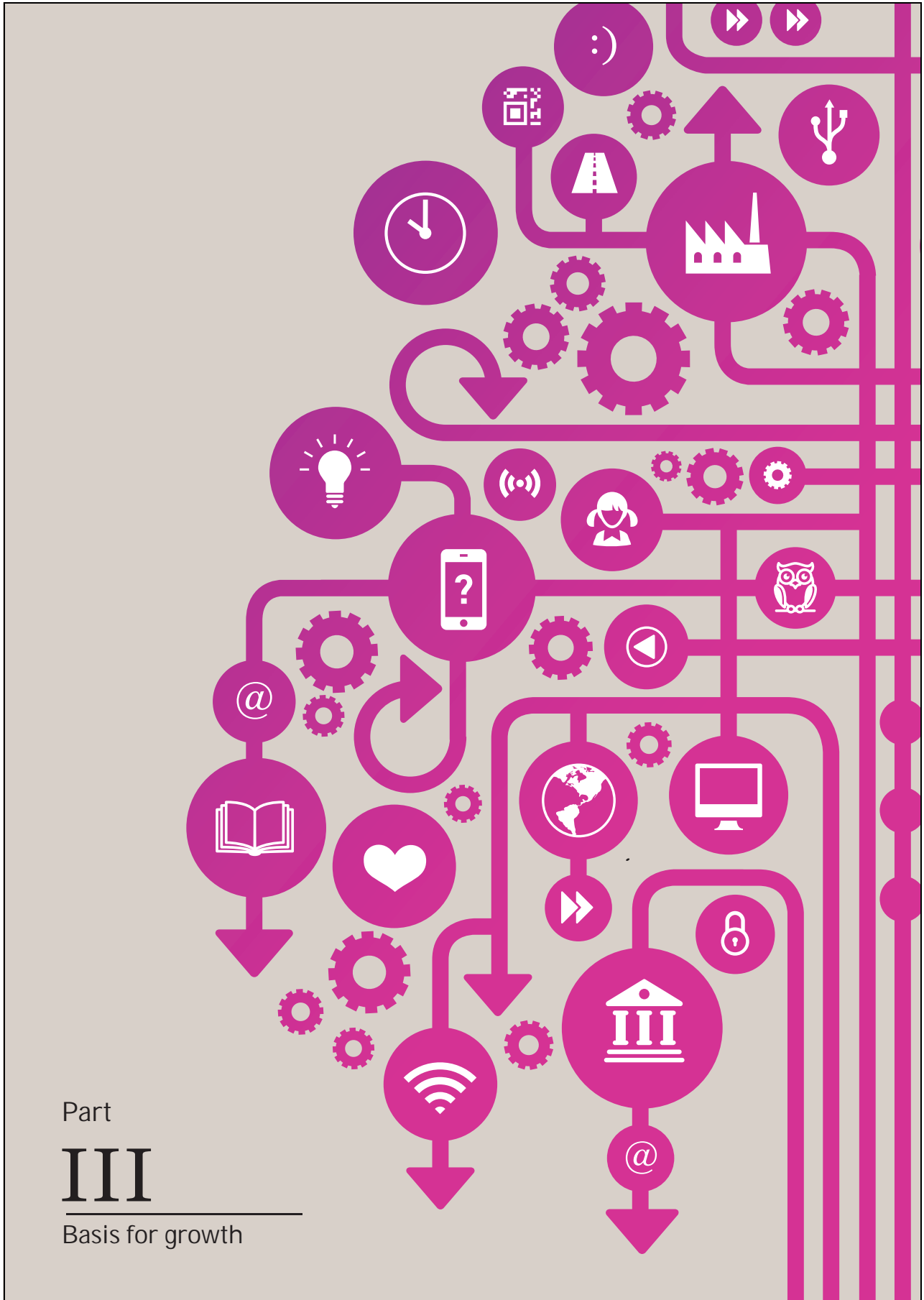


Figure 9.1

9 ICT competence and R&D

Education, expertise, and research in ICT can strengthen Norway's competitiveness and consolidate its position as one of the most developed, knowledge-based, and competitive economies worldwide. We must therefore have a sufficient high-level ICT competence. We must also have research excellence in ICT.

ICT is important not only in the ICT industry; it enables change and productivity growth in all sectors. An ICT perspective is therefore vital in other relevant professional education programmes such as health and care, energy, environment, design and architecture, crime prevention, and teaching.

The Government considers the most pertinent competence needs from an ICT perspective to be as follows:

- Norway needs core competence in computer science that can easily and widely be applied in industry and in the public sector.
- Norway needs interdisciplinary education programmes in computer science and certain key disciplines that are highly significant to industry and to the public sector.
- An understanding of ICT is vital in basic and further education in all professions. ICT's role in education must reflect future rather than current needs.

Norway must have sufficient advanced ICT competence in industry and in the public sector.

- Basic education programmes should contribute to providing society with a good recruitment base for advanced ICT competence in the long term.
- Good cooperation and dialogue between educational institutions and industry are important.
- Professional graduates should be well prepared for a working life in which digital tools play a key role.
- Sound mechanisms for labour migration should be implemented to satisfy the need for advanced ICT competence.
- Research communities that hold international leadership in ICT are vital for Norwegian

industry and the public sector. This applies both to ICT basic research and to applied research in fields crucial to Norwegian industry and to the public sector.

- High-quality ICT R&D is important for new enterprise and enhanced value creation.

9.1 Advanced ICT competence

Employee competence is essential to creating value in any enterprise. According to the white paper *Education Strategy* (St.meld. nr. 44 (2008–2009)), human resources have increasingly contributed to national wealth over the past 25 years, and now account for 80 per cent of it. In other words, human competence is Norway's key growth factor. The supply of a skilled workforce will heavily determine Norway's economic structure. Norway must host companies and industries with high value creation potential – regardless of disciplinary field – so as to ensure a high level of value creation. An adequate supply of advanced ICT competence is one element that will provide such capability. The Government is therefore concerned that Norwegian society and industry be supplied with such competence. This will provide a vital basis for innovation and new economic development in both the ICT industry and ICT-intensive industries. Adequate supplies of relevant competence can facilitate new enterprise and enhanced value creation.

According to projections from Statistics Norway, we will experience a lack of highly qualified technology specialists, including in the ICT field. The expected ICT skills shortage may therefore hamper economic development and goal achievement in several policy areas.

9.1.1 Companies' needs and demands

The demand for engineers and ICT specialists is high, while the number of available employees is low. Therefore, employers will have difficulty recruiting ICT professionals. This trend is not limited to Norway; demand for ICT competence is

growing throughout Europe, too, while the number of available candidates is declining. NAV's enterprise survey conducted in autumn 2012¹ showed the most pressing labour shortages to be in engineering and ICT. The ICT sector is amongst those reporting most recruiting problems. In the survey, 16 per cent of respondents operating in this sector reported severe recruitment problems; that is, they had failed to satisfy recruitment needs during the previous three months. In addition, 5 per cent of these companies reported that they had recruited employees with lower or other formal qualifications than those required.

International surveys show that employees within the ICT industry and employees with ICT specialist competence account for almost 5 per cent of the total workforce in OECD countries. More than 20 per cent of all employees have jobs defined as ICT-intensive. Surveys show that ICT specialists, such as programmers, account for 3–4 per cent of the total workforce in most OECD countries. Generally, demand for ICT specialists exists not only in the ICT sector but in other economic sectors, too.²

Projections

Because ICT is integral to many fields, obtaining statistical data specific to the ICT industry is difficult.

Projections from Statistics Norway show that demand for highly qualified technology specialists, such as master of engineering graduates, will increase towards 2030.³ Employment of technology specialists with lower degrees is expected to stabilise during the same period. A 2010 study from the Ministry of Education and Research showed that technology specialists would experience increasing demand, along with teachers, scientists, economists, and healthcare workers.⁴

¹ Sørbø, Johannes and Kari-Mette Ørbog (2013): *NAV's bedriftsundersøkelse høsten 2012* [NAV's business survey, autumn 2012], NAV Arbeid og velferd 1/2013

² Reimsbach-Kounatze, Christian and Cristina Serra Vallejo (2012): *ICT Skills and Employment. New Competences and Jobs for a Greener and Smarter Economy*, OECD Digital Economy Papers No. 198

³ Roger Bjørnstad, M.L. Gjelsvik, A. Godøy, I. Holm and N.M. Stølen (2010): *Demand and supply of labor by education towards 2030 – Linking demographic and macroeconomic models for Norway*, SSB Rapport 39/2010

⁴ Kunnskapsdepartementet (2010): *Tilbud og etterspørsel etter høyere utdannet arbeidskraft fram mot 2020* [Supply of and demand for a higher educated workforce towards 2020], by Statistics Norway and NIFU/Step

Box 9.1 World-class Norwegian microelectronics industry

Norwegian engineers have built a multi-billion industry based on electronic components for touch screens, advanced control systems, and wireless communication. Such technologies require chips with low power consumption, and Norwegian developers design chips that are extremely energy-efficient. Because more consumer electronics are installed with touch screens, and because all kinds of everyday devices are increasingly able to communicate with each other and with the internet, the market for such electronic products will grow. Today, more than half the manufactured radio circuits with ultra-low power consumption are designed in Norway.

The industry's greatest challenge is to find enough staff with high-level ICT competence, particularly in electronics and software. The industry considers this the key factor constraining industry growth.

9.1.2 ICT education

Norway has both public and private institutions offering ICT education. Most higher education programmes are run by the large universities, the largest being the Norwegian University of Science and Technology (NTNU) and the University of Oslo (UiO). Combined, NTNU and UiO educate around 80 per cent of Norway's masters graduates in computer science. Around 30 Norwegian institutions, three of them private, offer programmes in information technology and computer technology.

In 2010, slightly fewer than 1,000 students graduated from Norwegian ICT programmes at bachelor and master degree levels,⁵ a 50 per cent decline since 2004. Despite society's increasing demand for ICT, the level of interest in ICT programmes at all levels has steadily declined since 2004.⁶ Universities and university colleges publicise their programmes through the Norwegian Universities and Colleges Admission Service. In

⁵ DBH – NSDs Database for statistikk om høgre utdanning [Norwegian Social Science Data Services' Database for Statistics on Higher Education]

⁶ Olsen (2009), in Torgeir Reve and Amir Sasson: *Et kunnskapsbasert Norge* [A knowledge-based Norway], Universitetsforlaget 2012

Box 9.2 eCampus

The eCampus programme provides universities and university colleges with simple ICT tools for teaching and research. The objective for eCampus is to develop infrastructure that could make all tuition accessible to everyone, either in the form of lectures, seminars, and study groups or as web-based modules. eCampus is also testing solutions for video recording and podcasts.

The eCampus programme is developed and managed by UNINETT, which develops and operates the Norwegian research network and supplies internet and network services to universities, university colleges, and research institutions. NOK 15 million was allocated to eCampus from the 2013 national budget.

Source: More information at: www.ecampus.no

2011, more than 3,000 study places in computer science were offered.

The Norwegian Universities and Colleges Admission Service's application figures for 2012 show an increase in applications to ICT and natural science programmes. Applications to engineering programmes increased by 25 per cent compared to 2011.

The state universities and university colleges are independent, and have considerable powers to create and close programmes. When developing educational programmes, the institutions evaluate available academic resources, that is, the number of teaching staff, and how they can ensure academic quality. They must also take account of the number of applicants to the respective programmes. Pupil and student choice largely determines which programmes are offered and the dimension of the education system. In some areas, this dynamic can create gaps between labour market needs and students' educational choices.

Why don't more students choose ICT programmes?

The proportion of young people applying for ICT subjects has declined dramatically since 2004. International figures also suggest falling numbers of applicants to these subjects. Despite young people being highly active internet users, less than 30 per cent of boys and 15 per cent of girls plan to

take ICT-related subjects at upper secondary school.⁷ Women are under-represented in technology professions in Norway.⁸

We lack sufficient knowledge about why the number of applicants to higher ICT education has fallen so dramatically. In future, therefore, we should examine whether ICT subjects present particular challenges that should be addressed. We must also consider initiatives to stimulate pupils' interest in ICT and technology subjects at primary school level.

Focus on mathematics, science, and technology

The strategy entitled *A Joint Promotion of Mathematics, Science and Technology* was launched in 2006. The strategy's main goals are to stimulate interest in mathematics, science, and technology (MST) and to strengthen recruitment and comple-

Box 9.3 Energy Schools

The oil and gas, and energy sectors use increasingly advanced ICT systems for developing and operating installations. Developing and working on ICT systems in these sectors require people who understand physical processes and how ICT systems can be designed to model, interpret, and manage these processes. These tasks require broad MST competence.

The Ministry of Petroleum and Energy cooperates with the education sector on a project called Energy Schools. The project is managed by the Norwegian Centre for Science Education at UiO, and aims to stimulate interest in energy challenges and boost recruitment to the energy sector. Eleven upper secondary schools participate in the project, and each has established a partnership with one or more local energy companies through which pupils map and present practical applications of MST. Thus, young pupils have opportunities to learn about the energy industry and to resolve tasks the industry works on daily. The aim is to inspire young people to choose MST subjects in their later education.

⁷ Tapscott, Don, et al. (2012): *The e-Skills Manifesto*, European Schoolnet, Belgium

⁸ NOU 2012: 15 *Structure for Equality*

Box 9.4 Sponsored studies in railway technology

The Norwegian National Rail Administration faces large-scale projects in the future, involving upgrading the rail network, rail signalling system and power supply system. To ensure supply of relevant competence, it has asked NTNU to establish a programme in railway technology. The programme will be an experience-based master's degree programme with specialisation in electronics, signalling, and rail/traffic.

tion rates at all levels in the education system. In addition, Norwegian pupils' MST competence will be strengthened, and the proportion of girls choosing mathematics, physics, chemistry, and technology increased. Through this strategy, a national resource centre for MST recruitment, the RENATE Centre (National Centre for Contact with Working Life for the Promotion of the Natural Sciences and Technology), was established. By using mentors and role models, RENATE will show young people, parents, and teachers that MST offer exciting, creative, and interesting career opportunities. Since its launch, the MST strategy has been followed up in three action plans.

9.1.3 The role of business and industry

Business and industry receive the ICT competence the education institutions supply. However, companies must also ensure they have sufficiently qualified workforces for their own needs. Workers in today's workforce must have opportunities to take continuing and further education so as to receive new and relevant knowledge. Experienced employees can thus acquire ICT competence adapted to industry's needs. It should be easy for employees to take continuing and further education. This is an issue which business and industry also consider important. Companies can facilitate continuing and further education internally, though they should do so in dialogue with educational institutions.

Cooperation between the university and university college sector and industry

As we have seen, production in Norway of ICT graduates will be limited in future. ICT competence is needed in many areas in society. Many

disciplines will compete for the best candidates. This challenge must be monitored closely and solutions found jointly by educational institutions, industry, and the authorities.

In the 2010 white paper on education strategy, the Government highlighted the general need for cooperation between education and working life.⁹ To formalise and consolidate cooperation, all the state universities and university colleges have established councils for cooperation with working life (Råd for samarbeid med arbeidslivet (RSA)). The council members must represent social partners, students, and other relevant stakeholders. The councils must also prepare strategies for cooperating with working life, during which they will discuss issues such as development of degree programmes and continuing and further education. This mechanism must be used and further developed in the area of ICT.

9.1.4 Internationalisation of education

In the white paper *Internationalisation of Education* (St.meld. nr. 14 (2008–2009)), the Government highlights internationalisation initiatives in Norway and abroad. Because most of the world's knowledge development happens outside Norway, Norwegian educational institutions and research communities must have extensive international networks. These can be established through exchange schemes for students and teaching staff and through research activities.

Norway has gradually become one of the few European countries offering free higher education to students from outside the EEA and EU. Many international students therefore apply to study in Norway. International students represent a vital recruitment base for institutions struggling with low application rates, perhaps particularly so concerning science subjects.

The Norwegian Directorate of Immigration (UDI) conducted a survey to map the extent to which international students remain in Norway and enter the Norwegian workforce on completing their studies.¹⁰ Around 8 per cent of students at Norwegian institutions hold foreign citizenship. As of autumn 2011, around 2 per cent of the student population consists of international students studying mathematics, science, technology, or engineering

⁹ St.meld. nr. 44 (2008–2009) *Utdanningslinja*, white paper on education strategy

¹⁰ Kristian Rose Trondstad and Anne Britt Djuve (2012): *Immigration of International Students to the EU/EEA. Report to the European Migration Network from the Norwegian Contact Point*

subjects. Many international students leave Norway on completing their studies, but more than half (55 per cent) who arrived in 2008 from so-called ‘third countries’ (outside EU/EEA) are still in Norway today. Among those who came from EU/EEA countries, 25 per cent still live in Norway. Statistics also indicate that a large proportion of international students working in Norway today have jobs that are relevant to their studies, and at highly professional levels. Among students who came to Norway between 2000 and 2002, 90 per cent are studying, working, or actively seeking employment.

International contact is vital for enabling Norway as a knowledge-based society to compete and cooperate in the global education and labour markets.¹¹ The Norwegian Centre for International Cooperation in Higher Education today administers several programmes supporting international education cooperation. The Government will assess the need to strengthen international cooperation in ICT competence.

¹¹ Report No. 14 to the Storting (2008–2009) *Internationalisation of Education in Norway*

9.2 ICT competence in other professions

In line with increasing digitisation, a growing number of professions which previously made little use of ICT is realising the importance of digital competence and digital tools. In a growing number of areas, ICT is no longer a supporting function, but rather the core of the operation. To contribute to developing and implementing good innovative ICT solutions in these areas, it is necessary to have people with system understanding and high technical competence combined with sector knowledge. Today’s professional programmes must also address future needs. Therefore, the ICT perspective must be incorporated into other relevant professional programmes as well as into lower degree programmes. This is one issue forming the basis for the white paper *Education for Welfare* (St.meld. nr. 13 (2011–2012)), which covers health and welfare policy.

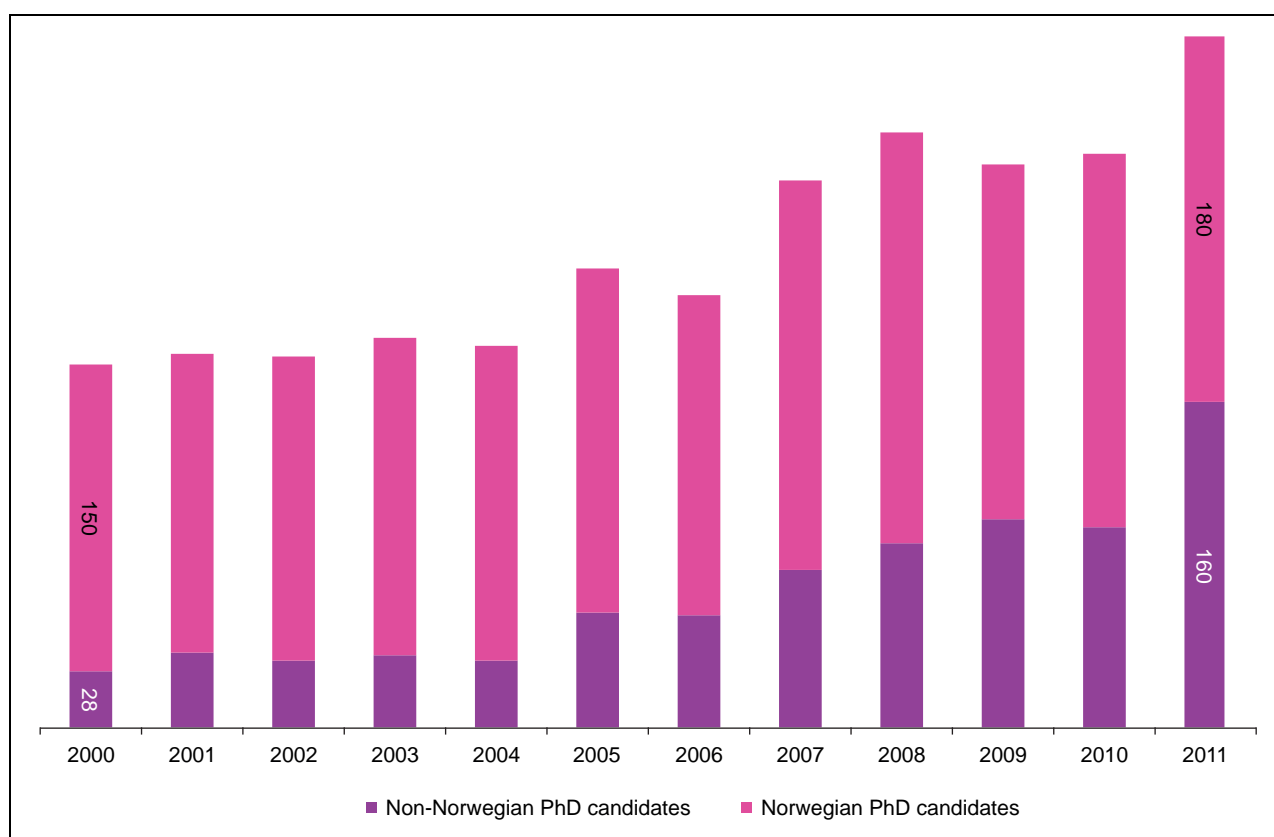


Figure 9.2 Number of PhD candidates in mathematics/sciences at Norwegian universities and university colleges, by Norwegian and foreign citizenship

Source: NIFU Doktorgradsstatistikk, februar 2012 [Nordic Institute for Studies in Innovation, Research and Education. Doctoral Degree Statistics, February 2012]

ICT in the health and care services

Major reforms are being implemented in the health and care sector, as described in chapter 6. These reforms entail introducing new technology such as web-based services, mobile health and care services, and smart home solutions. Such changes require health professionals with the competence to use them. The structure and content of health and social science programmes must reflect the competence needs of the services. A particular need exists for new thinking in the health and social science programmes at universities and university colleges so as to give students a better platform for understanding and using new technology at all levels of health and care services.

ICT in crime prevention

ICT is increasingly used in criminal activities. The scale of criminal activity targeting computer systems, computers, and mobile phones is growing. ICT is therefore becoming increasingly important in crime prevention. Electronic evidence or computer seizures are becoming increasingly important elements in most criminal investigations. Various trends indicate that cybercrime is increasing. The police must take measures to acquire the necessary competence to detect, identify, and handle cybercrime. The police must also increase its presence on the internet through web patrols and hidden surveillance. To accomplish this, police training programmes must provide necessary ICT training. In consultation with the Director of Public Prosecutions, the National Police Directorate appointed a working group in 2011 to prepare a report on how the police work on cybercrime, electronic evidence, and online presence. Its mandate was to find out how the police could address these issues in future.

The report, *Politiet i det digitale samfunn*¹² [The Police in the Digital Society], focuses on potential improvements and describes how the police work on electronic evidence, cybercrime, and online presence. It also suggests ways of addressing these issues in future. The police are assessing the measures presented in the report, including the need for training in technology literacy at all levels within the police force.

¹² Politidirektoratet (2012): *Politiet i det digitale samfunnet – En arbeidsgrupperapport om: elektroniske spor, IKT-kriminalitet og politiarbeid på internett* [The police in the digital society. Working group report on electronic evidence, cybercrime, and online presence]

ICT in the education sector

Use of digital tools is one of the basic skills pupils will learn as part of their basic education, and is an integral component in competence aims in all subjects. To achieve such aims, teachers should possess teaching competence in ICT, be able to use digital teaching materials, and integrate technology in their teaching.

The basic skills are entrenched in the curriculum for primary school teacher education. However, an OECD study shows that teacher education programmes do not offer practice-based experience in ICT.¹³ The programmes therefore fail to demonstrate how technology can be used effectively in the classroom. Teachers who rarely or never use digital teaching materials in their teaching say that one of the main reasons for this is their personal competence levels.¹⁴ Qualified teachers must also be updated in this area.

Through *Kompetanse for kvalitet*¹⁵ [Competence for Quality], the Government has implemented a large-scale further education programme for teachers. The aim is to increase the number of teachers who have up to 60 credits in subject competence and subject-didactic competence and who specialise in subjects and areas in particular need of improvement. Because ICT is not a separate subject in primary schools, it is not prioritised as a separate subject area. Instead, both the basic skill of *using digital tools* and *subject-specific pedagogical use of ICT* will be included in all courses provided.

The need for knowledge about technology also applies for kindergarten personnel. The new curriculum for pre-school teacher education states that, on completion of their studies, students must have broad knowledge about children's emerging digital skills.

ICT in the public sector

Both state and municipal administrations are undergoing extensive digitisation, with emphasis on improving interoperability between different ICT systems and collaboration between agencies

¹³ OECD (2010): *Inspired by Technology, Driven by Pedagogy. A Systemic Approach to Technology-Based School Innovations*

¹⁴ Synovate (2011): *Lærernes bruk og holdninger til digitale læremidler i videregående skole og i ungdomsskolen 2011* [Teachers' use of and attitudes towards digital teaching materials in lower secondary and upper secondary schools, 2011]

¹⁵ Kunnskapsdepartementet (2008): *Kompetanse for kvalitet. Strategi for videreutdanning av lærere* [Competence for Quality: Strategy for further education for teachers]

Box 9.5 Initiatives**79. Better knowledge about supply and demand**

The Ministry of Government Administration, Reform and Church Affairs will, in cooperation with the Ministry of Trade and Industry and the Ministry of Education and Research, obtain better statistical data on future trends in supply of and demand for future-oriented ICT competence.

80. Obstacles to recruitment to ICT subjects

The Ministry of Government Administration, Reform and Church Affairs will, in cooperation with the Ministry of Education and Research and the Ministry of Trade and Industry, assess whether there are any obstacles specific to recruitment to ICT programmes.

81. Measuring the supply of advanced ICT competence

The Ministry of Government Administration, Reform and Church Affairs will consider establishing competence surveys, so-called monitors, of advanced ICT competence in key areas of industry and working life, including the public sector.

82. Focus on MST

The Government will, in cooperation with social partners, continue its commitment to MST. Separate initiatives to recruit girls will be continued.

83. Cooperation between educational institutions and working life

The Ministry of Education and Research will examine the institutions' implementation of councils for cooperation with working life (*Råd for samarbeid med arbeidslivet*) and consider further development of the scheme.

84. International ICT cooperation between educational institutions

The Ministry of Education and Research will, in cooperation with the Ministry of Trade and Industry, assess alternative ways of better using existing high-quality schemes for international ICT cooperation, such as participation in the EU's education and research programme and bilateral cooperation with prioritised countries.

85. ICT competence of teachers and kindergarten personnel

The Norwegian Centre for ICT in Education has been tasked with promoting development of ICT in teacher and pre-school teacher education, including continuing and further education.

86. ICT competence in professional programmes

The Ministry of Government Administration, Reform and Church Affairs will cooperate with relevant actors to strengthen ICT competence in professional programmes that are essential to the welfare state.

(see chapter 8). Achieving the goal of a digital public sector requires robust infrastructure, well-designed and efficient common services and common components, and good adaptation to agency-specific functions.

Such a project requires public sector employees with competence in specialist fields such as ICT architecture, system development, data security, and data protection.

9.3 Labour migration

Even though the number of ICT graduates will increase in coming years, it will probably not meet society's demands for ICT competence. Enterprises that fail to find the competence they need resolve this challenge in different ways. In some cases, they recruit employees with lower qualifications, or buy services from consultancy firms or

staffing companies. Many also recruit relevant competence from abroad. The Government's labour migration policy is based on the white paper *Labour Migration* (St.meld nr. 18 (2007–2009)). The Government wants to facilitate easy and effective recruitment of necessary labour from abroad.

The EEA will constitute the main arena for Norwegian employers' recruitment of labour from abroad. The work permit requirement for EEA citizens was abolished in 2009. Instead, a registration scheme was introduced, requiring EEA citizens intending to live and work in Norway for more than three months to register with the police or with a service centre for foreign workers.

Third-country nationals, that is, citizens from countries outside the EU/EEA area, still require residence permits to work in Norway. Permits may be granted to skilled workers¹⁶ who have

received a concrete offer of employment based on Norwegian pay and working conditions. An early employment scheme has been created to speed up recruitment of labour from third countries. The scheme enables employees who have applied for a residence permit to start work while their applications are processed. In addition, the Directorate of Immigration is obligated to process 80 per cent of applications received from migrant workers within four weeks.

NAV is creating a portal dedicated to providing better information to foreign workers wishing to work in Norway. This will act as a gateway to all relevant information on labour migration and import of services. Furthermore, NAV is currently establishing a pilot project at selected foreign service missions to provide information on job opportunities in Norway.

Service centres for foreign workers have been set up in Oslo, Stavanger, and Kirkenes to assist foreign nationals wishing to work in Norway.

The Ministry of Labour has asked OECD to review the Norwegian regulations and initiatives and to assess whether they facilitate the desired labour migration. The report is expected to be published in autumn 2013.

Box 9.6 Initiatives

87. *Recruitment of foreign labour*

The Ministry of Labour will follow up the regulations on labour migration, in particular the requirement for processing time for labour migrants from outside the EEA. Emphasis will be placed on providing guidance and information through the web portal, and on other initiatives that will improve industry's possibilities to recruit labour in the field of ICT from countries outside the EEA.

88. *Recruitment of international students to jobs in Norway*

The Government will maintain Norwegian educational institutions' appeal to international students and will enable those who wish to use their education to work in Norway to do so.

9.4 ICT research and development

The Government's strategy for ICT R&D is currently being prepared, and ICT R&D will therefore be only briefly mentioned in this white paper.

The close link between education and research means that education can respond to changing needs, society's needs, and scientific advances.

In 2009, ICT R&D activities worth NOK 8.7 billion were conducted in Norway,¹⁷ representing around 20 per cent of total R&D costs.

Industry accounts for around 80 per cent of ICT R&D. Most of this (approximately 90 per cent), however, constitutes development. Around half of industrial R&D is conducted in industries which traditionally use considerable ICT but which are not naturally defined as belonging to the ICT sector, such as the oil and biotechnology industries. This situation illustrates the significance of ICT across sectors and industries.

In 2012, evaluations of the Research Council of Norway¹⁸ and of Norwegian ICT research¹⁹ were published. Both evaluations express the need for

¹⁶ The provision concerning skilled workers in the Immigration Regulations, section 6–1, first paragraph states:

'Employees who have special training which as a minimum corresponds to upper secondary school level, have a craft certificate or a university college or university education or who have special qualifications are entitled to a residence permit. Conditions are that:

a) The expertise is deemed to be relevant to the position.
b) The relevant specialist authority has given its approval or authorisation in the case of occupations/professions that are subject to statutory or regulatory qualification requirements.
c) The employee falls within the quota for skilled workers and specialists, see section 6–12.'

¹⁷ Kunnskapsdepartementet (2012): *Forskningsbarometeret 2012 – Forskning for forandring* [Research Barometer 2012: Research for Change]

¹⁸ Technopolis Group (2012): *A Good Council? Evaluation of the Research Council of Norway*

¹⁹ Research Council of Norway (2012): *Research in information and communication technology in Norway. An Evaluation*

increasing public investment in Norwegian ICT research. The issue of grants for ICT research will be addressed in ordinary budgetary processes.

9.4.1 Policy instruments for ICT R&D

Public ICT research is often conducted by universities, university colleges, research institutes and health authorities. The largest actors are NTNU and UiO, which combined accounted for around 75 per cent of the universities' total ICT research activities in 2009.

The state allocates around NOK 2 billion to ICT R&D every year, some of it as part of the annual basic allocations to the universities and university colleges. The allocation goes towards financing permanent research and teaching positions.

Open competitive arenas

Government grants are also allocated to competitive arenas whereby the best projects win funding. The competitive arenas offer possibilities to stimulate research in areas of particular social significance. The most important actor in the open competitive arenas is the Research Council of Norway. The EU's Framework Programme for Research constitutes the most important international arena.

VERDIKT

The Research Council of Norway's VERDIKT programme (Research Programme on Core Competence and Value Creation in ICT) has been the largest Norwegian publicly funded ICT programme since its establishment in 2007. VERDIKT will run until 2014, and had a total budget of NOK 180 million in 2011. The Research Council of Norway has begun work on determining future ICT programmes once VERDIKT is concluded in 2014.

User-driven research-based innovation

User-driven research-based innovation (BIA) is the Research Council of Norway's programme oriented towards R&D in industry. It is an open competitive arena, which means that projects from different areas compete for funding on the basis of research quality, degree of innovation, and value-creating potential. In other words, the projects originate in companies' own strategies and needs. Funding is worth 25–50 per cent of total project costs. The projects are organised in consortia whereby companies and R&D communities cooperate on achieving results. The knowledge, tech-

nology, and ICT industries account for 20 per cent of the portfolio. The ICT projects under BIA cover a wide spectrum, from software, sensors, and electronics to services and development methods. Public agencies may participate in BIA as partners but may not apply directly.

SkatteFUNN

SkatteFUNN is a tax deduction scheme for business and industry. Norwegian companies with research or development projects are entitled to tax deductions on costs related to R&D. The purpose of the scheme is to stimulate more R&D activities in business and industry and thereby enhance innovation. ICT often proves to be a research area not only for companies belonging to the ICT sector. In 2011, ICT was the most-used area in SkatteFUNN, with 1,384 projects, ahead of services (637), biotechnology (345), environmental technology (281), and innovation in and for the public sector (107). Measured by sector with most SkatteFUNN projects, ICT was again the largest, with 683 projects, ahead of marine/seafood (405) and petroleum (365). In 2011, projects in the ICT sector were expected to result in tax deductions worth NOK 481 million. Expected tax deductions for ICT projects in other sectors are of similar value.

Tax deductions related to R&D projects for small and medium-sized enterprises²⁰ can be 20 per cent, and for large companies 18 per cent. The ceiling for costs eligible for tax deduction is NOK 5.5 million per year for companies' internal R&D and NOK 11 million for R&D conducted both internally and procured from approved R&D institutions. This system allows small and medium-sized enterprises in particular to benefit from the scheme.

Industrial PhD

Industrial PhD is a three-year PhD scheme which a doctoral candidate completes in a company. The candidate is employed by the company, and the research topic must have clear relevance to the company. The Industrial PhD provides the company with new expertise and expands its network of contacts in academia.

Companies entering into a collaboration agreement under the Industrial PhD scheme receive an annual grant from the Research Council of Norway

²⁰ The criteria for whether a company qualifies as a small or medium-sized enterprise are specified in the regulations for SkatteFUNN, section 16–40–5, pursuant to corresponding EU regulations

equivalent to 50 per cent of the established rates for doctoral research fellowships. The candidate employed must be formally admitted to an ordinary doctoral degree programme at a university or university college. The scheme can be a good alternative for companies without the resources to participate in large-scale research projects.

The number of technology projects under the Industrial PhD scheme has risen; a total of 43 per cent of the projects are technology-oriented, and many contain elements of ICT. Many ICT projects are related to oil and gas technology, some to the health and care sector, and still others to teacher education and cognitive technology. For 2012, resources have been set aside for around 40 new projects under the Industrial PhD scheme.

The public sector will need advanced ICT competence in future, particularly relating to digitisation and transformation. Many actors, both in

research institutions and in public agencies, have called for a funding mechanism similar to and in addition to the Industrial PhD. Under such a scheme, the public sector would partly fund doctoral studies for its own employees within areas of importance to the agency in question. In its white paper on research with long-term perspectives (Meld. St. 18 (2012–2013)), the Government announced that it would pursue this issue by assessing a scheme for public agencies similar to the Industrial PhD scheme. In work on following up the Digital Agenda, a pilot scheme will therefore be considered, aimed specifically at themes and research topics related to ICT in the public sector. This work will be conducted within the current budgetary framework. Initial work will entail examining the mechanism, limitations, and scope of such a scheme in cooperation with the Research Council of Norway.

Box 9.7 Excerpts from the evaluation report on Norwegian ICT research

The evaluating team concludes that Norwegian ICT research possesses international strengths in a number of areas beyond what could be expected from its relatively small investments. The team believes there are several R&D communities in Norway with the potential to become international leaders in their fields.

According to the evaluating team, the greatest challenges to Norwegian R&D are:

- There is a lack of funding for basic research in ICT.
- Most of the resources are tied to students.
- Little is done to follow up young, newly employed researchers, for example through mentor schemes. Lack of follow-up could result in Norway losing expertise because of young researchers becoming disillusioned and leaving.
- Little is done to translate research into innovation.

The report makes several recommendations:

- Norway needs a national strategy for ICT R&D.
- There is a need for schemes for following up young researchers to prevent them from leaving research in favour of industry. A reward structure that makes research attractive should be established.

- Research communities should place importance on entrepreneurship. Institutions should prepare strategies for innovation with corresponding incentives.
- Research institutions should seek to better coordinate their educational offerings, flow of personnel, construction and support of facilities, and advanced research infrastructure. Coordination of curricula and doctoral programmes in different disciplinary fields will also increase mobility by making it easier to move between places of study during programmes.
- The institute sector should contribute more to educational institutions.
- Norwegian ICT research communities should be encouraged to compare their research focus, vision and productivity annually with a set of leading peer organisations outside of Norway.
- Efforts should be made to develop strong international partnerships between Norwegian and international research communities.
- Norway needs a strategic effort to increase national competence in cyber security.

Source: Research Council of Norway (2012): *Research in Information and Communication Technology in Norway. An Evaluation*

9.4.2 Strategy for ICT R&D

The white paper *Climate for Research* (St.meld. nr. 30 (2008–2009)) highlights ICT as one of three areas of R&D where specific strategies are needed. The goal is to achieve outstanding research results and national expertise of high calibre.

An international expert committee recently conducted an evaluation of Norwegian ICT research. The evaluation shows that while the quality of national research is good, room for improvement still exists. A key recommendation is that Norway needs a national strategy to give direction to research.

Box 9.8 Initiatives

89. *Doctoral scheme for ICT in the public sector, similar to the Industrial PhD scheme*

The Government will commission a report on a scheme for public agencies similar to the Industrial PhD scheme, and in addition consider establishment of a pilot scheme earmarked for ICT in the public sector. The Ministry of Government Administration, Reform and Church Affairs will prepare

the report, in dialogue with the Ministry of Education and Research and the Research Council of Norway.

90. *National strategy for ICT R&D*

The Ministry of Government Administration, Reform and Church Affairs will, in cooperation with other relevant ministries, prepare a national strategy for ICT R&D.

10 Reliable ICT

Already in 2000, the Vulnerability Committee's report *A Vulnerable Society* (NOU 2000: 24) ascertained that ICT systems had become part of the backbone of society and that society had become more vulnerable to failures in these systems. Since then, ICT systems have become increasingly essential, more integrated in all areas of society, and more crucial to society's ability to function. Information security is therefore an important aspect of civil protection, and systems and procedures are needed to prevent and manage cyber incidents. General trust in ICT solutions offered by the private and public sectors is vital. Experience in e-commerce shows that trust in, for example, secure payment solutions, has a major impact on how many use them (see chapter 4.2). Without such trust, deployment of ICT will be affected and the speed of transition to ICT in the public and private sectors will slow down.

Data protection will also be challenged by new ways to communicate and to use information systems and networks. Identity fraud is an increasing challenge for private citizens, businesses, and the authorities. Users of Norwegian public services must feel confident that their personal data will not fall into the wrong hands or be misused.

The Government has four main goals for network and information security:

- better coordination and shared situational awareness
- robust and secure ICT infrastructure for everyone
- good ability to handle adverse ICT events
- high level of competence and security awareness

By 'information security' is meant that information is securely stored, properly processed, and made accessible when needed. It is crucial that information is not disclosed to unauthorised parties and that only authorised individuals gain access to it. The technical term for this attribute is *confidentiality*. Furthermore, information and information processing must be complete, correct, and valid; attributes collectively known as *integrity*. ICT systems must also satisfy certain

Box 10.1 The Computer Crime Study (MørketallsundersøkelsenTM)

The purpose of the Norwegian Business and Industry Security Council is to prevent criminal activity within and against business and industry. The Council conducts an annual survey, *the Computer Crime Study* (MørketallsundersøkelsenTM) for the authorities and the business sector, mapping the scope of cyber-crime and cyber incidents in Norway. The survey provides insight into the scope and significance of security measures taken by public and private organisations. It also highlights cross-sectoral challenges, and is important for preventing such incidents in future.

The 2012 survey¹ showed that only one in three public and private enterprises has emergency preparedness plans and that one in three enterprises was unaware of the cost of cyber incidents. The survey receives technical and financial support from the Ministry of Government Administration, Reform and Church Affairs, among others.

¹ Næringslivets sikkerhetsråd (2012): *Mørketallsundersøkelsen – Informasjonssikkerhet og datakriminalitet* [Computer Crime Study]

requirements for stability to ensure that they can be accessed when needed; an attribute commonly referred to as *accessibility*.

Information security is a continuous process. The fast pace of technology development means that new security challenges are constantly emerging as new products and technology solutions are introduced and usage patterns change. Security protection challenges all levels of society, from personal computers and mobile devices (such as mobile phones and tablets) to systems critical for society.

The Office of the Auditor General of Norway has previously revealed several weaknesses in

information security in the public sector.¹ In *Annual Report 2011. Report on the state of Norway's security systems*, the Norwegian National Security Authority (NSM) stated that important ICT systems were often inadequately secured and that agencies' exposure to threats was increasing. *The Computer Crime Study 2012* (MørketallsundersøkelsenTM), revealed a growing gap between security threats and security measures in the public and private sectors. Simultaneously, agencies and enterprises increasingly depend on ICT.

Information security is becoming increasingly important to economic growth, civil protection, and national and international security policy. Many countries have formed strategies and guidelines for information security. Norway has also developed its own strategy for information security.² This strategy follows up previous guidelines on information security, and will be implemented through an action plan that will be revised when necessary.

The Government gives high priority to information security.

10.1 Current situation and challenges

When people hear about threats to information security, many think of cybercrime or cyberwarfare. However, threats against information security can be intentional or unintentional, and can just as easily be a case of unintentional harm to physical infrastructure as a case of sabotage of a computer system.

Society has become more vulnerable to brief service outages in systems and networks, partly because of increasingly complex multiple systems interoperating and depending on each other. Examples of these are processing industry monitoring and control systems, advanced measuring systems in power grids, and traffic signal and control systems.

10.1.1 Securing physical infrastructure

Statistics from the Norwegian Post and Telecommunications Authority show that mobile phone usage has increased from 12 per cent of total

phone traffic in 2001 to 72 per cent in the first half of 2012. A growing number of people are using mobile phones exclusively. Today, telecom networks are used for exchanging everything from basic text messages and conversations to controlling complex industrial systems.

A growing number of businesses and private individuals are using cloud services, that is, web-based services for storing and processing information. Use of cloud computing is increasing our dependence on the internet as infrastructure.

ICT infrastructure is dependent on power supply. To varying degrees, providers of ICT infrastructure and services have protected themselves against unstable power supply. Those who have done so are generally only protected against brief power outages. Secure and predictable power supply will be particularly critical for ICT infrastructure providers and for businesses dependent on ICT. This dependency represents a significant vulnerability in society.

Threats to infrastructure

In future, we can expect more frequent and more extreme climate incidents such as heavy precipitation, storms, drought, flooding, and landslides.

Box 10.2 Impacts of extreme weather: 'Dagmar'

The cyclone 'Dagmar' struck north-western Norway in December 2011. The ensuing extensive and prolonged power outage and disruption of telecommunications had serious consequences. 'Dagmar' showed that society is poorly prepared to handle prolonged interruptions to such services. Statistics from the Norwegian Post and Telecommunications Authority show that a large number of mobile phone base stations were put out of service, around 20,000 people had no fixed phone connection, and around 7,500 lost their internet/broadband connection. Parts of Norkring's transmission network, which provides radio and TV signals to the whole country, were also down. Many were without power, telephone, and internet connections for several days, and some areas were without telephone and internet for several weeks. Coastal radio service was affected when the station at Florø was damaged during the extreme weather.

¹ Riksrevisjonen (2010): Dokument 1 (2010–2011)

² Ministry of Government Administration, Reform and Church Affairs, Ministry of Defence, Ministry of Justice and Public Security, and Ministry of Transport and Communications (2012): *Cyber Security Strategy for Norway*

Gradual changes will occur, such as higher temperatures, rising sea levels, and increasing precipitation. These may result in more frequent and severe forest fires and in more frequent breakdowns in and damage to physical infrastructure.

Human error also damages physical infrastructure, usually when cabling is cut during excavation or when work is done on IT systems. Such incidents can be the result of carelessness, insufficient preparatory work, or deficient documentation.

To prevent negative consequences of natural events, accidents or acts of sabotage, critical infrastructure must be adequately secured. If infrastructure is classified in regulations as critical to national security interests, measures must be taken to prevent identified threats and possible incidents – both intentional and unintentional. Securing information infrastructure is critical to network and information security.

Security needs must be balanced against environmental and economic considerations when planning and deploying infrastructure. In establishing infrastructure, environmental and economic considerations often result in common conveyance routes for cabling, shared antenna masts, and co-location of technical equipment. Experience shows that such measures can compromise security. On the other hand, security measures for one type of infrastructure can provide protection for another infrastructure following the same route. One such example is where infrastructure

protecting roads from landslides also contributes to protecting cables laid under road surfaces.

10.1.2 Threats to ICT systems

Unforeseen events and human error

Unplanned downtime in ICT systems may be caused by external attacks, but it can also be caused by unforeseen events and human error. Human error manifests itself in many forms and can be extremely difficult to foresee. An event can often be attributed to a human error made long before the event.

Errors in ICT systems can be caused by insufficient testing or by failure to test the right things. They can also be caused by miscalculations in, for example, system design, or by use of an ICT system for purposes other than originally intended. Occasionally, attempts to fix an error result in new, even more severe errors. Unplanned downtime can also be caused by manufacturing errors in hardware or components that go undetected during quality assurance or testing.

Businesses must establish procedures for avoiding human error. Nonetheless, there is a high probability of an incident occurring because something happens which no one had envisaged, or because a series of unforeseen circumstances occur or because procedures are not followed. It is therefore crucial to have plans and procedures for dealing with incidents – regardless of cause.

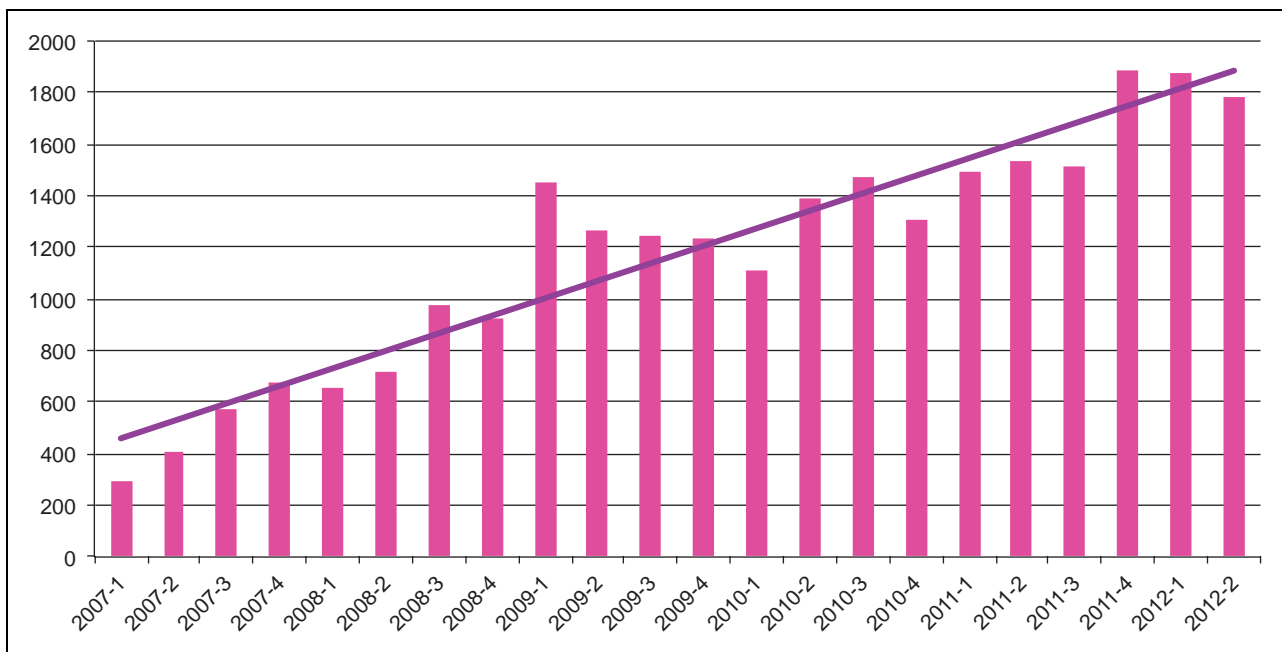


Figure 10.1 Number of cyber incidents handled in Norway, 2007–2012, by quarter

Source: Statistics on the number of cases handled at the NorCERT Operations Centre

Cyberattacks and cybercrime

Increased use of the internet and mobile devices has led to greater risk of exposure to cyberattacks and cybercrime. The trend in targeted attacks on critical ICT systems by professional criminals is growing. Attackers often use security holes in software and hardware. Civilian agencies, military units, and private companies are all exposed to espionage and sabotage. Many countries are developing capabilities to conduct cyberwarfare.

Annual threat assessments from the authorities show that the threat of ICT-based espionage and sabotage has increased in recent years. Many countries are developing intelligence and offensive capabilities for use in and against ICT infrastructure. Such activities seek to gain access to, manipulate, or delete sensitive information.

NorCERT (Norwegian Computer Emergency Response Team), a department under the NSM, constantly detects cyber incidents in Norway. The number of such incidents tripled between 2007 and 2011. Furthermore, incidents have become more severe and require more follow-up.

‘Cybercrime’ is a generic term for various types of criminal activity, either using ICT tools to commit crimes or committing criminal acts involving computer data and computer systems. Typical examples are crimes for profit such as e-commerce fraud, identity fraud, denial of service (DoS) attacks, illegal access, damaging important information systems or infrastructure, and cyber espionage. Identity theft and identity fraud are

increasingly challenging private citizens, businesses, and the authorities.

An underground market is now readily accessible on the internet where anyone can buy and sell information or tools for use in cybercrimes. Because of such activities, individuals with little ICT competence can carry out attacks.

Not all cyberattacks come from outside; employees may also steal data or cause damage to systems and data. For example, employees or former employees may be tempted by bribes or subjected to blackmail, or may seek revenge on current or former employers.

10.2 Strategic priorities

The Government has set seven strategic priorities to address the security challenges we face. These priorities are intended to ensure that we achieve the goals set for cyber security:

A more comprehensive and systematic approach to information security

Private and public organisations shall safeguard information security *comprehensively and systematically*. This entails a conscious use of information security management systems (ISMS) based on recognised standards. Requirements must be tailored to the risk facing the individual organisation. The nature, size and social significance of the organisation will dictate its level of ambition and the allocation of resources to security efforts. Critical infrastructure, such as power grids and electronic communication networks, must be prioritised.

Improving ICT infrastructure

ICT infrastructure supporting critical functions must be robust and reliable to avoid cyber incidents as far as possible. Achieving robustness and reliability requires identifying the most important functions and services in society, and the agencies responsible for them. This process will help identify infrastructure critical for agencies and, consequently, for society as a whole. Such efforts will simplify national control and follow-up of civil protection, and strengthen risk management by sector authorities and respective agencies, as well as business continuity planning in critical activities.

Box 10.3 NorCERT

NorCERT is Norway’s national centre for issuing alerts on and coordinating responses to serious cyberattacks. The Norwegian Alert and Early Warning System for Digital Infrastructure (VDI) gives authorities capabilities to verify and issue alerts on serious and coordinated attacks on critical ICT infrastructure. NorCERT participates in the Nordic CERT (Computer Emergency Response Team) partnership and cooperates closely with counterparts in other countries. NorCERT is a department under the NSM.

Source: More information at: www.nsm.stat.no

A common approach to information security in public administration

Citizens, the business sector, and the public sector must have confidence in the security and reliability of public sector business systems and online services. Risk and vulnerability should form the basis for all implementation of ICT security in public administration.

Safeguard society's ability to detect, alert, and handle serious ICT incidents.

Norway must be in a constant state of proactive operational preparedness in order to prevent, detect, and coordinate reactions to serious ICT incidents. In this context, relevant authorities and organisations must work in close collaboration, with special emphasis on working with those parts of the private sector that own or operate infrastructure. This collaboration must address both intentional and unintentional events, such as technical or human error, accidents, or natural disasters.

Safeguard society's ability to prevent, detect, and investigate cybercrime.

Cyber criminals must not be able to prepare or carry out criminal acts without significant risk of being detected and prosecuted. Public authorities will continue to increase their capacity in this field in order to detect cyber crime that directly or indirectly may have an impact on national security or vital national interests.

Continuous efforts to raise awareness and competence

Citizens, and employees and managements in Norwegian businesses must be security conscious and must enhance their competence in information security.

High-quality national cyber security R&D

Norwegian research communities should be at the forefront of many aspects of network and information security. Norwegian participation in international research should be encouraged.

10.3 Information security and data protection in public digital solutions

Increased public sector digitisation means that information security will become increasingly important (see chapter 8). In future, Difi will strengthen its work on public sector ICT security. A competence group will be established in Difi to act as a driver of and contributor to improving management and quality assurance of information security in the public sector.

Processing of personal data is necessary for the public sector to be able to exercise public authority and provide services. Citizens' privacy must be protected as much as possible. Public authorities should lead by example in protecting citizens' privacy and should give particular consideration to data protection issues.

An important principle of data protection is to only gather and process the personal data necessary to perform the service in question. If providers of public services shall be granted access to individuals' personal data, systems must allocate graded access according to roles and pre-defined access levels. Implementing the Government's digitisation programme will require new ICT solutions in several areas. These solutions must have sound systems for identity management and access control.

10.4 Responsibility for ICT security

Work on national civil protection and emergency preparedness has for many years been based on the principles of liability, conformity, and decentralisation.³

- *Principle of liability* means that the authority, agency, or department ordinarily responsible for a sector shall also be responsible for emergency preparedness and for maintaining operations during a crisis or catastrophe.
- *Principle of conformity* means that the organisation that shall handle a crisis should be as similar as possible to the regular organisation.
- *Principle of decentralisation* means that crises shall be handled at the lowest possible organisational level. The entity closest to a crisis will normally be best placed to understand the situation and therefore best suited to handling it.

³ St.meld. nr. 17 (2001–2002) *Samfunnssikkerhet – veien til et mindre sårbart samfunn*, white paper on the safety and security of society

Box 10.4 Critical infrastructure protection (CIP)

Actors responsible for critical societal functions are responsible for identifying which services and tasks are involved in those functions. They are also responsible for identifying which critical input factors, such as electronic communication services or electricity supplies, they need to sustain societal functions under different types of pressure.

A structured framework is necessary to implement these types of analyses. Commissioned by the Ministry of Justice and Public Security, the Directorate for Civil Protection and Emergency Planning (DSB) proposed an overall risk management model known as critical infrastructure protection (CIP).

This model has two dimensions: one for following up security at the highest level, and one for defining critical societal functions. So far, 12

critical societal functions have been defined, and functions necessary when society is under pressure have been described.

The next phase in the CIP project involves further clarifying sectoral definitions of the respective societal functions. DSB and sectoral authorities are closely cooperating in this phase. Agencies responsible for critical societal functions are also involved in CIP. Clarifying critical societal functions will produce a better overview of vulnerability and dependency on ICT infrastructure in society, and should contribute to strengthening risk management by various actors.

CIP will serve as a basis for planning and prioritising preventive and preparedness measures and will help ensure robust solutions and continuity in government and societal functions.

Source: DSB (2012): *Sikkerhet i kritisk infrastruktur og kritiske samfunnsfunksjoner – modell for overordnet risikostyring* [Security in critical infrastructure and critical societal functions: Model for overall risk management], KIKS-Prosjektet 1. delrapport, DSB 2012

Experience shows that, in crises, there is a strong need to view society's total resources in relation to each other. It is crucial that all authorities and agencies cooperate across sectors on prevention, emergency preparedness, and crisis management. Therefore, in the white paper on civil protection (Meld. St. 29 (2011–2012)), the Government is introducing a new principle, the *principle of cooperation*:

- *Principle of cooperation* means that an authority, agency, or department shall be independently responsible for ensuring best possible cooperation with relevant actors and agencies concerning prevention, emergency preparedness, and crisis management. Cooperation should take place not only between public agencies; private organisations and voluntary groups are also important cooperation partners.

10.4.1 Ministerial responsibilities for ICT security

Ministries have overall responsibility for ICT infrastructure security in their respective sectors and for ensuring that preventive efforts in ICT security in their sectors are satisfactory. These responsibilities entail identifying critical infra-

structure, initiating preventive and preparedness measures, planning crisis management, and following up work on information security in their respective agencies.

Some ministries have specific roles in ICT security:

The Ministry of Justice and Public Security is responsible for coordinating civilian security. In addition to initiating, developing, and implementing measures through its own channels, the Ministry acts as initiator and coordinator with respect to other sectoral authorities. The Ministry ensures that civil protection policy is followed up in all areas of society. ICT security constitutes a key and integrated element in this coordination work.

The Ministry of Government Administration, Reform and Church Affairs is responsible for coordinating government ICT policy. The Ministry has specific responsibility for promoting a stronger and more comprehensive approach to information security in the public administration. This responsibility involves choosing common standards, using information security management systems, and providing guidance at the highest level. The Ministry is also responsible for improving coordination of work on information security by agencies and for contributing to coordinated solutions.

The Ministry of Defence is responsible for cyber security in the military sector, including preventive measures. The Ministry of Defence has management responsibility for the NSM and administrative responsibility for the National Security Act.

The Ministry of Transport and Communications is, by virtue of its responsibility for the Norwegian Post and Telecommunications Authority, responsible for ICT security related to electronic communication networks and services.

10.4.2 Agency responsibilities

Several regulations instruct public agencies to use information security management systems. This requirement is stated in the eGovernment Regulations, which apply to the entire public sector. The Personal Data Regulations apply to both the private and the public sectors. In addition, the Security Act applies to the entire public sector and to specific areas in the private sector. Several regulations state provisions requiring security to be adapted to risk.

Many factors in everyday working life can complicate agencies' security policies:

- Employees are increasingly allowed to choose which mobile devices (computers, tablets, mobile phones) to use and to switch between using equipment at home and in the workplace. This situation makes security work more complex and more difficult in terms of assessing risk and vulnerability and in documenting personal security.
- A growing number of Norwegian companies outsource operating and system development tasks to service providers based abroad. Local operating conditions, regulations, and practices might deviate from Norwegian requirements for secure ICT operation.
- Many companies have internal – often industry-specific – or specially adapted systems that can make it difficult to understand the consequences of installing security updates. Updates can also create interruptions in production and delivery processes.
- Companies sometimes have customised systems running on platforms no longer supported by the manufacturer. In such cases, they will no longer receive patches to handle vulnerabilities. Updating to new platforms can demand considerable resources to replace legacy software and hardware and to adapt systems. Although developing new, more modern

systems is usually more expedient, it is time consuming and expensive.

Before companies begin implementing security measures, they often conduct risk and vulnerability analyses. Such analyses assess the probability of an incident and its consequences. Measures are implemented following a cost-benefit analysis. How much a company's customers are willing to pay for increased security often plays a role.

However, many companies – including private companies such as banks and telecommunication providers – administrate systems that are considered critical infrastructure. In such cases, the respective authorities set requirements for such systems' continuity of operation. In case of incidents involving electronic communication, such as faults in software, loss of or interruption to internet and mobile phone services, etc., companies are legally required to notify the Norwegian Post and Telecommunications Authority.

The public sector

The public sector must conduct sound risk and vulnerability assessments. The Norwegian Data Protection Authority, the NSM, and the Office of the Auditor General of Norway have uncovered weaknesses in the public sector's risk assessments. Existing security measures were found to be fragmented and not systematic enough, and work on information security was found to be neither sufficiently entrenched in agency managements nor sufficiently integrated with their performance management practices. Increased use of international security standards in the public sector will contribute to increased integration and systematisation of security work.

Consideration will be given to requiring public agencies to adopt standards for information security. Information security can be an integral part of an agency's overall management system for continual improvement of work processes, achievement of objectives, health, safety, and environment, environmental management, social responsibility, etc.

The principle of agencies' being responsible for their own information security is challenged by the new ways in which agencies operate. In future, public agencies will share or reuse common functionalities – also called 'common components' – to a far greater extent (see chapter 8.2). From this perspective, assessments of information security will be essential. For example, agencies can no longer rely on their own security policies alone. The trend in establishing common

components such as Altinn and the eID Gateway contributes to professionalization of security tasks, but it also places higher demands on coordination.

10.4.3 User responsibilities

In many cases, the individual user has become a key defence against intentional cyber incidents, meaning that demands placed on users are increasing. They are expected to be able to recognise fake websites, e-mails, images, and antivirus programmes, and virus-infected attachments. In addition, individual users are expected to install and use security tools and programmes without necessarily being qualified to do so. These issues present major challenges.

Use of web forums and social networks also creates a number of security challenges. Users and agencies need to be more aware of this. They also need information on data protection and potential threats. There is also a need to raise user awareness about the consequences malware can have for themselves, their employers, and other internet users, and about individual responsibility to prevent distribution of malware. Information obtained from social networks can provide valuable background information to cyberattackers. Such information can be used, for example, for social manipulation. These types of attacks, where attackers use methods such as fear, grooming, and baiting, are becoming increasingly widespread.

Inadequate security measures by private individuals can also have consequences for civil pro-

tection. A key element in this connection is the use of botnets. A botnet is a network consisting of thousands of computers which, unknown to users, are infected by Trojan horse programmes and controlled by criminal organisations. These programmes are used to perform so-called 'denial-of-service attacks' whereby a website is so deluged with access enquiries that it cannot respond to legitimate traffic and is therefore unable to provide service. These attacks are used for purposes of, for example, blackmail, or are politically motivated.

Personal computers controlled by criminals can also be used to illegally spread stolen personal data or credit card details. Such stolen information is then sold on the illegal market and used for identity theft, blackmail, and fraud targeting credit card companies and online banks. Criminals can also use so-called 'proxy servers,' which can avoid criteria for legally accessing online services or that can hide the identity of the party contacting a website.

Although individuals must exercise critical judgement online, they may be unable to do so if they lack sufficient information and competence. Both authorities and individual employers have a responsibility to ensure that such information is available and to increase awareness of information security. Many public and private actors are working on enhancing security competence among the population (see chapter 2.2.1). Although many actors are already cooperating with each other, better coordination will further reinforce these efforts.

Box 10.5 Initiatives**91. National strategy for information security**

In 2012, the Government launched a national cyber security strategy to provide guidelines and priorities for work on information security. The strategy was accompanied by an action plan stating how the Government will follow up the areas highlighted in the strategy.

92. Further development of the Norwegian National Security Authority (NSM)

In the Long-term Defence Plan (Prop. 73 S (2011–2012)), the Government decided to further develop the NSM as the central directorate for protection of information and infrastructure of importance to critical societal functions. In cooperation with the respective ministries, the NSM will undertake necessary coordination of selection processes associated with the Object Security Regulations, provide advice and guidance, and supervise.

93. Strengthening of NorCERT

From 2013, NorCERT (Norwegian Computer Emergency Response Team) will be significantly strengthened to enable round-the-clock operation, thus enhancing national capability to effectively handle serious cyber incidents, analyse malware, and perform strategic analyses of ICT risk situations. This will also enhance coordination of operative cooperation on security for critical ICT infrastructure. Cooperation with Nordic CERTs will also be strengthened.

94. Strengthening information security in the public sector

In the 2013 national budget, the Government decided to intensify efforts on information security in the public sector. The aim is to establish a dedicated ICT security group

under the auspices of Difi. Difi will develop common initiatives and coordinate work on information security across public agencies.

95. Cyberattack response teams

All relevant sectors must establish response teams (CSIRT: Computer Security Incident Response Teams). At a minimum, the sectors must create a contact point in the event of serious cyber incidents in their respective sectors, as well as procedures for notifying internally and for notifying NorCERT.

96. Object Security Regulations

The Object Security Regulations entered into force on 1 January 2011, and will be implemented over a three-year period. The Ministry of Defence will follow up implementation.

97. ICT security in the circular on digitisation

In the circular on digitisation issued by the Ministry of Government Administration, Reform and Church Affairs, public agencies are instructed to have internal controls for information security. These internal controls must be based on recognised standards for information security management systems. (See Difi's reference catalogue, version 3.1, item 2.16 *Styringsystem for informasjonssikkerhet* [Management system for information security]).

98. Improved coordination of awareness-raising initiatives

The Ministry of Justice and Public Security will facilitate common or coordinated programmes between the authorities and the business sector to raise awareness and provide training in information security, and in building a healthy culture of information security in public and private organisations.

11 Effective innovation policy instruments

The overarching goal of the Government's industrial policy is to create an optimal climate for value creation in the Norwegian economy and for full employment. Profitable companies mean secure jobs. Economic policy is important for the Norwegian ICT sector and for implementing the Digital Agenda. It is also important for companies based on innovation and business development through ICT – without being part of what we traditionally refer to as the ICT sector.

Like other parts of the economy, the ICT sector should have good framework conditions, the principal ones being effective taxation, infrastructure, competence (basic, applied, and advanced), access to capital, and other mechanisms that promote innovation and competitiveness. Initiatives such as public purchases and procurement, standardisation and ICT architecture, and development of new digital common solutions from the public sector have significance for the ICT industry (see chapter 8). Beyond general framework conditions, industrial policy is implemented by means of innovation policy instruments.

11.1 Innovation policy instruments

Innovation policy instruments will trigger socially and commercially profitable projects which otherwise would not be realised, regardless of industry sector. The purpose of innovation policy instruments is to contribute to better utilisation of society's resources than would be the case were they not applied. Specifically, the market should continue to be the key source of capital for new projects, but the public sector can contribute when the market fails. Innovation policy instruments should not be the only funding source for projects, but should contribute to attracting private capital. Only in exceptional cases should public funding of projects constitute more than 50 per cent of project costs. Innovation Norway, SIVA (Industrial Development Corporation of Norway), and the Research Council of Norway manage a large portion of the Government's innovation policy instruments. These instruments were created to coun-

teract the effects of failed markets on small and medium-sized enterprises and on R&D and innovation projects. Nonetheless, market failure alone will not justify implementing government initiatives.

To ensure that policy instruments are well utilised, the Government has outlined eight criteria for assessing the use of innovation policy instruments:¹

- Market failure must hamper economic value creation and growth.
- The impacts of market failure must exceed the cost of market intervention.
- The policy instrument implemented must be appropriate to correct the market failure as intended.
- The objective of the policy instrument must be clearly defined.
- No alternative instruments that would better achieve the policy instrument's objective must exist.
- The criteria for selecting the policy instrument must be clear and predictable.
- The policy instrument must be simple to administer so that the cost of applying it is small compared to its effect.
- Applicants seeking to participate in the policy instrument must be entitled to receive a decision within a reasonable time.

Since ICT is a key industry in its own right as well as highly significant for others, these criteria will also be important for the ICT industry.

11.1.1 Innovation Norway

Innovation Norway is a key contributor to national innovation policy instruments. The company has offices in all Norwegian counties apart from Akershus, and around 30 offices abroad. Innovation Norway administers policy instruments related to finance, networks, competence, advisory ser-

¹ The criteria are described in Meld. St. 22 (2011–2012): *Verktøy for vekst – Om Innovasjon Norge og SIVA SF* [Tools for Growth: About Innovation Norway and SIVA]

vices, and promotional services. Most of Innovation Norway's policy instruments are essentially industry-neutral. Support is given to the best and most economically and financially profitable innovation projects, though some schemes can have other objectives. In its white paper on tools for growth (Meld. St. 22 (2011–2012)), the Government announced its intentions to:

- Simplify Innovation Norway's policy instrument portfolio to make it easier for users to learn about the company's programmes and services.
- Develop the current offering of capital to enterprises during the early growth stage.
- Strengthen Innovation Norway's internationalisation efforts, prioritising small and medium-sized enterprises.
- Establish a professional and robust role in the national innovation policy instrument – Invest in Norway – to handle investment enquiries from abroad.
- Establish a new investment mandate for Investinor (see below).
- Establish new nationwide seed funds (see below).

11.1.2 SIVA

The main objective of SIVA is to contribute to innovation and economic development in all regions of Norway. The company does so through real estate activities and by developing strong regional innovative and value-creating clusters. Some examples of SIVA's activities are programmes for business gardens and business incubators, and ownership interests in innovation companies and physical infrastructure. Business incubators are most often attractive policy instruments for new ICT companies. These schemes offer physical environments (premises) and advisory and support services to help entrepreneurs to further develop promising business ideas.

11.1.3 Investinor

Investinor is an investment company offering capital, by means of direct investment, to promising companies during their early growth stage. Investments must be made on a commercial basis and on the same terms as for private investors. The Government has granted Investinor a total of NOK 3.7 billion in equity. In the second quarter 2012, ICT was Investinor's second-largest business sector, measured in number of investments.

Much of the rest of Investinor's portfolio has ICT as an important product or service element.

In its white paper on tools for growth (Meld. St. 22 (2011–2012)), the Government presented a shift of focus for Investinor's core investment areas, from industries such as energy, environment, tourism, and the marine and maritime sectors to profitable investments in sectors:

- with business clusters having international comparative advantages
- that utilise vital natural resources
- that utilise new technology and competence
- that contribute to minimising environmental impacts and man-made climate change

These investments can be in environmental technology, energy, the marine industry, the maritime sector, tourism, ICT, biotechnology, and health technology.

11.1.4 Other key innovation policy initiatives

The white paper on tools for growth (Meld. St. 22 (2011–2012)) also announced other new and important initiatives:

Establishment of new nationwide seed funds

Seed funds are a form of policy instrument for providing new, innovative, and internationally competitive companies in their early growth stage with competent capital through cooperation between public and private investors.

ICT is a particularly important investment area for seed funding. These projects often have a relatively short time to market, are moderately capital-intensive, and internationally scalable. ICT projects are also in good supply. One of the four nationwide seed funds established focuses on ICT, while the other funds invest heavily in ICT-intensive projects. In practice, these funds are fully invested, and only invest in new projects to a small degree.

The Government therefore wants to establish up to six new nationwide seed funds. Each fund will have around NOK 500 million under management, and the state and private investors will each supply half the capital. The Government will also provide risk relief to private investors to trigger capital and competence. Industry practice is that funds specialise in certain industries to focus on resources and to thereby ensure best possible profitability. The funds' focus areas will be determined by fund manager competence and investor interest. In addition to ICT, interesting investment

areas might be energy, environmental technology, the marine sector, biotechnology, health technology, and tourism. The objective is to establish funds in all regions of Norway, with national investment mandates. Resources were allocated in the revised 2012 national budget for government participation in two new funds.

Network for business angels

Business angels are private investors who provide capital, competence, and networks to new businesses, often based on their own entrepreneurial experience. Networks between business angels can help potential entrepreneurs in need of capital and competence to find investors more easily. Simultaneously, such networks can enhance investors' competence and investment skills. The Government has announced its wish to support

establishment and further development of national networks for this type of investor.

Strategy for small enterprises

Eighty-eight per cent of ICT enterprises in Norway have 1–4 employees, which makes investment in such enterprises important. The Government will follow up the strategy laid out in *Små bedrifter – store verdier* [Small enterprises – great value], where 64 specific initiatives were launched to improve general conditions for small and medium-sized enterprises. One of the key initiatives is simplification. The goal for the strategy is for enterprises to spend less time on statutory administrative tasks and more time on operating and developing their businesses.

Box 11.1 Initiatives

99. *New mandate for Investinor*

The Ministry of Trade and Industry will consider changing current guidelines on specific investment areas to facilitate greater flexibility. Ownership of Investinor will be transferred from Innovation Norway to the Ministry of Trade and Industry.

100. *Simplification of Innovation Norway's policy instruments portfolio*

The Ministry of Trade and Industry will ask the two main actors (Innovation Norway and SIVA) to review the companies' collective portfolio of policy instruments. Innovation Norway will be tasked with proposing

specific initiatives for this type of simplification and to consider following up in cooperation with the owners and relevant ministries.

101. *New nationwide seed fund*

The Ministry of Trade and Industry proposes establishment of new nationwide seed funds, and that Innovation Norway be tasked with managing state ownership.

102. *White paper on intellectual property rights*

The Ministry of Trade and Industry will present a white paper to the Storting on intellectual property rights in which the significance of intellectual property rights for innovation and value creation is discussed.

Part IV
Implementation

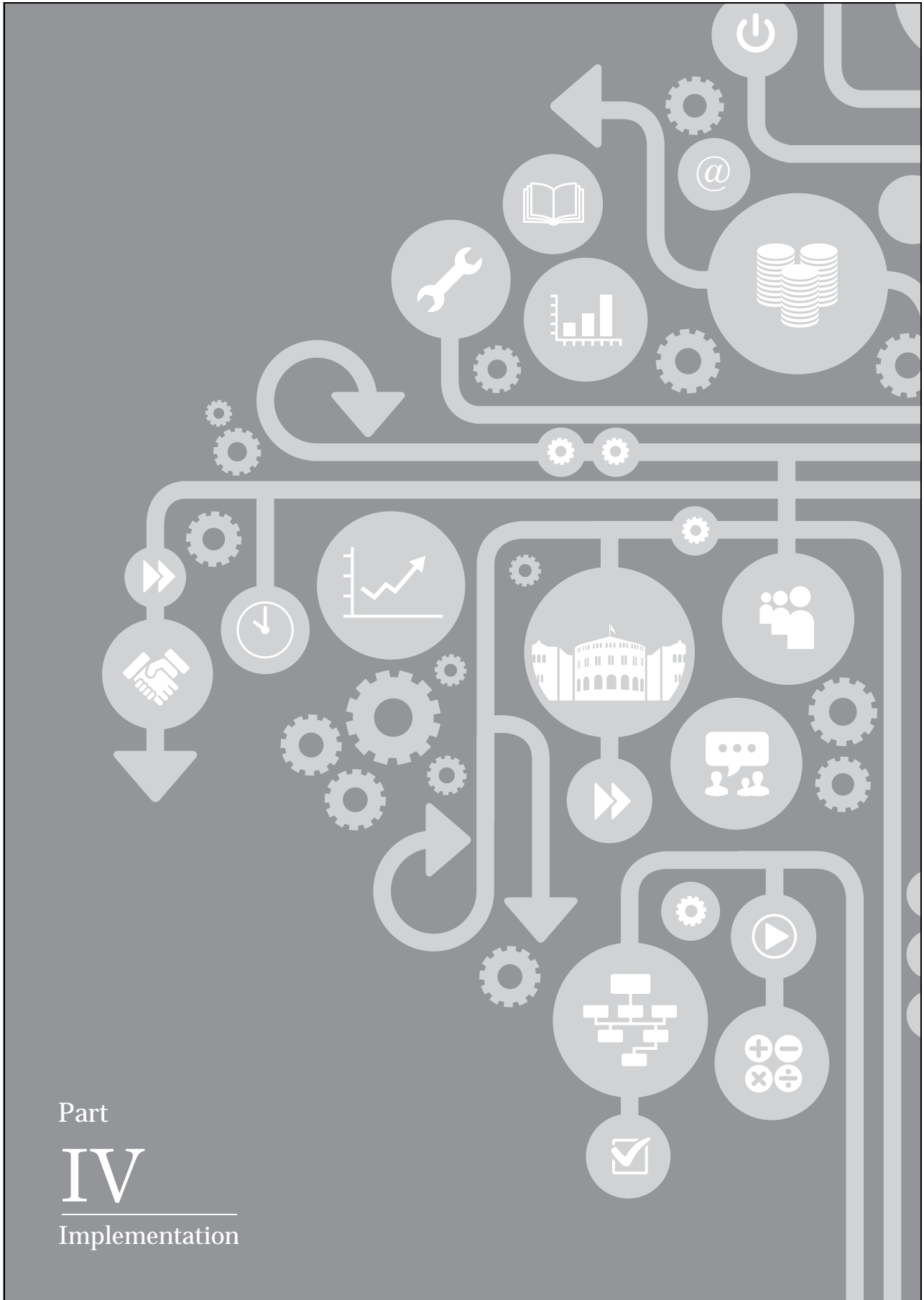


Figure 12.1

12 Responsibility, follow-up, and realisation

Digital Agenda highlights the priority areas for promoting value creation and innovation by means of ICT.

The Ministry of Government Administration, Reform and Church Affairs has overarching responsibility for coordinating ICT policy. This role involves acting as a driver for key areas related to the information society, responsibility to identify and follow up cross-sectoral issues, and responsibility to initiate and coordinate cross-sectoral initiatives. This work entails preparing overviews and strategies for national ICT policy.

ICT policy is closely linked to several other policy areas. This white paper has therefore been prepared in cooperation with several ministries. The ministries are responsible for ICT within their respective areas. This means that, for example, the Ministry of Education and Research has responsibility for ICT policy in the areas of competence and education, the Ministry of Transport and Communications for ICT policy in the areas of transport and communications, and the Ministry of Culture for ICT policy in the areas of culture and media.

Overarching responsibility for following up many of the initiatives presented in this white paper and in the relevant policy areas lies with ministries other than the Ministry of Government Administration, Reform and Church Affairs. The Ministry of Government Administration, Reform and Church Affairs will, nevertheless, have overarching responsibility for following up progress and results, in dialogue with the other ministries.

This white paper has also been based on dialogue and communication with external stake-

holders such as individual enterprises, non-profit organisations, interest groups, and representatives of academia and the R&D community. The Government will build on this cooperation in following up on the white paper. The Government will therefore create forums and networks on important issues discussed in this white paper.

The Government wants the white paper on Digital Agenda for Norway to be relevant to business and industry, interest groups, decision-makers in the public and private sectors, academia, the R&D community, volunteers, and civil society.

The Government will be following developments over time of ICT's spread throughout society and how ICT creates growth and value creation.

ICT development is, by its very nature, a cross-sectoral phenomenon, meaning that ICT trends in Norway will largely follow *international* trends and general international conditions. The Government will therefore place importance on international programmes and projects at Nordic level, in the EU and OECD, and through dialogue with individual countries.

Box 12.1 Initiatives

103. *Indicators and statistics on ICT trends*

The Ministry of Government Administration, Reform and Church Affairs will prepare statistics and indicators on ICT trends.

13 Economic and administrative consequences

The white paper on Digital Agenda for Norway outlines how the Government will enable Norway as a society to exploit the possibilities that ICT and the internet offer for value creation and innovation.

Several studies show that use of ICT, and of the internet in particular, contributes positively to economic development and acts as a catalyst for growth and innovation. An OECD study from 2012 summarises the results from multiple studies showing that increased broadband penetration contributes positively to GDP growth.¹ According to another study conducted by researchers at the University of Groningen, 50 per cent of Europe's productivity growth between 2004 and 2009 was attributable to use of ICT.² An analysis undertaken by McKinsey in nine countries (Sweden, Germany, UK, France, South Korea, Canada, Italy, and Japan) estimates that 21 per cent of GDP growth in the past five years alone can be attributed to the internet.³ We can make a calculation to illustrate what this means for Norway. GDP for mainland Norway grew by 9.6 per cent between 2006 and 2011, measured in constant prices. If we make a conservative estimate that 10 per cent of this growth is attributable to the internet, this is equivalent to almost NOK 17 billion (in 2011 kroner).

A Norwegian study shows a positive connection between use of ICT and work productivity in business and industry.⁴ The results also show that

there are positive interaction effects between use of ICT and employees with higher education. These can be interpreted to mean that the benefits a company derives from ICT increase if the company's employees have higher education.

This white paper discusses a range of initiatives with potentially beneficial effects for stakeholders in the private and public sectors and for society. Many of these initiatives will also entail costs that must be weighed against short-term and long-term gains. Gains often occur in places other than those where investments are made, and often years later. Estimating effects can therefore prove difficult. Many of the initiatives presented in this white paper involve assessing the need for, and design of, changes in policy. Future reporting will discuss the economic and administrative consequences of relevant initiatives. The costs of the initiatives described in this white paper will be covered by the budgets of the ministries involved.

The Ministry of Government Administration, Reform and Church Affairs

r e c o m m e n d s :

that the recommendation from the Ministry of Government Administration, Reform and Church Affairs dated 22 March 2013 on Digital Agenda for Norway be presented to the Storting.

¹ Strykowski, Piotr (2012): *The Impact of Internet in OECD Countries*, OECD Digital Economy Papers, No. 200, OECD Publishing

² Ark, Bart van and Robert Inklaar (2005): *Catching up or Getting Stuck? Europe's Troubles to Exploit ICT's Productivity Potential*, Groningen Growth and Development Centre, University of Groningen

³ McKinsey Global Institute (2011): *Internet matters: The net's sweeping impact on growth, jobs, and prosperity*

⁴ Rybalka, Marina (2008): *Hvor viktig er IKT for utviklingen i næringslivet: produktivitetsanalyse* [How important is ICT for development in business and industry?: A productivity analysis], in Økonomiske analyser 5/2008 (SSB)

Published by:
Norwegian Ministry of Government Administration, Reform and
Church Affairs

Internet address:
www.government.no

Illustrations, cover and parts: Dinamo

Printed by:
07 Aurskog AS 05/2013

