Shaping Norway's Digital Future

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Foreword

Shaping Norway's Digital Future analyses Norway's digital performance, policies and priorities to inform development of a new national digital strategy. It outlines the priorities and trends that will shape the country's digital future and maps its digital policy ecosystem. The report further assesses Norway's digital performance based on the OECD Going Digital Toolkit dashboard of indicators, analysing its policies through the lens of the OECD Going Digital Integrated Policy Framework. It concludes with policy recommendations to achieve a more digital, innovative and inclusive Norway.

The report was undertaken with the financial support of the Norwegian Ministry of Digitalisation and Public Governance. It draws on interviews with Norwegian stakeholders from academia and the private sector, including Digital Norway and Innovation Norway.

The OECD Directorate for Science, Technology and Innovation carried out the study under the auspices of the OECD Digital Policy Committee (DPC). The DPC declassified the report on 4 April 2024.

Molly Lesher, Lorena Giuberti Coutinho and Louis Holt wrote the report under the leadership of Audrey Plonk and Jerry Sheehan. Katarina de Brisis, Timothy Szlachetko and Astrid Solhaug (Norwegian Ministry of Digitalisation and Public Governance) provided invaluable advice and feedback. The following OECD colleagues provided content and support in their respective areas of expertise: Nicolas Benoit, Elif Koksal-Oudot, Pierre Montagnier, Julian Olsen and Hanna Pawelec. Mark Foss provided editorial support and Bertrand Sadin designed the cover.

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Reader's guide

Acronyms

AI	Artificial intelligence
CDMA2000 1x EV-DO	Code Division Multiple Access (Evolution-Data Optimised)
CDMA 1xRTT	Code Division Multiple Access (Single-Carrier Radio Transmission Technology)
Datatilsynet	Norwegian Data Protection Authority
Digdir	Norwegian Digitalisation Agency
ICT	Information and communication technology
EDGE	Enhanced Data for Global Evolution
FDI	Foreign direct investment
Finanstilsynet	Financial Supervisory Authority of Norway
Framework	OECD Going Digital Integrated Policy Framework
Gbps	Gigabits per second
GDPR	General Data Protection Regulation
GDP	Gross domestic product
GHz	Gigahertz
GPRS	General Packet Radio Service
HSPA	High Speed Packet Access
IoT	Internet of Things
Kbps	Kilobits per second
LTE	Long-Term Evolution
Mbps	Megabits per second
NDS	National digital strategy
NDSC	National digital strategy comprehensiveness indicator
Nkom	Norwegian Communications Authority
R&D	Research and development
SME	Small and medium-sized enterprise
STEM	Science, technology, engineering and mathematics
VC	Venture capital
WCDMA	Wideband Code Division Multiple Access
WiMAX IEEE 802.16e	Worldwide Interoperability for Microwave Access

Country groupings

EU	Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain and Sweden.
Nordic 5	Denmark, Finland, Iceland, Norway and Sweden.
Nordic 4	Denmark, Finland, Norway and Sweden.
OECD	Austria, Australia, Belgium, Canada, Chile, Colombia, Costa Rica, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, the United Kingdom and the United States.

Abbreviations

For most of the figures, this publication uses ISO codes for countries or economies.

AUS	Australia	ISL	Iceland
AUT	Austria	ISR	Israel
BEL	Belgium	ITA	Italy
BGR	Bulgaria	JPN	Japan
BRA	Brazil	KOR	Korea
CAN	Canada	LTU	Lithuania
CHE	Switzerland	LUX	Luxembourg
CHL	Chile	LVA	Latvia
COL	Colombia	MEX	Mexico
CZE	Czech Republic	NLD	Netherlands
DEU	Germany	NOR	Norway
DNK	Denmark	POL	Poland
ESP	Spain	PRT	Portugal
EST	Estonia	ROU	Romania
FIN	Finland	SVK	Slovak Republic
FRA	France	SVN	Slovenia
GBR	United Kingdom	SWE	Sweden
GRC	Greece	THA	Thailand
HRV	Croatia	TUR	Türkiye
HUN	Hungary	USA	United States
IRL	Ireland		

Executive Summary

Norway is at the digital frontier in many areas. However, it needs to keep pace with rapid technological developments and competition, while improving performance in areas where it could catch up. Staying at the frontier requires agility, flexibility and well-co-ordinated digital policies. A national digital strategy can play an important role to ensure the policy framework in place makes the most of digital technologies and data for growth and well-being.

Norway has identified several underlying priorities that will shape the content and structure of its forthcoming national digital strategy: ensuring high-quality information and communications infrastructure; developing the data economy; fostering data protection and information security; increasing the digitalisation of small and medium-sized enterprises; promoting an inclusive digital society in the context of an ageing population; supporting the green transition; and digitalising the public sector. These priorities will help realise Norway's vision of a sustainable welfare society that safeguards a safe and simple everyday life for citizens and the non-governmental sector, a strengthened business sector and a better and renewed public sector.

Norway's digital policy landscape comprises relatively more initiatives related to Innovation than the other dimensions of the OECD Going Digital Integrated Policy Framework (the Framework), followed by Society, Access and Use. In terms of performance, Norway outperforms all OECD countries in indicators related to the effective use of digital technologies. It also outperforms the OECD and Nordic averages in societal indicators of digital transformation. Norway is above the OECD average on indicators of Trust and Access, although below the Nordic average. Norway has opportunities to catch up in indicators related to Market openness, Jobs and Innovation where there is the most potential to improve performance.

Recommendations

Key policy recommendations to achieve a more digital, innovative and inclusive Norway are structured around six areas:

- **Encourage technology adoption and skills development to ensure a more digital-intensive economy and resilient workforce**. This involves promoting adoption of digital technologies among small and medium-sized enterprises and empowering people with the skills to succeed in a digital world of work.
- **Prioritise innovation to create a more digital Norway**. This requires encouraging a culture of experimentation and risk taking, reducing regulatory burdens on start-ups and young firms, incentivising venture capital investment and support firms in scaling up, promoting investment in research and development, and harnessing the potential of "GovTech".
- **Maximise the potential of data, while maintaining Norway's strong culture of trust**. This includes leveraging Norway's culture of trust to incentivise data sharing, realising the potential of open government data to drive digital innovation, taking a multifaceted approach to monitoring and addressing cyber risks, and supporting development of data-related skills and infrastructure.
- **Harness the potential of digital technologies for society**. This involves increasing digital inclusion through policies targeted at the groups most in need, discouraging e-waste production and encouraging e-waste recycling.
- **Prepare for next generation networks and a future of unlimited connectivity everywhere**. This entails upgrading fixed and mobile networks to 5G and beyond, closing geographic connectivity divides by focusing on the underserved, fostering competition and reducing red tape, and supporting businesses to improve their connectivity.
- **Design holistic digital policies within effective governance and monitoring mechanisms**. This involves using all dimensions of the Framework to design future digital policies; fostering interministerial and stakeholder co-operation in digital policy design and implementation; monitoring progress using the OECD Going Digital Toolkit as Norway's national digital dashboard; and strengthening a whole-of-government approach to adoption of digital technologies in the public sector.

Introduction

Norway's digital future is intertwined with broader technological and global trends. The most recent phase of digital transformation has benefited from several key technological breakthroughs, including data-dependent technologies like big data analytics and artificial intelligence. Generative artificial intelligence in particular is reshaping the technology landscape, bringing productivity enhancements and convenience, but also risks. Other key developments include Internet of Things technologies, cloud computing, next generation wireless networks (e.g. 5G and beyond), distributed ledger technologies (e.g. blockchain), immersive technologies and quantum computing.

Alone, each of these technologies is powerful, bringing opportunities to improve efficiency and generate consumer welfare. However, their combination within an integrated digital technology ecosystem has even more potential. For example, the extensive use of connected devices and sensors, including in the context of smart cities, generates enormous amounts of data. Such data can enable artificial intelligence to generate new insights and efficiencies. Given the rapid pace of change, even a country at the technological frontier requires continuous investment and attention to remain a leader.

Digital technologies and large-scale data flows fundamentally change how people live and work, interact with one another, participate in the economy and engage with the government. Yet such benefits come with new challenges. Digital transformation is changing the nature and structure of organisations, markets and communities. In so doing, it raises concerns around jobs and skills, privacy and security, as well as notions of equity and inclusion. Societal effects of digital transformation are complex because overall impacts are often not clear-cut. People, firms and governments need to shape a digital future together that exploits the immense potential of digital transformation to improve people's lives, while ensuring no one is left behind.

The Nordic region has been a digital front-runner for many years, and Norway is at the frontier in many areas. Norway needs to keep pace with rapid technological developments and competition from its neighbours and beyond, while improving performance in areas where it could catch up. Staying at the frontier requires agility, flexibility and well-co-ordinated digital policies. In this respect, a national digital strategy can play an important role in ensuring the right policy framework makes the most of digital technologies and data for growth and well-being.

As Norway develops a new national digital strategy, it is useful to take stock of its digital performance, priorities and policy landscape. Through the lens of the OECD Going Digital Integrated Policy Framework (OECD, 2020[1]), this report reviews key developments in Norway's digital performance and policies. It aims to provide input into the design of a new NDS for Norway. The report comprises four sections: digital priorities and trends that will shape Norway's digital future; a mapping of Norway's digital policy ecosystem; Norway's digital performance and outlook in its policy context; and policy recommendations to make Norway more digital, innovative and inclusive.

Section 1

PRIORITIES AND TRENDS SHAPING NORWAY'S DIGITAL FUTURE

Digital transformation touches all aspects of an economy and society. While ensuring a holistic approach is important, policy makers also need to focus on a few key priorities. These priorities sometimes address weaknesses; other times, they represent key social objectives. Even if performance in these areas is strong, there is a risk of falling behind.

Norway has identified several priorities that will shape the content and structure of its forthcoming national digital strategy (NDS): ensuring high-quality information and communications infrastructure; developing the data economy; fostering data protection and information security; increasing the digitalisation of small and medium-sized enterprises (SMEs); promoting an inclusive digital society in the context of an ageing population; supporting the green transition; and digitalising the public sector. These priorities will help realise the Norwegian government's vision of a sustainable welfare society that safeguards a safe and simple everyday life for citizens and the non-governmental sector, a strengthened business sector and a better and renewed public sector.

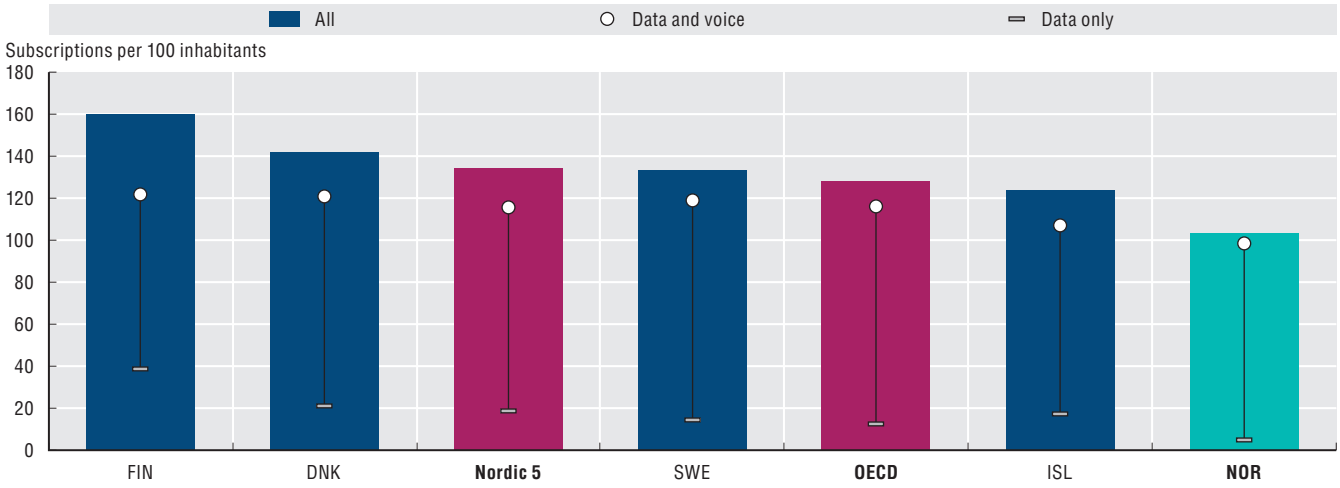
Ensuring high-quality information and communications infrastructure

Norway has high fixed broadband connectivity and wide 5G network coverage. Firms and governments worldwide are investing to expand and upgrade networks so they remain ready for the data demands of tomorrow. Norway performs well compared to other OECD countries when it comes to connectivity. More households in Norway (99%) have broadband connectivity than in the average OECD country (92%) (OECD, 2024[2]). Norway also has the second lowest level of disparity between rural and urban broadband provision of any OECD country (OECD, 2024[3]). Moreover, Norway has a higher than OECD average share of businesses with broadband connections over 100 megabits per second (Mbps) (OECD, 2024[4]) and 99.9% of its population is covered by a 4G network (OECD, 2024[5]).

Despite its good performance, Norway could improve its uptake of mobile broadband (Figure 1)[1]. This area is key to develop next generation networks that could offer unlimited connectivity everywhere and realise the full potential of the Internet of Things (IoT) (OECD, 2024[6]). Norway's uptake of mobile broadband is below the OECD and Nordic averages. It is also markedly lower in data-only subscriptions, which are particularly useful for IoT applications. Indeed, Norway has 1 data-only subscription per 100 inhabitants, compared to 12 for the OECD average and 14 for Sweden (OECD, 2023[7]). This could be partly explained by a propensity towards fixed connections; however, fibre penetration is high across all Nordic countries.

Figure 1. Mobile broadband uptake

Subscriptions per 100 inhabitants, 2022



Source: OECD (2024[7]), "Mobile broadband subscriptions per 100 inhabitants", *OECD Going Digital Toolkit*, based on the OECD Broadband Portal (*www.oecd.org/sti/broadband/broadband-statistics*), *https://goingdigital.oecd.org/indicator/11*.

Norway's commitment to action in this area is no surprise given the rapid growth in data consumption, the existence of older communications technologies such as fibre-to-the-cabinet, and the need to upgrade 4G networks to fibre-to-the-home and roll out 5G to meet the connectivity demands of the future.

However, upgrading existing networks in Norway represents a sizeable engineering challenge. Large amounts of new hardware are required. Meanwhile, the return on investment is far from guaranteed outside of highly populated areas. Moreover, the country relies increasingly on digital technologies and services delivered over the Internet for everything from banking and shopping to healthcare. This means the consequences of connectivity outages are increasing, particularly for rural communities. Ensuring that modern connectivity networks are robust and resilient requires upgrades to the power network. In addition, it requires suitable contingency measures in the event of long outages caused by severe weather events. Such events are likely to become more common as the global climate continues to change.

Developing the data economy

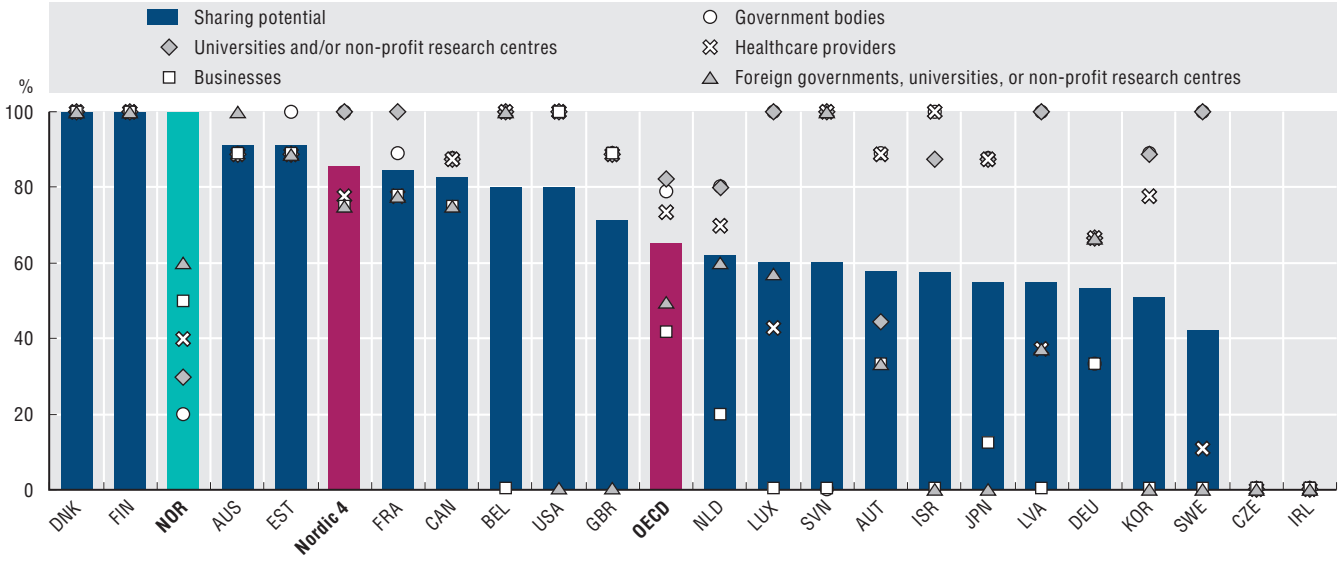
Digital technologies have increasingly made generating, storing, manipulating and managing data easier than ever, making data an integral part of daily life. Devices, services and sensors that are ever more ubiquitous help both to generate and use increasingly large streams of data. Algorithms create value from data, and data in turn improve the output from algorithms. This leads to advances in machine learning and new forms of artificial intelligence (AI). A lot of data are created and used by consumers and exchanged over the Internet. As the IoT progresses, connected devices will become even more central for data collection and consumption. However, not all data are the same. Different types of data may require different policies (OECD, 2019[8]).

From an economic perspective, data underpin digital transformation. Data have become an important source of value, including for decision making and production, and for firms, governments, people and society. The availability and prevalence of data have given rise to new or significantly improved products, services and business models, and helped enhance productivity (Mitchell, Ker and Lesher, 2021[9]). Data are also helping address societal challenges, ranging from climate change to the management of natural disasters to health crises.

Norway has been trying to develop the data economy, and the healthcare sector serves as an example of the nation's capacity to harness the benefits of data sharing. Norway excels in sharing national health datasets with both domestic and international stakeholders. In 2020, the intensity of health data sharing was 100%, showing that actors in Norway are allowed to share all national health datasets with all relevant stakeholders (Figure 2)[2]. The high data-sharing intensity in healthcare may be due in part to the eNorway plan, an initiative that facilitated secure communication between patients and healthcare professionals.

Figure 2. Health data-sharing intensity

Percentage of sharing potential, 2020



Source: OECD (2024[91]), "Health sharing data intensity", *OECD Going Digital Toolkit*, based on the OECD Questionnaire on Health Data Development and Governance, *https://goingdigital.oecd.org/indicator/64*.

While Norway has made good progress on data sharing in sectors such as health and banking, other areas – including the private sector – have untapped potential. In the private sector, the immediate business incentives of opening up and sharing data are not always clear, but the positive societal externalities can be greatest. For example, the extraction industries (e.g. oil and gas) and agriculture could benefit from improved access to and sharing of data between companies. Increased efficiencies, for example, could lower production costs. However, this can be challenging in a competitive environment. Likewise, the construction and building sector has significant scope to increase the level of shared environmental data. Such efforts could bring significant benefits in energy optimisation.

Fostering data protection and information security

As the digital technology ecosystem becomes increasingly interdependent and complex, the risk of privacy breaches and systemic failures spreading rapidly and unpredictably across sectors and borders has increased. To fully embrace and benefit from digital transformation, individuals, firms and governments must be confident that engaging in digital environments will bring more benefits than downsides. Such downsides can arise from various sources of uncertainties, data and cross-border flows. Many are related to potential cybersecurity incidents (e.g. breaches of availability, integrity or confidentiality of data, systems or networks). Other downsides are related to breaches of laws and regulations such as privacy, consumer protection or product safety.

Actors in the digital ecosystem must be confident that their data are both secure and protected. While Norway's data privacy laws are in line with European Union (EU) countries, creating a culture and understanding of data protection and information security involves going beyond legislation. Government action can help build the capacity of people and firms to protect themselves in digital environments. Better data stewardship, in turn, can lead to increased levels of data sharing, which can bring positive impacts for innovation and productivity.

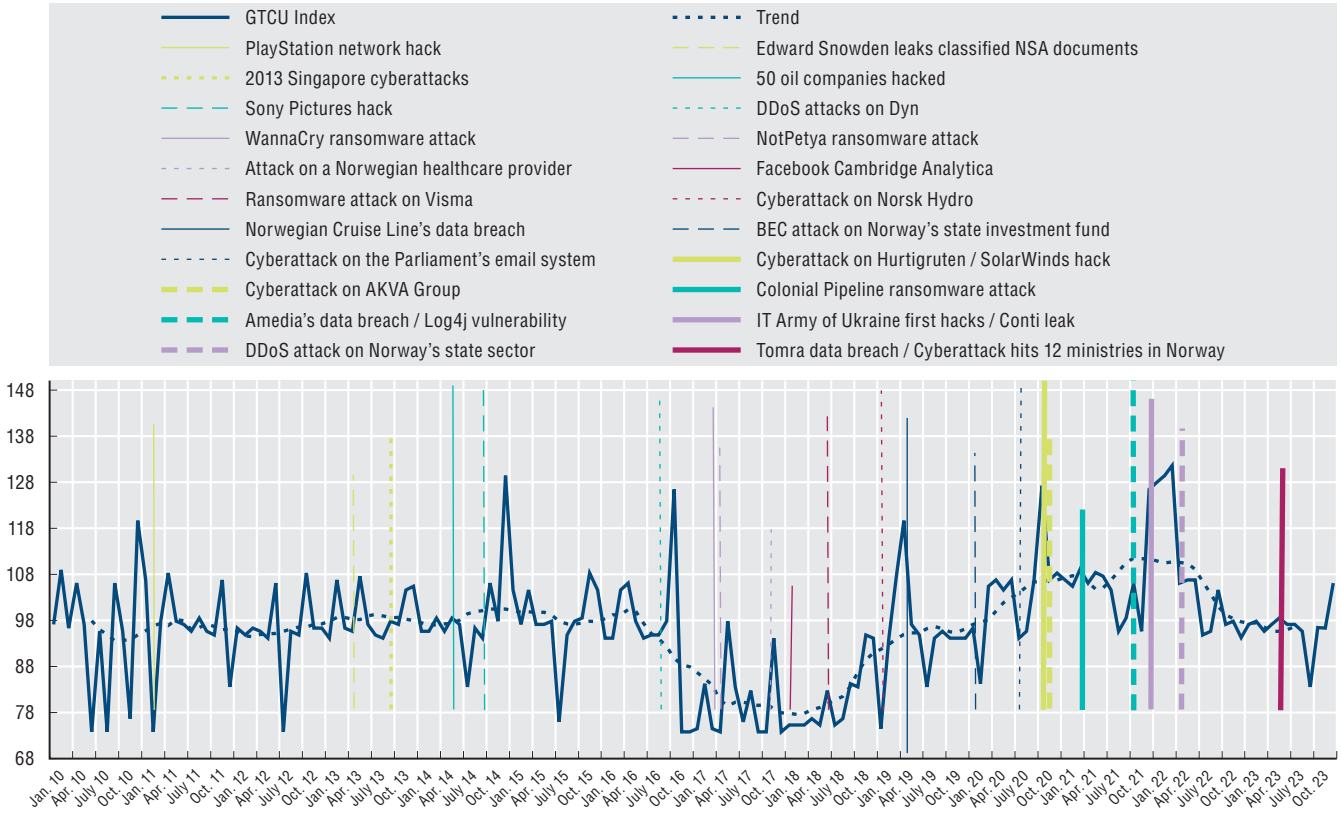
Ensuring cybersecurity and resilience of critical infrastructure and services is fundamental for digital transformation to flourish in Norway and beyond. Cybersecurity uncertainty is a multifaceted phenomenon that arises from the inherent unpredictability and ambiguity surrounding cyber threats and vulnerabilities. It manifests itself in the limited transparency regarding emerging threats, the challenges of assessing known vulnerabilities and the daunting task of predicting the impact of future cyberattacks. This inherent uncertainty can significantly affect cybersecurity strategies, decision making and public perceptions of cyber risks.

Figure 3[3] presents a cybersecurity uncertainty index based on online search data for Norway for the period January 2010 to December 2023. Norway's index reveals peaks aligned with significant national and global cyber incidents. These include the distributed denial of service attack on Dyn in October 2016; the WannaCry ransomware attack in May 2017; the cyberattacks on Norsk Hydro (March 2019) and on Norway's parliamentary e-mail system (October 2020); and Amedia's data breach (December 2021). The alignment of the cybersecurity uncertainty index with these cyber incidents indicates it serves as a reliable proxy for assessing cyber risk uncertainty in Norway.

Variations in the Google Trends Cybersecurity Uncertainty Index between countries can be attributed to a range of factors. These include differences in awareness about cyber risks, investment or exposure to cybercrime. The periods of stability, on the other hand, might indicate a relative lull in cyber incident activity or successful mitigation. Overall, a comprehensive understanding of these fluctuations provides insights into the multifaceted nature of uncertainty surrounding cyber incidents in Norway. This contributes to informed policy making and strategic planning in cyber risk management.

Figure 3. Cybersecurity uncertainty in Norway

Google Trends Cybersecurity Uncertainty Index, 2010-23



Notes: GTCU = Google Trends Cybersecurity Uncertainty Index. This figure chart presents a cybersecurity uncertainty index for Norway from January 2010 to December 2023 based on online search data.

Source: Authors' elaboration based on OECD (forthcoming)[10].

Increasing the digitalisation of SMEs

In the OECD, SMEs and young firms create a disproportionate number of jobs relative to their size, and they underpin economic growth. Digital tools can help SMEs develop more efficient business processes and diverse product lines, as well as scale up and internationalise. However, smaller, younger firms may face barriers to adopting new business models, investing in key technologies or developing the skills to use them.

SMEs play a crucial role in Norway's economy, contributing to nearly half of employment (OECD, 2023[11]) and serving as catalysts for innovation. In 2023, 64% of Norwegian SMEs had access to fixed broadband download speeds of at least 100 Mbps. This was above the EU average (62%) but below Denmark (86%), Finland (76%) and Sweden (77%) (OECD, 2024[4]). However, obstacles persist for smaller and younger Norwegian companies in integrating into digital markets, accessing capital, and acquiring information and communication technology (ICT) skills.

The shortage of risk capital is another common barrier for Norwegian SMEs to scale up and spread their productivity benefits. Venture capital (VC) firms and investors are key mechanisms for firms with high-risk profiles. Beyond financing, venture capitalists play pivotal roles in guiding firms through strategy development. They offer managerial advice and foster network connections in exchange for shared ownership of the business, with the ICT sector instrumental for knowledge and production networks (OECD, 2023[11]). However, VC investment in firms within the ICT sector in Norway is one of the lowest in the OECD (OECD, 2024[12]).

A tight labour market and the need to adapt to a highly digital economy and society in Norway add more pressure on SMEs. Recent data indicate that Norwegian medium-sized enterprises offering positions for ICT specialists (17%) lag the Nordic average (22%) (OECD, 2024[13]). In terms of sophisticated technologies, Norwegian small-sized enterprises have lower adoption rates of AI (8%), IoT (22%) and 3D printing technology (3%) than the Nordic average (17%, 29% and 6%, respectively) (OECD, 2024[14]).

Despite labour challenges, SMEs in Norway are well positioned in the development of ICT skills. Nearly a third (30%) of small businesses provide training to enhance ICT skills among their employees. Among the OECD, this places Norway behind only New Zealand (49%) and Finland (34%) in terms of ICT skills development within SMEs (OECD, 2024[15]).

To address these challenges and unlock the full potential of SMEs, Norway plans to increase digitalisation of SMEs. Digital Norway, a non-profit organisation with a special focus on SMEs, provides free online resources and training to promote effective use of advanced digital tools. Such initiatives play a crucial role in accelerating the digitalisation of Norwegian enterprises. In addition, collaborations involving data sharing, such as the incorporation of the online data repository Datafabrikken into the national open data portal data.norge.no, will further support SME participation in the data-driven economy and drive innovation.

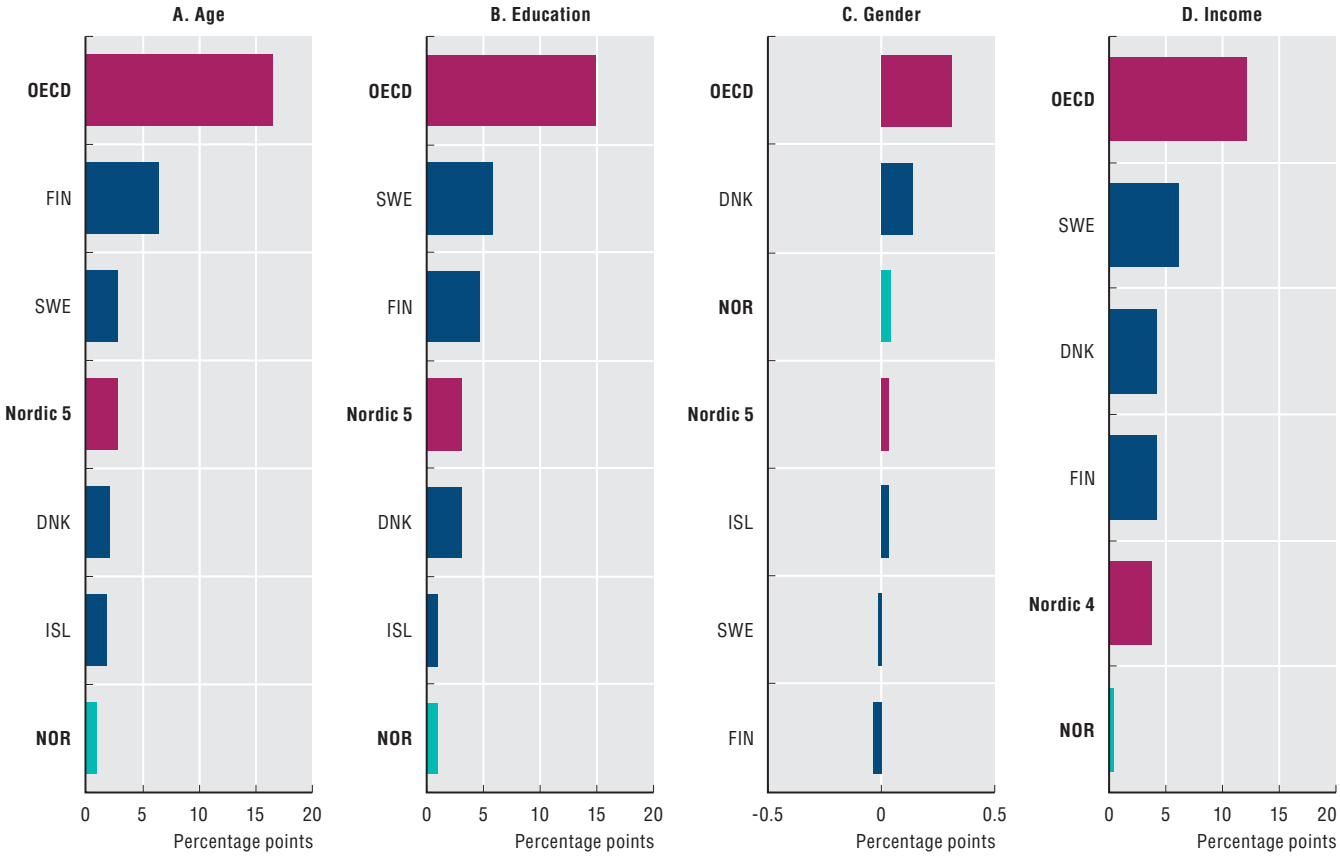
Promoting an inclusive digital society in the context of an ageing population

For digital transformation to work for growth and well-being, a positive and inclusive digital economy and society is fundamental. While developed countries, including Norway, have achieved much progress to ensure basic connectivity, digital divides persist along a range of dimensions. Broadly speaking, digital divides refer to gaps in opportunities to access digital technologies and their use of the Internet for a wide variety of activities. Such gaps can exist between individuals, governments, firms and geographic areas at different socio-economic levels. Norway places considerable focus on closing digital divides.

In terms of Internet use, Norway's performance is exceptional (Figure 4)[4]. Differences in the share of adults using the Internet in Norway by age, education level, gender and income are significantly lower than the OECD average. In the Nordic region, such differences are lowest in Norway for age, education level and income. Norway's digital divide is above the Nordic average for gender. However, at less than half of a percentage point, this gender divide is still small in absolute terms.

Figure 4. Internet use by demographics and socio-economic variables

Differences in the share of adults using the Internet at least once over the last three months, 2023



Source: OECD (2024[88]), ICT Access and Usage Databases, *https://oe.cd/dx/ict-access-usage*.

Beyond closing digital divides, the creation of an inclusive digital society depends on ensuring that online public services are accessible to all. This means not only addressing disparities in access but also designing public services effectively, and in consultation with a wide range of stakeholders. Different levels of literacy and proficiency with the Norwegian language should be considered, as well as compatibility with assistive devices such as screen readers. In addition, ensuring all of society has the necessary competences to use digital technologies confidently and effectively is essential to ensure everyone can thrive in a digital society. This encompasses skills to use a broad range of applications – from e-commerce and banking to interaction with public services such as healthcare.

Supporting the green transition

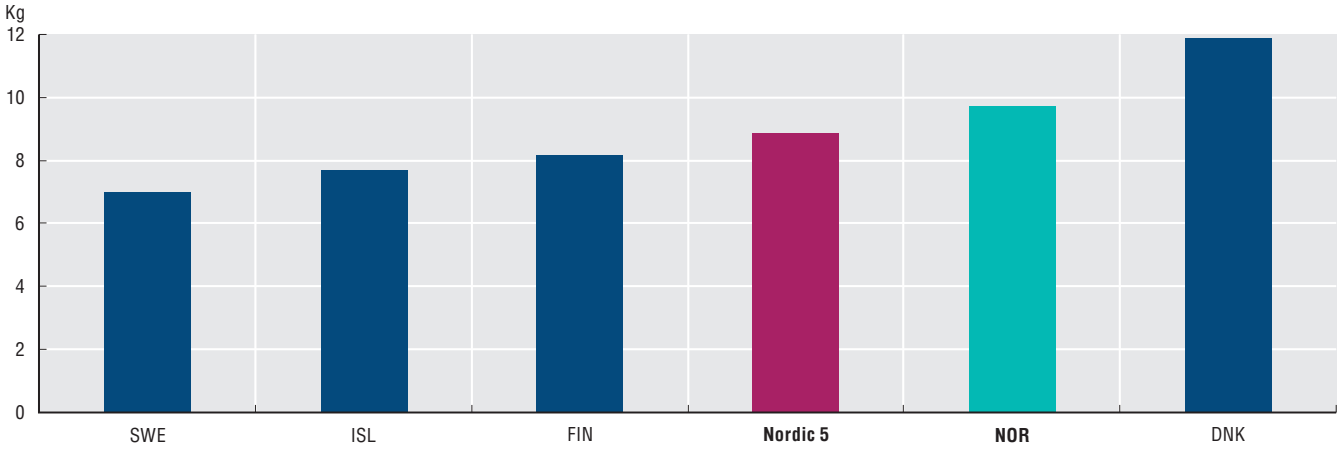
As a nation producing large quantities of oil, gas and hydroelectric power, Norway will be affected significantly by the green transition. On the one hand, digital technologies can directly affect energy consumption. The widespread use of "smart" meters, for example, can promote more continuous management of electricity. Digitalised energy systems can also better identify where and when energy should be delivered, with potential impacts on long-term sustainable energy production. The increased digitalisation of energy-intensive sectors also holds promise to increase the energy efficiency and sustainability of many economic and social activities. On the other hand, digital transformation enables more trade, which could change the global distribution of environmental footprints and nationally implemented recycling regimes. Similarly, demand for digital technologies may increase energy and resource demands associated with ICT production and use, offsetting some of their environmental gains.

In navigating the challenges posed by the green and digital transitions, Norway has invested heavily in technological development and innovation to support its green transition. This is demonstrated by an increase in patents related to green technologies (Research Council of Norway, 2021[16]). Moreover, it also made notable progress in zero- and low-emission technologies. For example, Norway is a world leader in zero emission vehicle adoption (OECD, 2022[17]) with the share of newly registered such vehicles reaching 79% in 2022[5].

However, the generation of e-waste remains a challenge for the country. Since 2016, Norway has consistently held a prominent position in e-waste production per capita, with a slight decrease from 28.5 kg to 26.0 kg per capita between 2016 and 2019. This figure surpasses both the OECD average of 17 kg per capita and the Nordic average of 22 kg per capita. Norway remains proactive in e-waste management by recycling more than half of its generated e-waste (OECD, 2024[18]). However, its gap between e-waste generation and recycling per capita is second only to Denmark across Nordic countries (Figure 5)[6]. Addressing this gap is crucial for sustaining Norway's environmental goals and advancing its sustainability efforts.

Figure 5. Overall e-waste generation

Difference between e-waste generation and recycling in kg per capita, 2019



Source: OECD (2024[18]), "E-waste generated per capita", *OECD Going Digital Toolkit*, based on the Global E-waste Monitor, Eurostat Waste Electrical and Electronic Equipment, and the OECD National Accounts Database, *https://goingdigital.oecd.org/indicator/53*.

Norway has set a clear national priority to support the green transition, recognising the importance of action in this area. Given the extent to which traditional extraction industries dominate the Norwegian economy, the growth of digital-intensive sectors represents a clear path to Norway's future if properly managed. Norway's abundant renewable

energy has the potential to power the digital revolution without increasing emissions, and new forms of employment can emerge for those willing and able to re-skill. Digitalisation can further drive efficiencies and growth, increasing prosperity and ensuring quality of life continues to improve throughout the green and digital transitions.

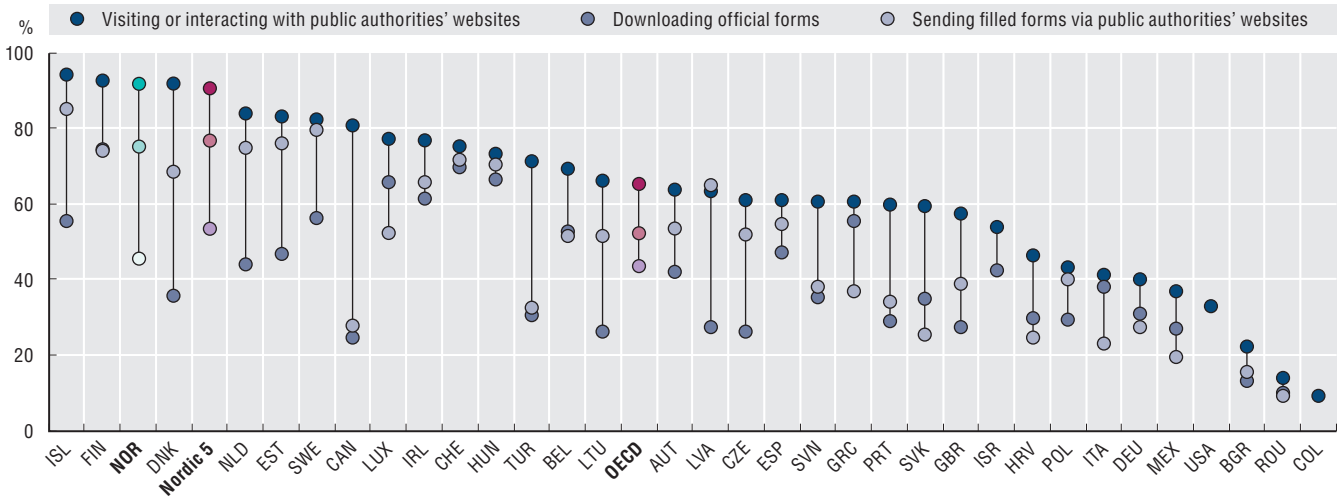
Digitalising the public sector

Digital government leverages digital technologies and data to deliver more effective, holistic and user-centred services, public sector innovation and stronger civic engagement. A core principle of digital government is to leverage digital technologies more fully to design, develop, deliver and monitor public policies and services centred around the needs of people and firms. Two key enablers of wider uptake of digital services across the economy and society are digital identities (i.e. eIDs) and electronic and/or digital signatures. As the public sector both produces and consumes large amounts of data, there is also significant potential for governments to use digital technologies and data to innovate.

Norway is a leader in digitalisation of the public sector. Many countries still have significant potential for general use and wider uptake of digitalised public services. About 65% of people across the OECD visit or interact with the websites of public authorities; less than 45% use the Internet to download or send filled forms via public authorities' websites; and 52% use the Internet to send filled forms via websites of public authorities (Figure 6)[7]. Norway outperforms the OECD on all indicators; indeed, Norway is among the leaders in the digitalisation of government services in line with other Nordic countries.

Figure 6. Uptake of digital government services

Use of digital government services by individuals, as a percentage of individuals aged 16-74, 2023 (or latest available)



Source: OECD (2024[88]), ICT Access and Usage Databases, *https://oe.cd/dx/ict-access-usage*.

As the Norwegian government develops its new digital strategy, it is exploring the use of data-driven technologies such as AI to improve its services and address critical societal issues. At the same time, active participation in collaborative digitalisation projects across Europe underscores Norway's commitment to strengthening public sector efficiency and tackling pressing societal challenges. Within this landscape, Norway is committed to establishing a solid foundation for a mature digital government, closely aligned with the OECD's Digital Government Policy Framework (OECD, 2020[19]).

Section 2

MAPPING NORWAY'S DIGITAL POLICY ECOSYSTEM

As digital transformation accelerates, policy makers must consider not only which policies are important, but also how those policies are co-ordinated, monitored and implemented. This is because the success of policies to achieve their desired outcomes depends on devising effective governance regimes. This section briefly discusses the Going Digital Integrated Policy Framework (Framework), which is used as a guide to Norway's digital policy landscape. It then considers recent developments in the Norwegian digital policy ecosystem, including the main entities that design and implement digital policies in Norway. The section then briefly examines Norway's current national digital strategy (NDS) – the "Digital Agenda for Norway" – as well as the wider digital policy landscape.

The Framework as a benchmark for a holistic approach to policy making

Digital transformation affects almost all aspects of the economy and society, and designing effective digital policies requires a whole-of-government effort. The effects of digital technologies and data differ depending on national context and culture. However, the challenge of navigating the digital transition effectively and ensuring that well-being and growth are not just protected, but enhanced, is a global one. For this reason, the Framework (OECD, 2020[1]) aims to help countries build a more inclusive and prosperous digital future with effective, impactful and evidence-based digital policies.

The Framework comprises seven interrelated policy dimensions (Access, Use, Innovation, Jobs, Society, Trust and Market openness), each of which contain several policy domains (Figure 7). Growth and well-being are at its heart, and several transversal domains (investment, digital government, skills, small and medium-sized enterprises (SMEs), tax and benefits, regional development, privacy and security) cut across multiple dimensions. Some domains, such as data and data governance, are relevant for all of the Framework's dimensions.

Figure 7. The Going Digital Integrated Policy Framework

Source: OECD (2020[1]), "Going Digital integrated policy framework", *OECD Digital Economy Papers*, No. 292, OECD Publishing, Paris, *https://doi.org/10.1787/dc930adc-en*.

The Framework has been used as a guide to develop national digital strategies in OECD countries and partner economies. It has also been applied as a benchmark to assess the comprehensiveness of national digital strategies (Gierten and Lesher, 2022[20]). Recognising the evolving nature of digital technology, the Framework has remained relatively flexible to accommodate changes in the landscape. It further provides guidance on the governance of digital policies to ensure coherence and co-ordination across all domains and sectors that shape digital transformation. This includes how to involve all relevant stakeholders in the development and implementation of digital policies.

Norway's governance ecosystem

While governance understandably varies between countries, research has shown certain cross-country trends in the governance of national digital strategies. Most notably, there is a growing move towards the development and co-ordination of national digital strategies being led either at the prime ministerial or chancellery level of government, or by a dedicated digital ministry (Gierten and Lesher, 2022[20]; OECD, forthcoming[21]). This approach helps ensure that digital policies are created and organised by bodies with enough specialist knowledge to design them effectively and with enough clout to guarantee their implementation.

The Norwegian government has created a new ministry to steer the country towards an inclusive digital society. In October 2023, the government announced the creation of the Ministry of Digitalisation and Public Governance. The new ministry, alongside a new ministerial post with the same title, took effect on 1 January 2024 (Office of the Prime Minister, Norway, 2023[22]). The new ministry comprises elements of digital policy previously situated in the Ministry of Local Government and Regional Development. This announcement reflects the growing importance of digital transformation to the Norwegian government and ensures the forthcoming NDS will have a dedicated home. Central to its success is the ability of the new ministry to collaborate effectively with others, given the cross-cutting nature of digital transformation.

While the new ministry leads on digital policy, it is supported by a range of other actors, including an agency focused on the public sector, as well as departments, regulators, and other agencies and trade organisations. The creation of the new ministry means that one government body will assume primary responsibility for designing, implementing and evaluating digital policy. The ministry will be complemented by the Norwegian Digitalisation Agency (Digdir), an underlying agency that will co-ordinate the digitalisation of the public sector. This will help create a coherent approach and support effective co-ordination across the full range of Norwegian digital policies. Beyond this organisation, however, a number of others are vital to the healthy functioning of Norway's digital policy governance ecosystem. These are highlighted below.

Government departments

Given that various departments address digitalisation and its impacts within their individual sectors, Norway needs to ensure they work in sync to achieve its digital policy priorities. As every sector of the economy digitalises, specialist and sector-specific knowledge can often improve the design and delivery of policy. In Norway's case, in addition to the Ministry of Digitalisation and Public Governance, a range of other departments prepare and oversee elements of the digital policy landscape. Each ministry is responsible for digitalisation in its respective sector. For example, the Ministry of Justice and Public Security and the Ministry of Defence are jointly responsible for Norway's National Cyber Security Strategy. For its part, the Norwegian Ministry of Health and Care Services, including the Directorate of Health, manages Norway's National Strategy for e-health. Meanwhile, the Ministry of Education and Research directs skills and education policy from school age into research settings and adult life. Effective co-ordination between and among these agencies and others is essential for Norway to achieve its digital policy priorities.

Regulators

Independent regulators contribute specific expertise and ensure markets function effectively. They are responsible for upholding regulation in a fair and even-handed way and can be crucial partners to small and new firms seeking to enter tightly regulated markets. To that end, they help such firms understand and comply with complex regulations. Increasingly, regulators are also helping stimulate innovation by creating regulatory sandboxes. These ensure that new products and services can be tested and improved without fear of sanction if they do not meet existing regulations.

Norwegian regulators are already part of the digital ecosystem. The Norwegian Communications Authority (Nkom) and the Norwegian Data Protection Authority (Datatilsynet) are both underlying agencies of the Ministry of Digitalisation and Public Governance. They play an important role in digital policy making in Norway, as does the Financial Supervisory Authority of Norway (Finanstilsynet), which operates or oversees digital policies in financial markets. These organisations are key to achieving the priorities of ensuring a high-quality information and communications infrastructure, developing the data economy, and fostering data protection and information security.

Agencies and trade organisations

Alongside government departments and regulators, government-funded agencies and industry-founded trade organisations can also help ensure that digital transformation works for growth and well-being. They tend to be more agile and better able to form close connections with industry participants, while benefiting from a narrower and more

focused remit than government departments. In many cases, these organisations can be backed with significant amounts of government capital to deliver large and important programmes with a real impact on individuals and firms.

Innovation Norway and Digital Norway are both helping the government achieve its digital objectives. These organisations work directly with individuals and firms to provide advice and guidance, as well as implement government-funded programmes. Innovation Norway, founded by the Norwegian government, specialises in helping innovative companies to grow and establish themselves overseas. Meanwhile, industry founded Digital Norway to help SMEs digitalise. Both organisations are integral to Norway's priority to support further digitalisation of SMEs.

The "Digital Agenda for Norway"

At the centre of Norway's digital policy landscape is its NDS "Digital Agenda for Norway", which sets out how the country can exploit information and communication technology (ICT) in the best interests of society (Norwegian Ministry of Local Government and Modernisation, 2016[23]). This report to the Storting, published in 2016, has two main objectives: to create a user-centric and efficient public administration and to enhance value creation and inclusion, beneath which sit five key priorities:

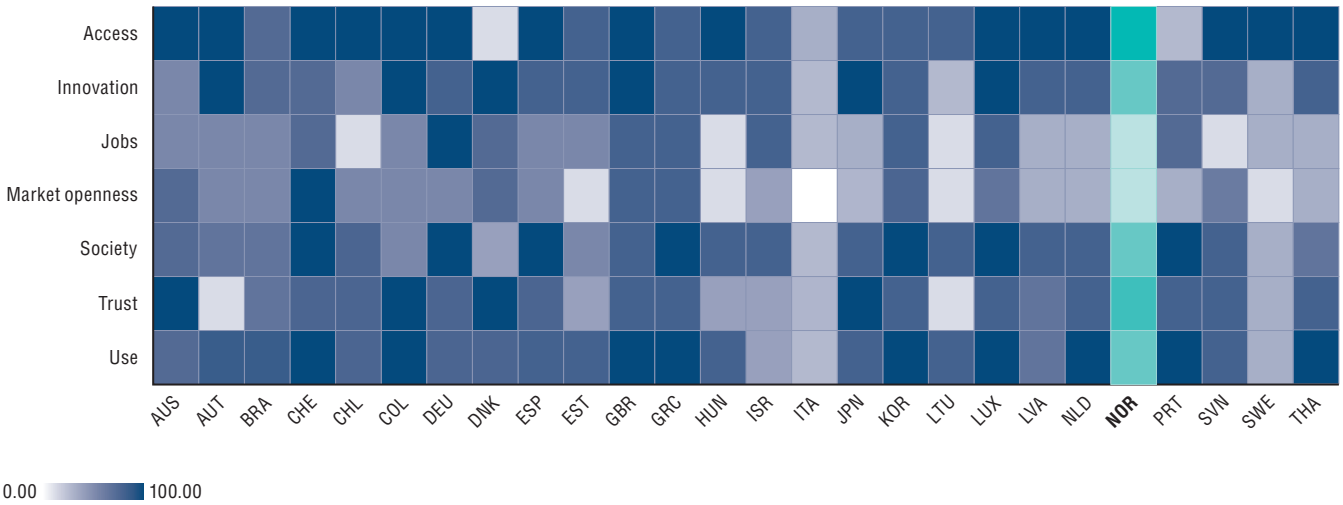
- a user-centric focus;
- ICT as a significant input factor for innovation and productivity;
- strengthened digital competence and inclusion;
- effective digitisation of the public sector; and
- sound data protection and information security.

The Ministry of Local Government and Regional Development (now the Ministry for Digitalisation and Public Governance) is the primary lead for development, co-ordination, monitoring and evaluation of the strategy. However, given the cross-cutting nature of digital transformation, all ministries are expected to contribute to and implement the strategy. Overall, the strategy has been backed with a budget of NOK 1 500 000 000 for digitalisation initiatives, which is decentralised across all of the ministries implementing the objectives in the report.

The comprehensiveness of the Digital Agenda for Norway was assessed using the Framework as a benchmark (Gierten and Lesher, 2022[20]). The resulting National Digital Strategy Comprehensiveness indicator (NDSC) measures how comprehensively Norway's NDS covers the Framework. It also serves as a tool to determine the likely effectiveness of the NDS in promoting a digital transition that boosts growth and well-being (Figure 8). The higher the NDSC score per Framework dimension, the more comprehensively that dimension is covered in the NDS. Each dimension is scored out of a maximum of 100.

Figure 8. National digital strategy comprehensiveness across countries

2021



Notes: Norway's NDSC score is based on the NDS in force, the "Digital Agenda for Norway" strategy. A darker colour indicates greater comprehensiveness in relation to the Framework.

Source: OECD (2024[96]), *OECD Going Digital Toolkit*, based on the OECD National Digital Strategy Database, *https://oe.cd/ndsc*.

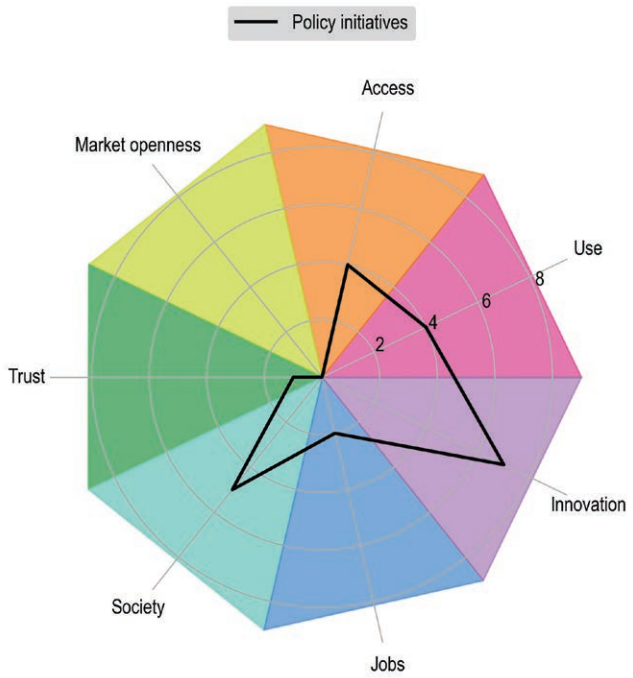
Based on the NDSC, Norway scores highly for dimensions such as Access and Trust, but it needs to improve coverage in Jobs and Market openness. The NDSC for Norway shows that Access is the most comprehensively covered dimension, and the only area to achieve the maximum score of 100. This is followed by Trust (80), Use (71) and Innovation and Society (67). Jobs and Market openness are the least comprehensively covered dimensions, each with a score of 40. As Norway develops its next NDS, improving its level of comprehensiveness in domains such as Jobs and Market openness will help ensure all areas of the Framework are implemented effectively. This, in turn, will help Norway achieve its digital policy priorities in a holistic manner.

Norway's digital policy landscape beyond its national digital strategy

Beyond Norway's NDS, the wider digital policy landscape clearly plays a definitive role in Norway's ability to achieve its policy objectives. Figure 9[8] shows Norway's major digital policy initiatives mapped according to the Framework's seven dimensions. At first glance, Innovation is the area with the most policy initiatives, followed by Society, Access and Use. There are two initiatives in the Jobs dimension, only one in Trust, and none in the Market openness dimension. More detail about the policy initiatives can be found below and in Annex A.

Figure 9. Norway's digital policy landscape

Per dimension of the Framework, 2023



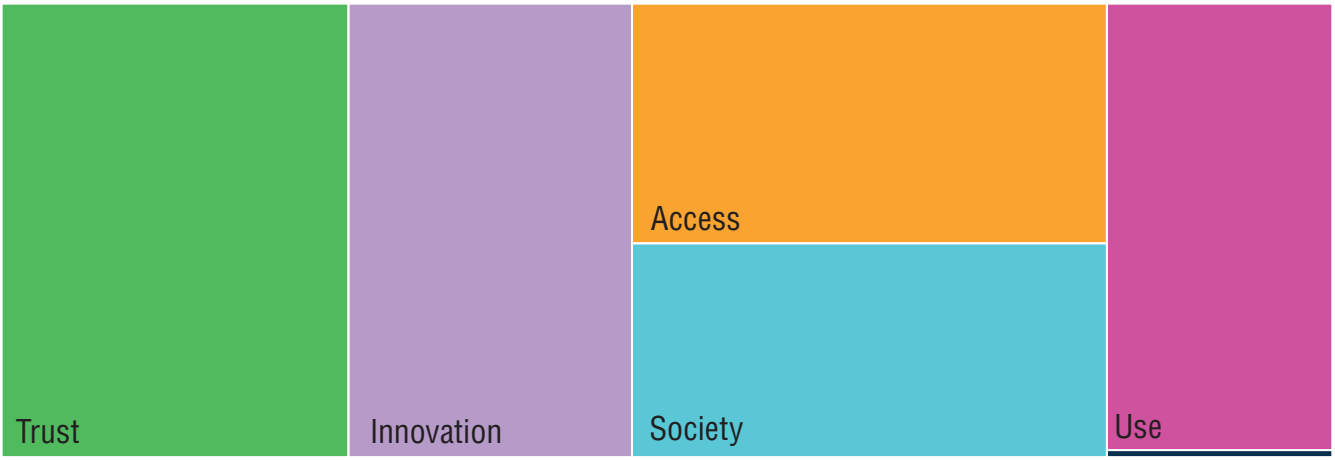
Note: The depth of the colours in each of the Framework's dimensions do not represent any score or numerical value.

Source: Authors' elaboration based on the 2024 OECD Digital Economy Outlook Questionnaire.

Simply counting the number of initiatives is not a robust method of determining the level of policy focus given to each dimension. One well-funded and detailed initiative with clear goals and policy measures, for example, can have much more impact than several more limited and less specific initiatives. Moreover, the relationship between a policy initiative's success and its level of funding is not always linear. However, exploring the size of budget allocated to a specific intervention can offer clues to its likely effectiveness and its relative importance for a national government. Figure 10 provides a relative assessment of the different levels of funding allocated to each dimension of the Framework within Norway's digital policy landscape.

Figure 10. Allocated budget for Norway's digital policy landscape per Framework dimension

NOK, 2024



Notes: The Jobs dimension is displayed under Use in dark blue. No budget is indicated for Market openness. Some policy initiatives are relevant for more than one dimension; therefore, some funding has been counted more than once. The budget allocated to Meld St. 28 in the Access dimension, for example, incorporates the budget for the broadband support scheme, and the security and resilience scheme.

Source: Authors' elaboration based on the 2024 OECD Digital Economy Outlook Questionnaire.

The data show a relatively even allocation of funding across most Framework dimensions except for Jobs and Market openness, which received little or no funding. This is particularly surprising for Jobs, given the likely cost of delivering skills and training initiatives. Most funding was allocated to the Trust dimension, which will help Norway achieve its priority to develop the data economy and foster data protection and information security.

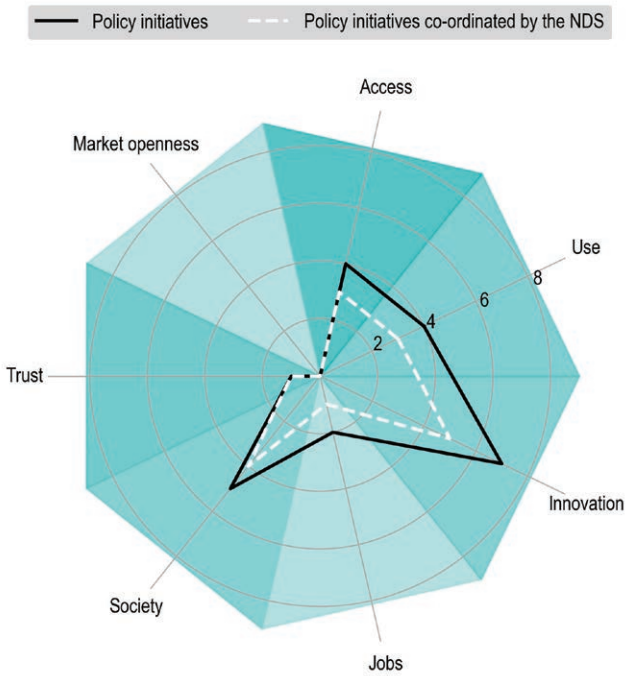
The relationship between Norway's NDS and its other major digital policies

How well the forthcoming NDS can co-ordinate Norway's wider digital policy landscape is a crucial determinant of its success. The rapid pace of technological change means obsolescence is, to a certain extent, built into the design of digital policies. This means new policies are almost constantly under development. Thus, losing sight of the wider strategic direction is easy without clear and explicit co-ordination between the NDS and its policy environment. To the extent possible, clearly identifying and linking the NDS with future policies also helps ensure it will remain relevant throughout its life cycle.

An analysis of how the major digital policies in Norway's ecosystem interact with its NDS reveals the extent to which the strategy acts as a strong co-ordinating force. Figure 11[8] combines the NDSC indicator and the assessment of the wider digital policy landscape. It shows that Norway's NDS co-ordinates most of its digital policy landscape in all dimensions. While the Trust dimension includes a relatively small number of policy initiatives, it is the second most comprehensively covered in Norway's NDS and the area with the largest budget. This suggests there is strong policy action in this dimension. Norway's NDS also co-ordinates all major policy initiatives in the Trust dimension.

Figure 11. Disentangling the relationship between Norway's NDS and its major digital policies

Norway's NDSC (heatmap) and major digital policies, 2023



Notes: Norway's current NDS is the "Digital Agenda for Norway" strategy. For the NDSC (heatmap), a darker colour indicates greater comprehensiveness in relation to the Framework.

Source: Authors' elaboration based on the 2024 OECD Digital Economy Outlook Questionnaire and the OECD National Digital Strategy Database, *https://oe.cd/ndsc.*

As Norway develops its next NDS, it needs to ensure a greater balance among the seven dimensions. The Innovation and Society dimensions are equally comprehensive in Norway's NDS. However, there are more Innovation initiatives in the wider policy landscape and it receives more funding than Society. Norway's NDS co-ordinates some of the small number of Jobs digital policy initiatives. Jobs and Market openness are the two dimensions least comprehensively covered by the NDS. They have the fewest initiatives and, likewise, the least amount of funding allocated to them. This suggests that Jobs and Market openness dimensions are in the greatest need of enhanced policy focus as Norway develops its next NDS.

Norway can draw on lessons learnt from outside the digital policy landscape to inform its next NDS. Policy initiatives not co-ordinated by Norway's NDS tend to be either highly technical or implemented primarily by a technical agency, such as the Finanstilsynet's fintech regulatory sandbox. In addition to co-ordination, adequate monitoring and evaluation helps ensure policies achieve their desired outcomes. It also enables policy makers to learn lessons for use in future policies. The Norwegian government has indicated that it monitors and evaluates all policies within its digital policy landscape and its NDS (Table A.1). Using the outputs of these processes should help develop the forthcoming NDS by enabling integration of good practice from elsewhere into the policy ecosystem.

Section 3

SITUATING NORWAY'S DIGITAL PERFORMANCE AND OUTLOOK IN ITS POLICY CONTEXT

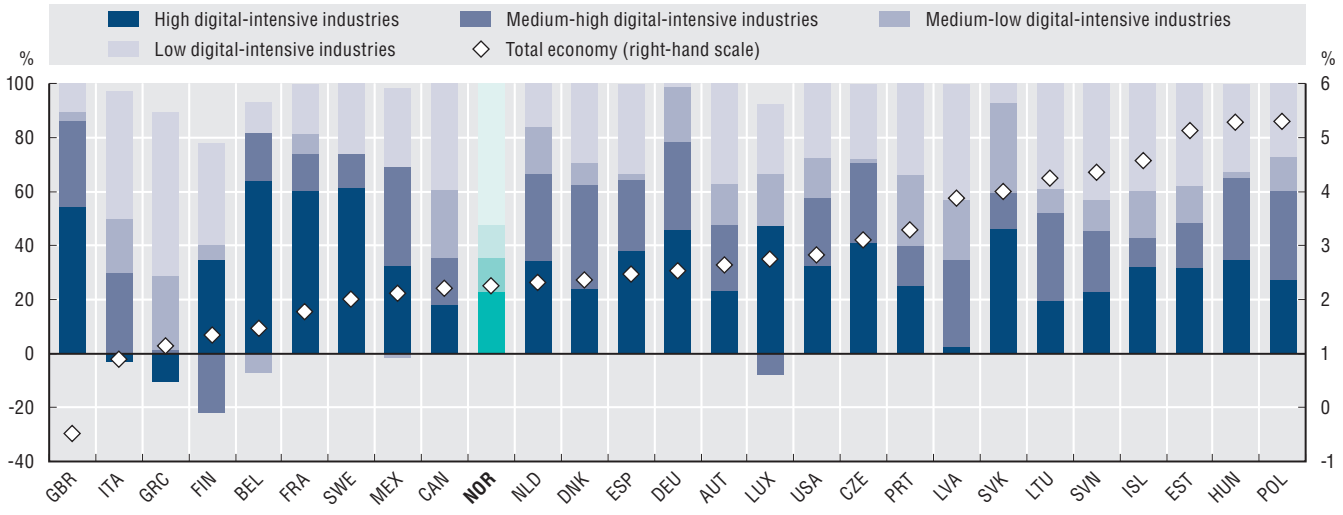
This section focuses on Norway's digital performance and marries it with a more in-depth discussion of the policies that underpin each dimension of the Framework. Norway requires policy decisions grounded in solid evidence to shape its digital future. Overall, the economic outlook for Norway is characterised by high inflation and weakening domestic demand, with growth expected to slow in 2024 (OECD, 2023[24]). Norway's strong reliance on natural resources such as oil and gas have led to an underinvestment in innovation. The country's inward orientation has also limited the effects of productivity-related technology spillovers from foreign direct investment (FDI) and trade. With regard to the digital aspects of the economy and society, Norway performs well overall, albeit with some areas in which it could catch up.

The digital growth outlook for Norway

Measuring the size of the digital economy is complex, in part because digital technologies and data are everywhere. The contribution of high and medium-high digital-intensive sectors to value-added growth is a proxy for the contribution of the "digital economy" to growth (Figure 12)[9]. Digital-intensive sectors are characterised by high and medium-high digital intensity.[10] In Norway, these sectors account for 35% of value-added growth, well behind Sweden (74%), Denmark (62%) and Iceland (43%), though above Finland (13%). With its resource-rich economy, primary products such as oil, gas and fisheries contribute heavily to Norway's gross domestic product (GDP). The relatively low contribution of highly digital sectors to growth relative to its neighbours suggests further opportunities to benefit from productivity-related spillovers from highly digitalised sectors.

Figure 12. Contribution of digital-intensive sectors to value-added growth

Real value-added growth as a percentage of annual growth in real value added, chain-linked volumes, 2018 (or latest available)



Note: The growth contributions shown for each country are calculated in absolute terms and add up to 100% (or sometimes 99.9% due to rounding).

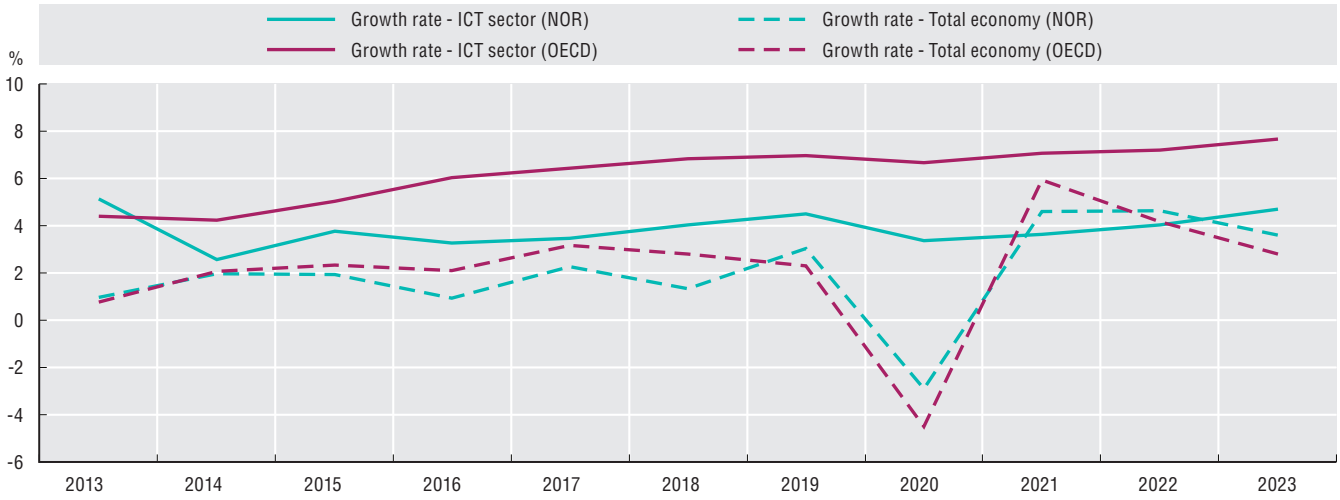
Source: OECD (2024[89]), *OECD Going Digital Toolkit*, based on the OECD Structural Analysis (STAN) database, *http://oe.cd/stan*, *https://goingdigital.oecd.org/indicator/08*.

While all economic sectors are somewhat digitalised, the information and communication technology (ICT) sector remains at the core of digital transformation, and critical to further digital innovation. However, sectoral growth rates in official statistics have a considerable lag. New estimates of ICT sector growth in real time provide insights into its performance, which will in turn help inform policy decisions that affect this sector in the future. The estimates are based on an artificial neural network model that leverages online search data (OECD, 2024[25]).

Figure 13[11] shows the evolution of ICT sector growth and total economic growth in Norway and the OECD over the past decade. While ICT growth in Norway has been consistently positive during this period – even in the face of the COVID-19 pandemic – it has been well below the OECD average. In 2023, ICT sector growth in Norway was estimated at 4.7%, below the OECD average of 7.6%.

Figure 13. The growth outlook for Norway

ICT sector and total economy, 2013-23



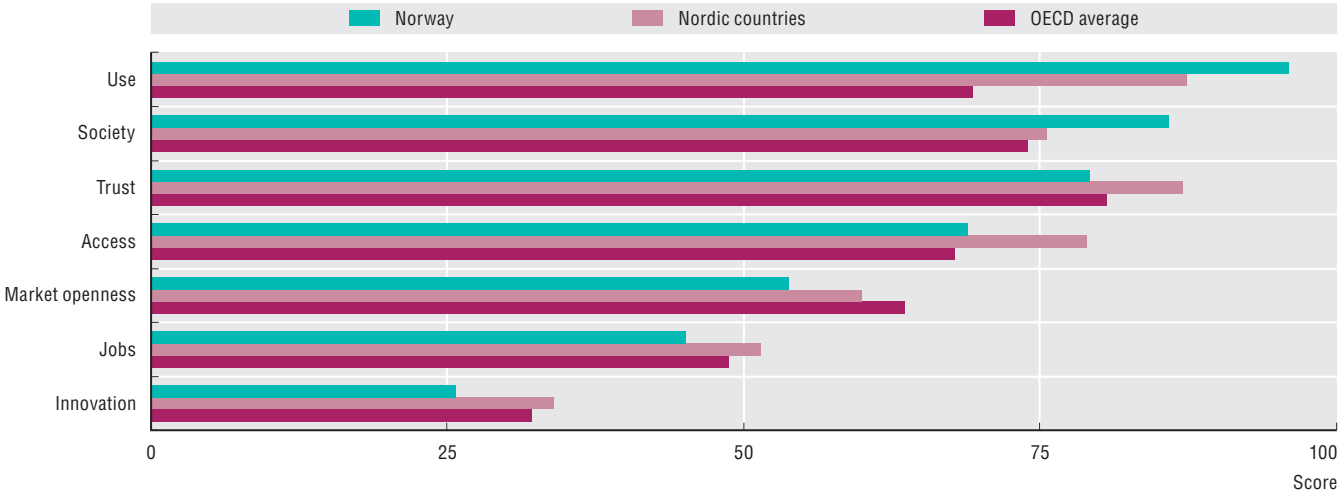
Source: Data for 2013-18 come from the OECD STAN Database *http://oe.cd/stan*; nowcast estimates of the growth rate of the ICT sector for 2019-23 come from OECD (2024[25]); and nowcast estimates of total economic growth for January 2019 to April 2023 come from the OECD Weekly Tracker, *www.oecd.org/economy/weekly-tracker-of-gdp-growth*.

Norway's digital performance through the lens of the Framework

The Framework provides a useful lens to assess digital performance. The Nordic region is generally a strong digital performer, and Norway is no exception. Norway is a digital front-runner in indicators related to effective use of digital technologies and the societal dimension of digital transformation, and it outperforms the OECD and Nordic averages (Figure 14 and Figure B.1). Indeed, Norway is the best performing OECD country in select indicators in both the Use and Society dimensions, particularly in Use, where it is best in class.

Figure 14. Overview of Norway's digital performance

By dimension of the Framework, 2023



Note: Scores express each country value as a proportion of the best performing country value, which is set equal to 100.

Source: Authors' elaboration based on OECD (2024[95]), "Norway", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/en/countries/nor*.

Norway performs strongly in Trust in digital environments and in Access to communications infrastructures, services and data. Market openness in digital business environments and Jobs fit for the digital age are the next best-performing dimensions. Indicators related to teleworking, training and low barriers to digital services show outstanding performance. At the same time, Norway has opportunities to catch up in indicators related to the number of science, technology,

engineering and mathematics (STEM) graduates, jobs in digital-intensive sectors and cross-border e-commerce. Furthermore, it clearly lags in digital Innovation, performing below the OECD average in all of that dimension's indicators and behind the Nordic average overall.

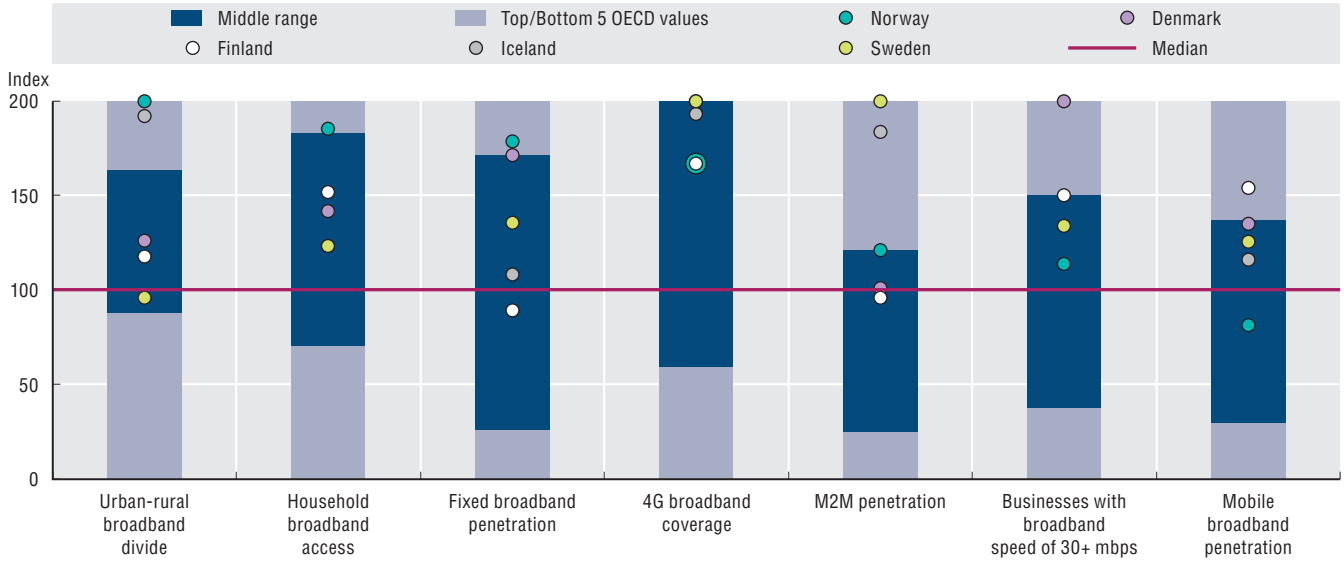
Access to communications infrastructure, services and data

Communications infrastructures and services are the backbone of digital transformation, facilitating interactions between connected individuals, organisations and machines. Ensuring access to high-quality communication networks and services at competitive rates is essential for driving digital transformation. Demands for networks are growing as more people, things and activities go on line. Likewise, data are increasingly recognised as a foundation for digital transformation, fuelling economic activity and productivity.

With much of Norway's population and landmass situated north of the Arctic Circle, it is no small task to connect its citizens to essential services and the rest of society in all seasons. Moreover, while digital technologies can provide seamless connectivity, they depend on a reliable power supply and resilient physical infrastructure. Despite the geographical hurdles, Norway is within the top tier of the best performing OECD countries in some Access indicators. It is also at or above the OECD median in all but two indicators (Figure 15)[12].

Figure 15. Norway's performance in the Access dimension

Normalised index of performance relative to the OECD median (index median = 100), 2023 (or latest available)



Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

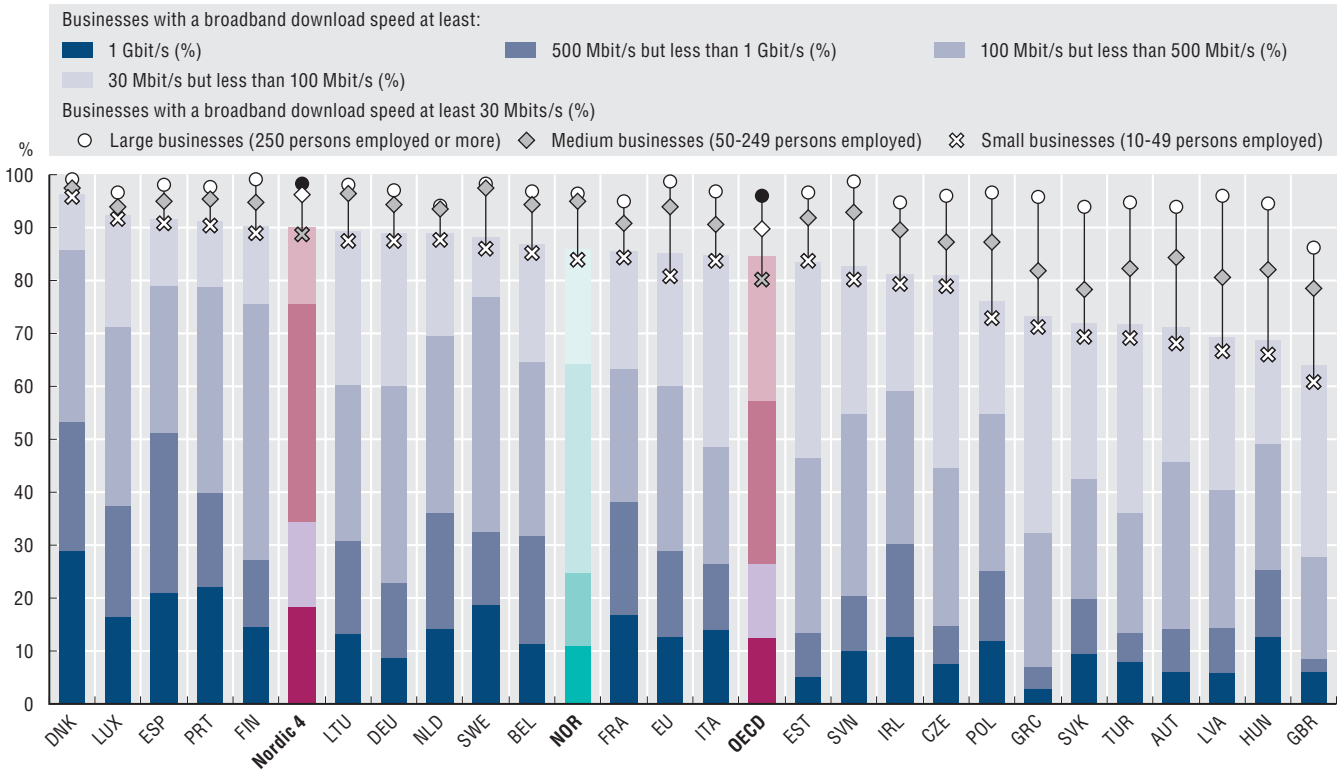
Source: Authors' elaboration based on OECD (2024[87]), "Access", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/access*.

Access to communication infrastructures and services is unparalleled for a country of Norway's size. As of 2023, fixed or mobile broadband services, with an advertised speed of at least 256 kilobits per second (Kbps), reached an impressive 99% of households in rural and large urban areas. This level of access was behind only Korea and Switzerland. Moreover, Norway consistently secures a top position in fixed broadband penetration. Since 2010, it has maintained the highest subscription rates, alongside countries like Denmark, France, the Netherlands and Switzerland (OECD, 2024[26]). The share of enterprises with a contracted broadband speed of 30 Mbps or more is 86%, close to the Nordic (87%) and OECD (84%) averages. However, there is a noticeable gap between small enterprises (83%) compared to their large (96%) and medium-sized counterparts (95%) (Figure 16)[13].

Performance noticeably drops off at higher speed tiers. Norway falls below the OECD average for businesses connected to broadband services of 500 Mbps. It is also falling behind both the OECD average and the performance of other Nordic nations for businesses connected to broadband services of at least 1 gigabit per second (Gbps) (OECD, 2024[4]). These higher speed tiers are more likely to be required for digital-intensive businesses, including implementation of data-heavy technologies such as artificial intelligence (AI) and virtual reality.

Figure 16. Share of businesses with broadband contracted speed of 30 Mbps or more

All businesses (excludes financial sector) with 10 employees or more, 2022



Note: Fibre covers fibre to the premises and fibre to the building.

Source: OECD (2024[4]), "Share of businesses with broadband contracted speed of 30 Mbps or more", *OECD Going Digital Toolkit*, based on the OECD ICT Access and Usage by Businesses Databases (*https://oe.cd/dx/ict-access-usage*), *https://goingdigital.oecd.org/indicator/14*.

Performance is mixed for the uptake and use of mobile broadband. By 2021, nearly all Norwegians were served by at least a 4G mobile network (OECD, 2024[5]), which is essential for the rollout of the Internet of Things (IoT). Machine-to-machine communication penetration – which enables applications and services based on data collected from devices and objects – has also increased rapidly in the last few years. The number of machine-to-machine SIM cards[14] used in the country increased from 33 per 100 inhabitants in 2018 to 72 in 2022, although this is still below the Nordic average of 110 (OECD, 2024[27]).

Despite this performance, the share of Norwegian households with mobile broadband Internet access at home (40%) lags both the OECD average (58%) and other Nordic countries (OECD, 2024[28]). Mobile data usage in Norway (12 GB/subscription/month) exceeds the OECD average (10 GB/subscription/month). However, the next closest Nordic country (Sweden) uses over 50% more data per mobile subscription per month (19 GB) (OECD, 2024[29]). This suggests either that Norwegians tend to use less data-intensive mobile applications or that pricing or infrastructure quality is restricting more intensive use.

Norway's policy landscape related to Access

Norway's position as a digital front-runner is in part due to its excellent connectivity. Not surprisingly, the Access dimension is both one of the most well-funded and well-covered dimensions in Norway's digital policy landscape. Norway's main policy initiative in the Access dimension is "Our common digital foundation" (Norwegian Ministry of Local Government and Modernisation, 2021[30]). It sets ambitious targets such as universal coverage of 100 Mbps broadband and the expansion of gigabit coverage to certain sectors such as public administration, education, traffic hubs and emergency services by the end of 2025. This initiative also set an objective for 2025 to provide 5G coverage to all areas covered by 4G as of 2020.

Given more than a quarter of Norway's population live in remote areas (compared to an OECD average of just under 10%) (OECD, 2024[31]), policies to ensure equitable Internet access for all citizens have particular salience. To achieve this, the Norwegian government has two distinct yet linked policy initiatives. First, bidders in the 2021 spectrum auction that agreed to provide broadband services of 100 Mbps in rural areas were eligible for an optional discount of up to

NOK 560 million. Second, as a complement to the discount, the broadband support scheme provides an annual state aid grant to connect premises not covered by commercial deployment. In 2024, the government approved NOK 400 million (about EUR 35 million) for this broadband support.

Beyond investment, connectivity and regional development, the Norwegian government has initiatives to increase the security and resilience of the telecommunications network. While power outages in Norway are relatively rare, severe weather events such as heavy snowfall and high winds are the main cause of disruption. Research shows communications network outages are the primary concern of Norwegian households in the event of electricity disruption (Wethal, 2023[32]). Given the government has emphasised preparations for the digital and green transitions, action in this area is sensible; climate change will likely cause more disruptions in future. In 2024, the Norwegian government will spend NOK 188 million to improve security and resilience in the Norwegian electronic communications networks. Among other actions, this includes power backup on mobile stations and improved resilience in vulnerable regions.

For Norway, the challenge in the Access dimension is less about getting ahead than staying ahead. In future, achieving universal coverage of 100 Mbps broadband in such a challenging geography for communications infrastructure and delivering the gigabit speeds needed will be much more demanding. Wireless technology cannot reliably deliver such speeds, especially over the long distances required to serve Norway's rural communities. Getting the next generation of connectivity policies right will require maintaining a thriving and competitive commercial market. At the same time, Norway needs sufficient investment to ensure Norway's rural north is not left behind for access to next generation communication networks.

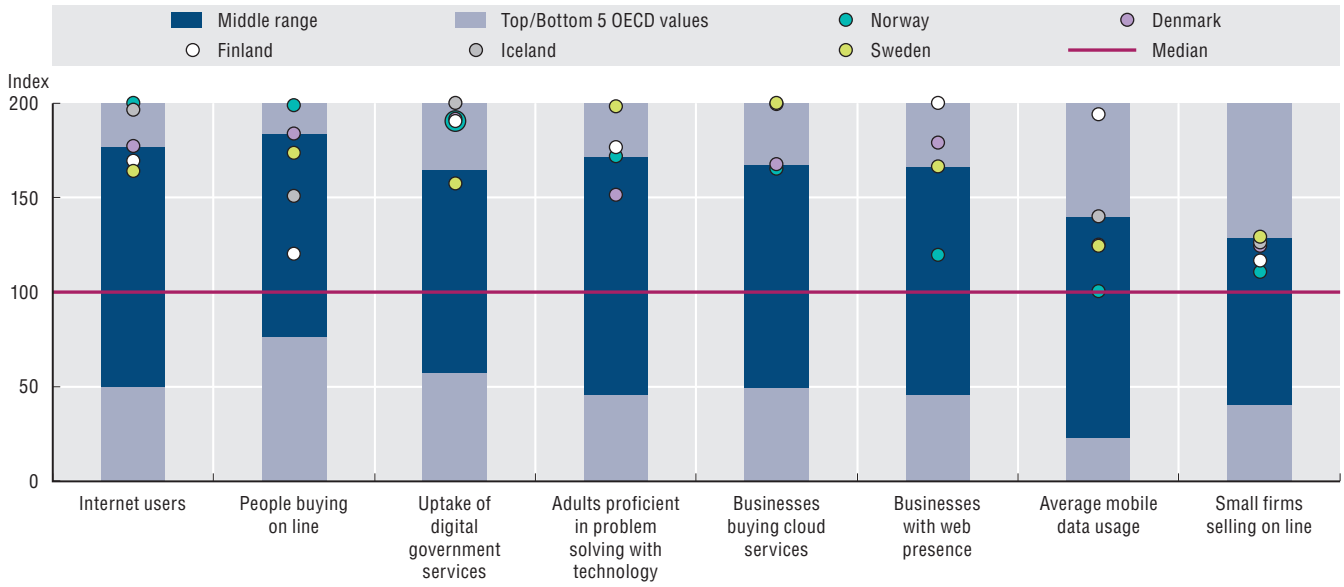
Effective use of digital technologies and data

The power and potential of digital technologies and data for individuals, governments and firms hinge on their effective use. Promoting adoption, diffusion and proficient use of advanced digital tools is crucial, especially among small and medium-sized enterprises (SMEs). Policies aimed at training people to use digital technologies effectively, and at promoting the adoption and diffusion of advanced digital tools, can boost productivity growth in firms and enhance the reach and quality of public services.

Norway has identified a range of priorities relevant to the Use dimension. These priorities include developing the data economy; increasing digitalisation of SMEs; digitalising the public sector; and promoting digital inclusivity, particularly in the context of an ageing society. Overall, Norway excels in the effective use of digital technologies – the country is among the first tier of best performing OECD countries (Figure 17)[12].

Figure 17. Norway's performance in the Use dimension

Normalised index of performance relative to the OECD median (index median = 100), 2022 (or latest available)



Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

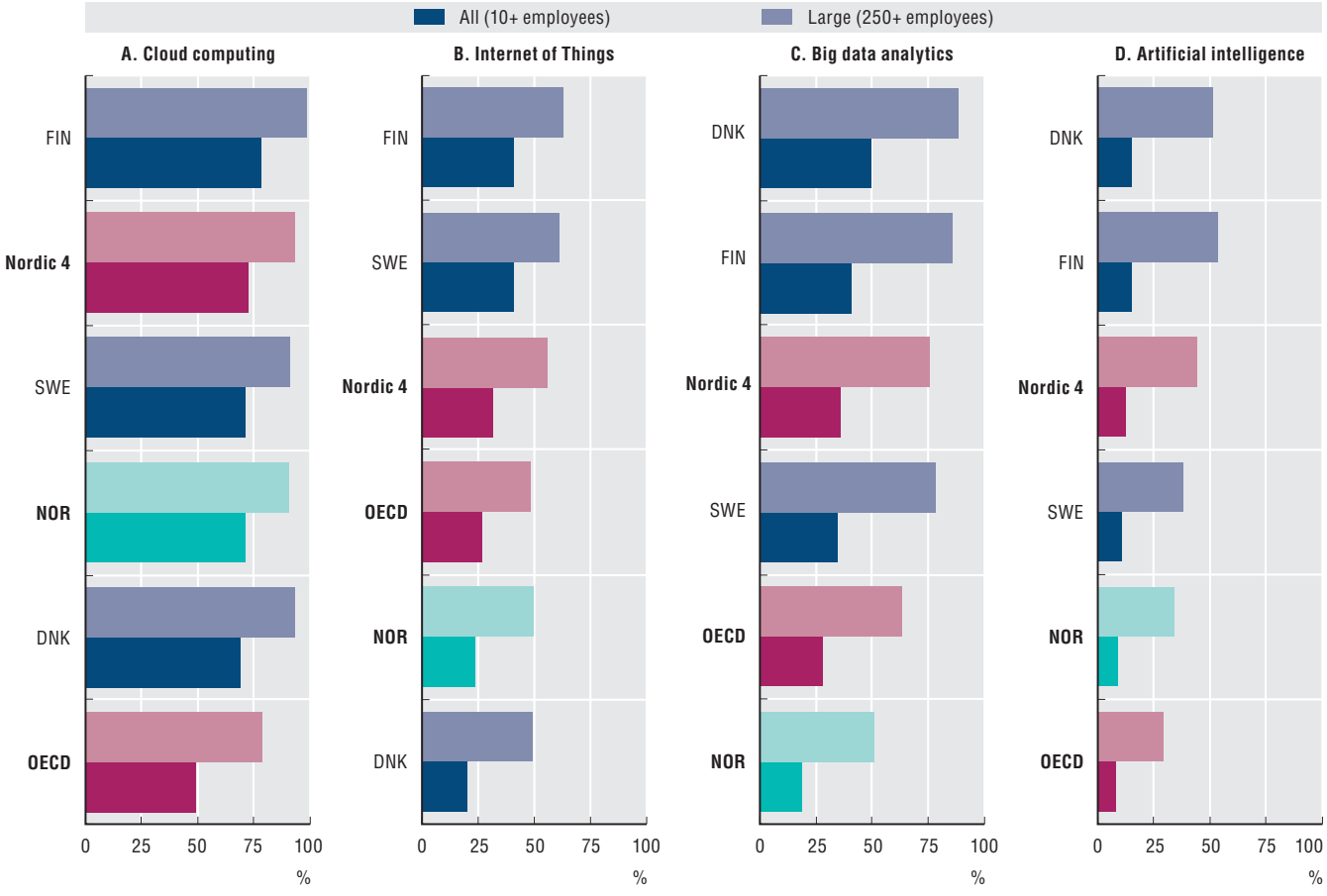
Source: Authors' elaboration based on OECD (2024[105]), "Use", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/use*.

Norway has consistently led the way in Internet adoption, with an impressive 96% of people aged 16-74 being frequent Internet users (OECD, 2024[33]). The prevalence of Internet users purchasing on line (92%) is among the highest in the OECD, along with the Netherlands and the United Kingdom (OECD, 2024[34]). In addition, Norway stands out for its robust online business presence. In all, 83% of Norwegian companies maintained a website or homepage in 2022, although this is slightly behind the Nordic average of 90% (OECD, 2024[35]).

As digital transformation continues, digital tools have become indispensable for the effective use of technology. Sophisticated technologies such as cloud computing, IoT, big data analytics and AI are crucial for improving business efficiency. In particular, Norwegian companies with ten or more employees have widely adopted cloud computing, closely matching the Nordic average and exceeding the OECD average. However, adoption of IoT technologies, big data analytics and AI is relatively low and lags the Nordic average (Figure 18)[15]. Larger companies are more likely adopters of these advanced technologies, highlighting the importance of further investment in skills. For all firms, a shortage of more advanced ICT skills appears to be slowing the rate of digitalisation in the private sector (KPMG, 2020[36]).

Figure 18. Adoption rates of cloud computing, IoT technologies, big data analytics and AI

As a percentage of businesses with 10 employees or more and 250 employees or more, 2021-23



Note: Enterprises with ten employees or more in the business sector (excluding financial services).

Source: OECD (2024[88]), ICT Access and Usage Databases, *https://oe.cd/dx/ict-access-usage*.

Norway's policy landscape related to Use

Norway's impressive Internet usage statistics point to a population of early adopters with a solid foundation of basic skills. Use is the dimension that corresponds to the highest number of Norway's national digital priorities. Therefore, achieving success in this area is critical as Norway plans for the future. With over NOK 1 billion allocated over three large, multi-year policy initiatives, Norway has clearly made it a priority to provide and improve digital public services, teach foundational skills and ensure as much of Norwegian society as possible can benefit from digital transformation.

The Norwegian government's digital government strategy is "One digital public sector" (Norwegian Ministry of Local Government and Regional Development, 2019[37]). However, a new comprehensive strategy encompassing digital government and the digital economy is under development. This strategy, supported by a budget of NOK 1 billion, aims to boost the digitalisation of Norway's public sector in three ways. First, it will improve the quality and breadth of digital public services. Second, it will increase co-ordination within the public sector and co-operation between the public and private sectors by creating a common ecosystem and improved procurement processes. Third, it will build the digital competences of public sector employees. Beyond this, other initiatives in the Use dimension focus on improving basic ICT skills for all citizens and improving the innovative potential of the public sector.

Norway is responding to policy gaps in two key areas: increasing business dynamism and helping SMEs to digitalise, which is a priority for Norway. A new plan aims to help the education sector better nurture the skills needed for a modern, digital economy (Norwegian Ministry of Education, 2023[38]). In addition, the trade organisation Digital Norway, backed by the government, provides guidance and short training courses for SMEs seeking to digitalise. Despite these efforts, there is scope for additional policy development in this area. More incentives to encourage firm digitalisation, for example, could result in higher uptake of available courses. Norway could also increase expenditure on ICTs, which is relatively low for a country so digitally advanced.

Through the new national digital strategy (NDS), Norway could promote a culture that encourages more risk taking to strengthen the dynamism of SMEs. Norwegian firms seem reticent to build on successful limited pilots with large-scale digital transformation projects. In part this may be due to a historically strong economy based on extraction of raw materials, where the business case for digitalisation is not always clear-cut. As another potential factor, the national business culture often does not encourage risk taking. For the forthcoming NDS, Norway may wish to consider policies to increase business dynamism, such as changes to insolvency regimes to make bankruptcy less penalising (Adalet McGowann and Andrews, 2018[40]).

Data-driven and digital innovation

Innovation helps push out the frontier of what is possible in the digital age, driving job creation, productivity and sustainable growth. The formation of new companies, and the spread of new ideas in existing ones, leads to better and more effective service. It also creates new products and business models that can have profoundly positive effects on society at large.

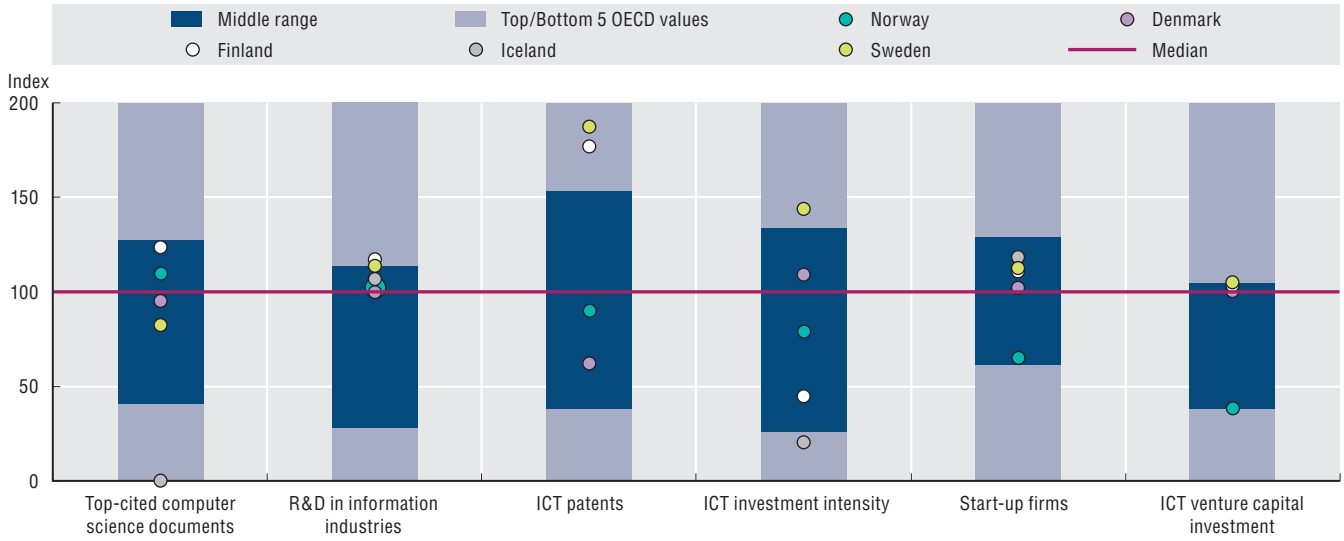
Progress in the Innovation dimension requires specific measures to support and stimulate innovative entrepreneurs and SMEs, alongside balancing competition regimes to allow new entrants to disrupt existing markets. Discovery is an important enabler of innovation, which requires stimulation and commercialisation of scientific research. Sectors such as healthcare, agriculture and the public sector need to be ready to experiment and implement new technologies. This, in turn, may require reforms and dedicated strategies or policy measures.

Norway has prioritised increasing the digitalisation of SMEs and the public sector, as well as developing the data economy. These are all priorities relevant to the Innovation dimension, making progress paramount. This is especially true as Norway lags the other Nordic countries and ranks below the OECD median for most related indicators (Figure 19)[12].

While Norway is a strong innovator overall, it faces challenges in catching up to its Nordic neighbours in terms of digital innovation performance. Unlike Sweden and Finland, which are home to globally recognised companies like Spotify and Nokia, Norway's industrial innovation is not heavily focused on ICT companies (Parmiggiani and Mikalef, 2022[41]). As a result, Norway is far from realising its full digital innovation potential.

Figure 19. Norway's performance in the Innovation dimension

Normalised index of performance relative to the OECD median (Index median = 100), 2022 (or latest available)



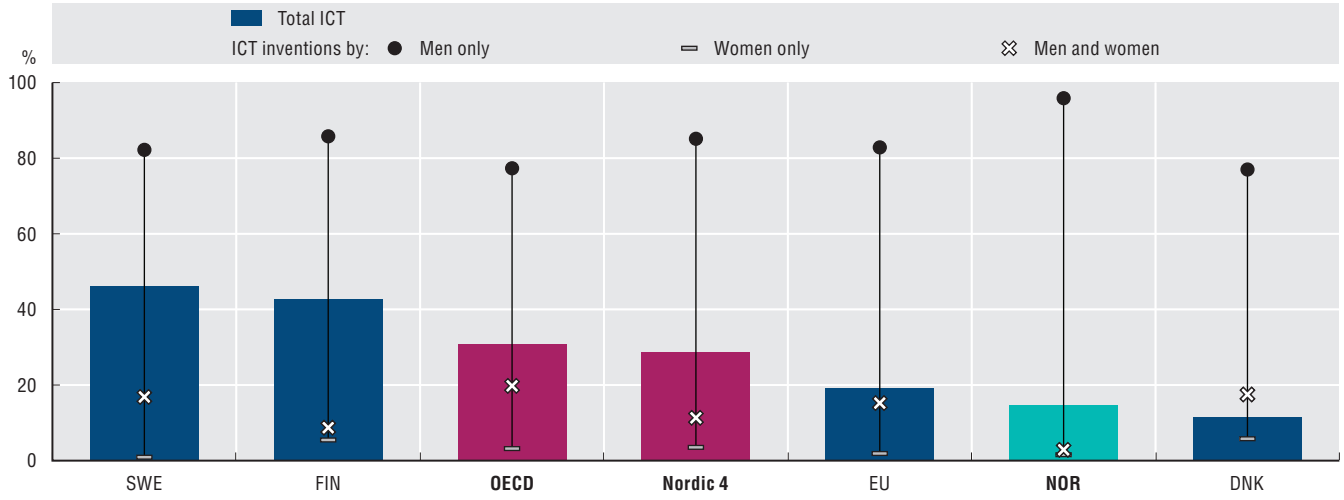
Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

Source: Authors' elaboration based on OECD (2024[92]), "Innovation", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/innovation*.

Promoting digital innovation requires intangible assets such as patents and software. Yet Norway faces a notable disparity when compared with its Nordic counterparts in terms of intellectual property related to the ICT sector. Data from 2019 reveal that only 14% of all Nordic patents in Norway were in ICT, a substantial lag behind Sweden (46%), Finland (42%) and the Nordic (29%) and OECD (31%) averages (Figure 20, Panel A)[16]. Furthermore, Norway's share of the top 10% of most-cited documents in computer science as a share of the top 10% in all fields has consistently remained below the Nordic and OECD averages since 2010 (Figure 20, Panel B)[17]. Adding to this, Norway's investment in ICT as a share of GDP has tended to remain at low levels. In 2022, ICT investment as a share of GDP was 2%, below the Nordic (3%) and OECD (3%) averages (OECD, 2024[42]).

Figure 20. Innovation activity in Norway

Panel A. Patents in ICT technologies as a share of total IP5 patent families, 2019

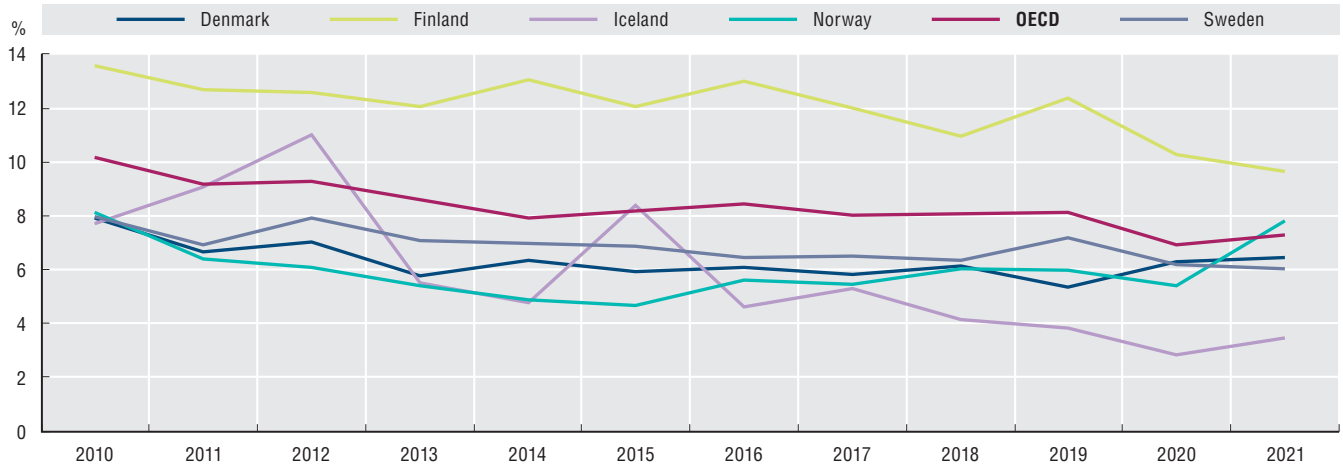


Note: Patents protect technological inventions (i.e. products or processes providing new ways of doing something or new technological solutions to problems).

Source: OECD (2024[97]), "Patents in ICT technologies as a share of total IP5 patent families", *OECD Going Digital Toolkit*, based on the OECD STI Micro-data Lab: Intellectual Property Database (*http://oe.cd/ipstats*), *https://goingdigital.oecd.org/indicator/33*.

Figure 20. Innovation activity in Norway *(cont.)*

Panel B. Top 10% most-cited documents in computer science as a share of the top 10% ranked documents in all fields, 2010-21



Note: Top-cited publications are the 10% most-cited papers normalised by field and type of document (articles, reviews and conference proceedings).

Source: OECD (2024[102]), "Top 10% most-cited documents in computer science, as a share of the top 10% documents ranked in all fields", *OECD Going Digital Toolkit*, based on OECD calculations using Scopus Custom Data, Elsevier, and Scimago Journal Rank from the Scopus journal title list, *https://goingdigital.oecd.org/indicator/32*.

Norway lags other OECD countries for venture capital (VC) investment in ICT firms, with negative consequences for start-ups in information industries. Access to finance is an essential part of the digital innovation landscape, and VC investment is an important source of funding, especially for high-risk and innovative firms. However, VC investment in firms within the ICT sector in Norway is among the lowest across the OECD, accounting for only 1% of the GDP in 2022 (OECD, 2024[12]). This extends to VC investments in AI, where Norway's share is relatively low considering GDP (OECD, 2024[43]). The shortfall of VC investment can affect the start-up ecosystem, hindering essential resources for young firms to thrive. Norway trails other Nordic countries in terms of start-up firms in information industries.[18] In 2021, the share of start-up firms in information industries was as low as 24%, below the Nordic average of 32% (OECD, 2024[44]). In addition, Norway is only home to just over a quarter of the number of unicorns – tech companies valued at over USD 1 billion – as neighbouring Sweden (11 versus 42) (Dealroom.co, 2024[45]).

In recent years, Norway has been allocating less of its GDP to research and development (R&D), which may also be undermining digital innovation. Norway experienced robust growth in R&D as a share of GDP in 2015 (9%) and 2017 (7%). However, the following years saw lower increases of 2-3%. In 2020, Norway allocated 2% of its GDP to R&D with the private sector contributing to almost half of the investment (The Research Council of Norway, 2021[16]). In the information industries, which are crucial for digital innovation, business expenditure on R&D as a share of GDP in Norway (0.4%) is below Finland (0.7%), Sweden (0.7%) and the Nordic average (0.5%) (OECD, 2024[46]).

Nonetheless, Norway has made efforts to foster digital innovation in the public sector. This is evident in its commitment to delivering innovative services (OECD, 2017[47]) and developing integrated digital systems for data sharing across sectors. This commitment has led to the early creation of innovative public portals such as Altinn and ID-porten. These portals facilitate digital communication, identification and authentication between public authorities, citizens and businesses (Parmiggiani and Mikalef, 2022[41]; Government of Norway, 2024[48]). These efforts produced an impressive result: in 2022, 91% of the Norwegian population used the Internet to interact with public authorities (OECD, 2024[49]).

Norway's policy landscape related to Innovation

Somewhat paradoxically, Norway has the highest number of major digital initiatives, especially with respect to data, in the Innovation dimension. In 2021, Norway published "Data as a Resource" – a landmark policy paper backed with NOK 300 million of investment. The paper set out the immense potential for value creation in both the public and private sectors from increased sharing of, and innovation with, data (Norwegian Ministry of Local Government and Modernisation, 2021[50]). This document shows that Norway is at the front of the pack for developing policies to foster data-driven innovation and its potentially positive impacts on all parts of the economy and society.

This culture of data innovation is further reinforced by two separate regulatory sandboxes. Datatilsynet stimulates responsible AI innovation through free guidance to a selection of qualifying companies of various size and across different industries (Datatilsynet, n.d[51]). For its part, Finanstilsynet has run a similar initiative since 2018. It aims to help fintech firms gain better understanding of regulations so they can launch innovative products. In return, the supervisory authority can gain useful insights into new technological developments that help it anticipate regulatory challenges.

Norway is building on the strength of its hydropower industry and climate to develop a data centre industry that can serve foreign clients. Norway has an abundance of clean energy generated by an advanced hydropower industry (Business Norway, 2023[52]). This foundation, combined with an Arctic climate and excellent connectivity, gives Norway natural potential for data centres. Indeed, in its 2021 data centre strategy, the Norwegian government aims to facilitate the sustainable development of the data centre industry by providing specific guidance for foreign companies (Norwegian Ministry of Local Government and Modernisation, 2021[53]).

Norway has also produced extensive work in the science and technology policy domain, laying the foundation for major investment in AI research. The latest iteration of Norway's "Long-term Plan for Research and Higher Education" (Norwegian Ministry of Education and Research, 2023[54]) was published in 2023. The new strategy sets out ambitious proposals to enhance Norwegian competitiveness and innovation capacity. At the same time, it seeks to boost scientific research in six priority areas, including a range of industrial technologies such as AI, advanced robotics and quantum technology. The strategy includes an objective to increase R&D expenditure from business and industry to 2% of GDP by 2030. To that end, the government announced its intention to dedicate NOK 1 billion to AI research over the next five years.

Norway could harness its forthcoming NDS to update its approach to AI. Norway's 2020 "National Strategy for Artificial Intelligence" addresses emerging challenges related to ethics, infrastructure and skills. These are issues that Norway must solve to realise its potential as an AI leader (Norwegian Ministry of Local Government and Modernisation, 2020[55]). The strategy is designed to be open-ended in recognition of the rapidly evolving policy environment. With this in mind, the forthcoming NDS could be an opportunity to refresh the current position in light of the recent emergence of large language models.

While the government encourages innovation, it could do more to help young firms access funding. The government-founded Innovation Norway provides funding and guidance to innovative companies, including those in early-stage development. However, additional policies to stimulate entrepreneurship and SME growth could help young companies to thrive. These could include building incubators or increasing access to patient and risk-tolerant capital at seed stage. The latter would recognise that firms in emerging areas may not guarantee immediate returns or success.

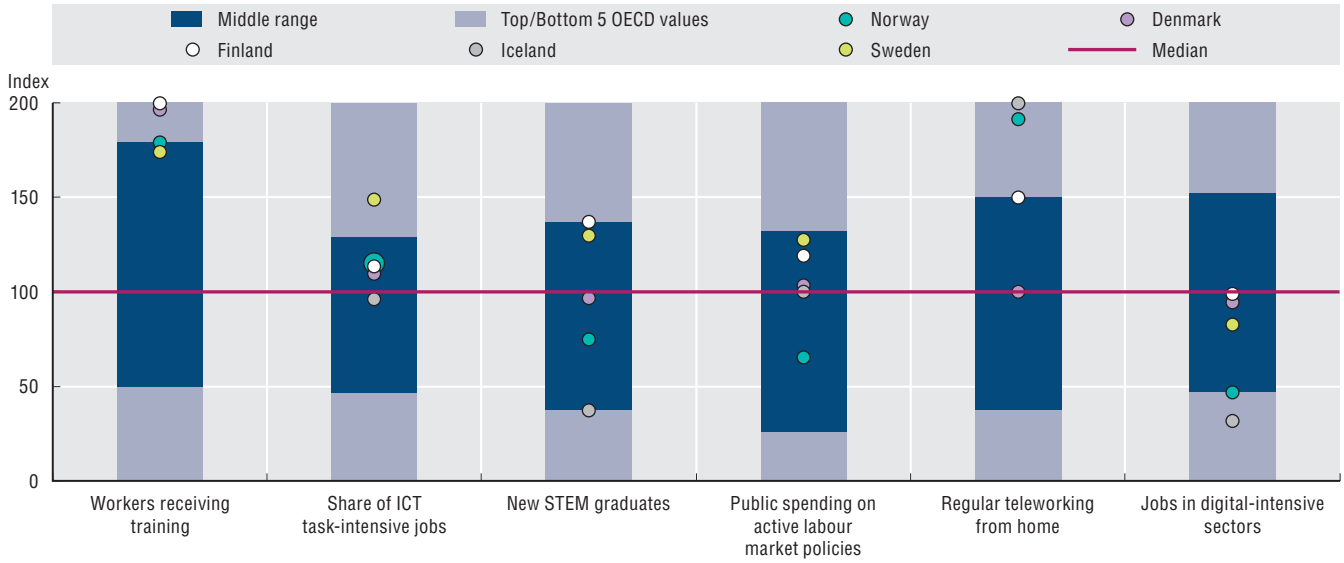
Finally, Norway could benefit from policies that encourage a greater spirit of entrepreneurship and competition. A culture of risk aversion among Norwegian businesses and investors could hinder the country's ability to fully capitalise on its innovative potential. In response, it could design policies to encourage start-ups from research institutions and introduce reforms to ensure business failure or insolvency is not overly penalised. Together, these changes may help foster a more entrepreneurial spirit and lead to value creation through increased start-up success. In addition, Norway could encourage new market entry and disruption and further boost its innovative potential. This could include a review of regulatory frameworks to ensure they do not favour incumbents.

Jobs fit for the digital age

Digital transformation leads to creative destruction, with some jobs lost and others created. As labour markets transform, many new jobs are likely to be in unfamiliar areas. It is thus essential to empower people with the mix of skills to succeed in a digital world of work. This includes improving education and training systems throughout the life cycle, facilitating job-to-job transitions and ensuring adequate social protection. Some workers are likely to benefit more from digital transformation than others. Thus, an adequate safety net is needed to ensure a successful and fair transition for all. Overall, Norway's performance in the Jobs dimension falls within the mid-range among OECD countries but lags behind most of its Nordic counterparts (Figure 21)[12].

Figure 21. Norway's performance in the Jobs dimension

Normalised index of performance relative to the OECD median (index median = 100), 2022 (or latest available)



Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

Source: Authors' elaboration based on OECD (2024[93]), "Jobs", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/jobs*.

Norway's performance in the Jobs dimension is mixed. High levels of digital literacy, a well-educated population and a high employment rate[19] in Norway mask some alarming trends. Attainment in foundational subjects such as mathematics, science and reading is declining (see Society section). Meanwhile, inequality of education is increasing alongside the skills gap reported by Norwegian companies (NHO, 2022[56]). In one notable concern, the labour market has tightened in recent years, measured by the number of vacancies per unemployed person (OECD, 2023[57]). This situation reflects, among others, a mismatch between available and demanded skills in the country, particularly among high and middle-skilled occupations (OECD, 2022[58]).

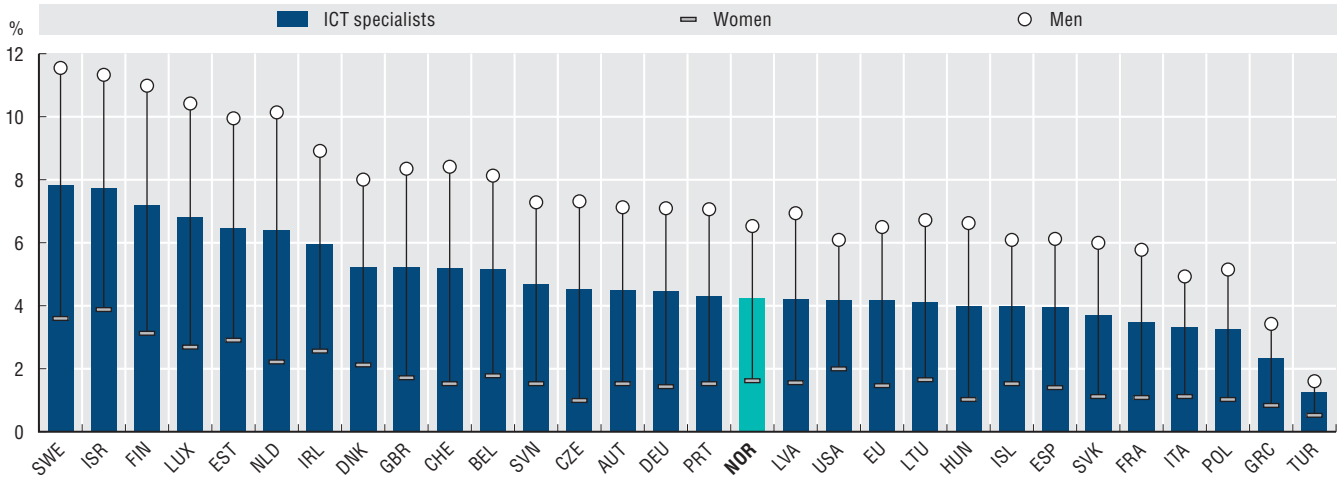
The lack of specialised and skilled workers across sectors is a prevailing concern among Norwegian stakeholders and researchers. Professional competence gaps are identified as a prominent barrier for labour market participation, hindering companies from fully benefiting from digital transformation (KPMG, 2020[36]). In all, 46% of companies in Norway surveyed in 2023 tried to recruit without obtaining the desired expertise (NHO, 2023[39]). Indeed, Norway's share of ICT specialists lags most of its Nordic neighbours, with a worrying five percentage point gap between men and women (Figure 22)[20].

Norway could better align its workforce to the demands of a highly digital economy. As use of digital technologies in the workplace continues to grow, and technological advancements unfold rapidly, the demand for a workforce adept in ICT-related tasks and in digital-intensive industries intensifies. However, the share of employees engaged in ICT-related tasks has remained relatively stable in Norway over the last decade. In contrast, countries like the Netherlands and Sweden have seen this proportion increase by seven percentage points over the same period (OECD, 2024[59]). In addition, the share of the labour force employed in high and medium-high digital-intensive industries hovers around 43% in Norway, slightly below the OECD (50%) and Nordic (45%) averages in 2018 (OECD, 2024[60]). This points to a potential area of improvement to align Norway's workforce composition with the evolving demands of a highly digital economy.

Part of the mismatch between labour supply and demand could reflect inadequate levels of active labour market programmes. Not all workers will adapt quickly to the evolving demands of digital technologies. Consequently, adequate social protection becomes crucial to successfully match the new needs of businesses with supply. This involves providing displaced workers with active labour market programmes that include job search services and training. In recent years, Norway has performed below the Nordic and OECD averages in this area. Public spending on active labour market programmes is also notably low, accounting for only 25% of GDP, below the OECD (52%) and Nordic (55%) averages. In particular, public spending on training has fallen significantly in recent years, which could explain the current skill mismatch in the country (OECD, 2024[61]).

Figure 22. ICT specialists

ICT specialists as a percentage of all occupations, by gender, 2022 (or latest available)



Source: OECD (2024[59]), "Share of ICT task-intensive jobs", *OECD Going Digital Toolkit*, based on European Labour Force Surveys, national labour force surveys and other national sources, *https://goingdigital.oecd.org/indicator/40*.

Norway's policy landscape related to Jobs

With one exception, Norway lacks a wide range of major policy initiatives related to the digitalisation of labour markets. While Norway has generally robust labour market policies, it has only a single policy focused on digitalisation. "Overview of Skills Needs in Norway" (Norwegian Ministry of Education, 2023[38]), launched in 2023, recognises the size of the skills challenge, offering constructive approaches towards tackling it. For example, it focuses on investment in skills provision to working-age adults outside of the labour market. It also proposes reforms to university funding mechanisms to incentivise lifelong learning and professional retraining. In addition, given the concentration of educational institutions in Oslo, it suggests changes to spread skills provision throughout the country.

While "Overview of Skills Needs in Norway" does not identify ICT skills as a government priority, it clearly acknowledges the need for long-term reforms in the education system. Apart from an increasingly digitalised world, the education system faces challenges such as an ageing population and the green transition. In addition, the government has also committed to publishing an additional skills reform targeted at working life, expected in the course of 2024. This offers an opportunity to further develop policies to maximise the benefits and mitigate the disruptive effects of increased levels of digitalisation (Norwegian Ministry of Education, 2023[38]).

Despite the positive steps by Norway in the Jobs dimension, a number of domains remain underexplored. Early consideration of labour market policies may be warranted to ensure successful and fair transitions of workers between industries and jobs. In addition, Norway could develop a detailed plan to ensure it can produce enough advanced ICT specialists to complement its high level of foundational skills. Changing careers can be difficult. Therefore, Norway might benefit from an evaluation of social policies. This could consider whether those working in jobs most at risk of automation have access to the requisite advice and guidance, including support for job searches.

In addition, notwithstanding Norway's excellent social safety net, new models of employment – such as the platform economy – may alter the landscape for labour. Consequently, it could reflect on how these protections could be maintained as new employment models take hold. While studies suggest the number of platform economy workers in Norway is marginal (Ilsøe and Jesnes, 2020[62]), this growing phenomenon may require a novel policy response.

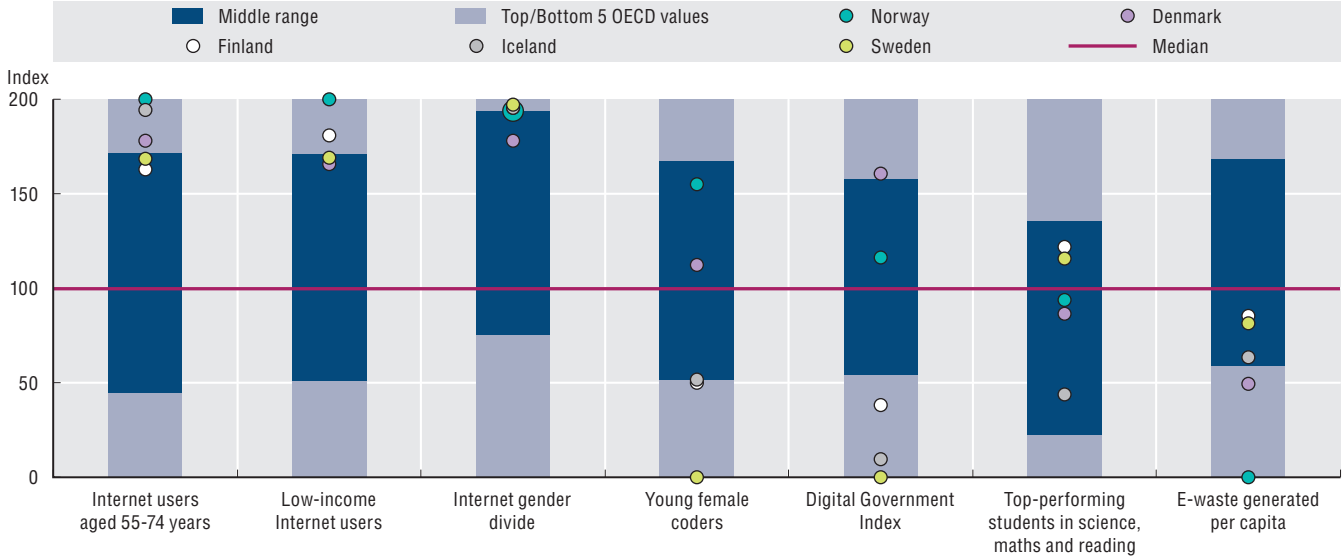
A prosperous and inclusive digital society

Societal effects of digital transformation are complex because overall impacts are often not clear-cut, and they do not affect all segments of society equally. Action in the Society dimension helps ensure every citizen can share in the benefits of digital transformation. It also minimises the number of people who find themselves excluded due to their age, gender, economic circumstances or level of educational attainment. In addition, it provides opportunities to enhance access to information via a free and interconnected Internet and improve information integrity. Moreover, it aims to ensure that societal challenges are realised, including those related to providing quality healthcare, supporting a modern and digital government, and ensuring the green transition.

Norway has identified a range of priorities relevant to the Society dimension that can support its overall ambitions for its digital future. Key priorities for the Society dimension include supporting the green transition, digitalising the public sector and promoting digital inclusivity, particularly in the context of an ageing society. It is therefore essential to focus on the Society dimension to achieve Norway's policy ambitions. Overall, Norway excels in this dimension, outperforming both the OECD median value and the Nordic countries (Figure 23)[12].

Figure 23. Norway's performance in the Society dimension

Normalised index of performance relative to the OECD median (index median = 100), 2023 (or latest available)



Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

Source: Authors' elaboration based on OECD (2024[101]), "Society", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/society*.

Norway has been successful in addressing societal challenges related to digitalisation. Notably, there has been significant progress in narrowing age disparities in Internet usage since 2018. The elderly population (aged 55-74) has made notable progress in catching up with the overall population's Internet usage. In 2022, the gap between daily Internet usage among the elderly and the wider population (aged 16-74) was only five percentage points compared to nine in 2018 (OECD, 2024[33]). Looking beyond Internet use, the population in Norway is among the most digitally literate across OECD countries, along with other Nordic countries (Iceland and Finland) and the Netherlands.

However, recent data suggest a need for improvement to ensure that individuals can meet the demands of an increasingly digital economy and society. Insights from the OECD Programme for International Student Assessment (PISA) indicate a significant decline in Norway's performance in science, mathematics and reading – critical skills to thrive in the digital economy. Norway's performance in 2022 marks the lowest scores ever recorded in the survey, with mathematics suffering the highest decline in the short term (-32.5% from 2018 to 2022) (OECD, 2023[63])[21]. Despite this decline, Norway remains in line with the average across OECD countries, although below the performance of Finland and Sweden (Figure 24)[22].

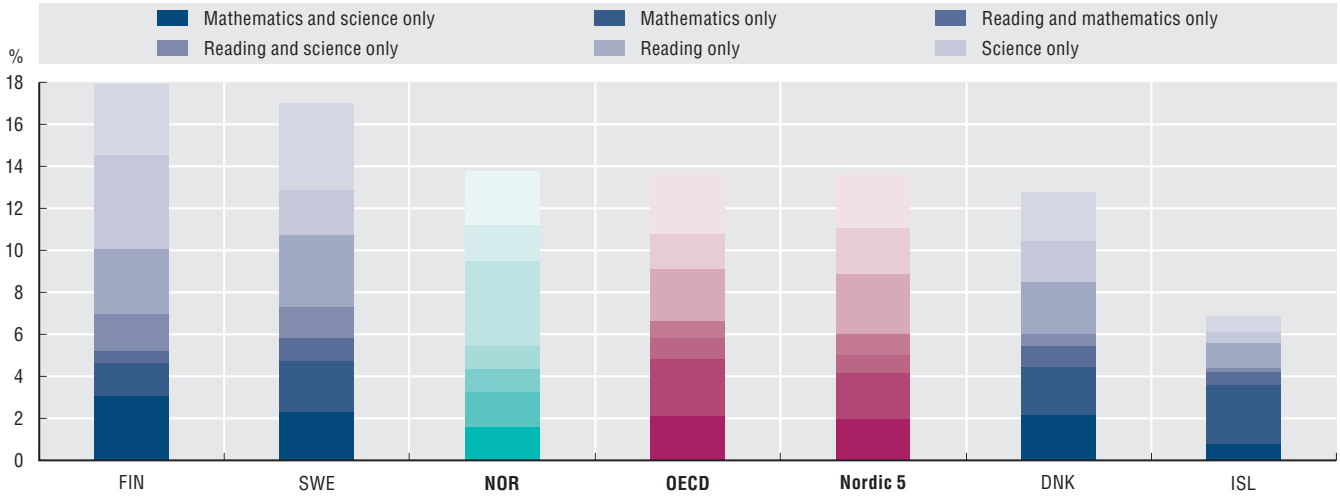
PISA also highlights another concerning trend in Norway: an increase in educational inequality. The gap in learning outcomes of reading and science between the best and the worst students has increased since 2018. The survey also shows a widening gap between the performance of the most advantaged and disadvantaged students in terms of socio-economic status from 2012 to 2022 in Norway. Most OECD countries did not experience such a downward trend (OECD, 2023[63]).

Norway also faces challenges in encouraging students to pursue degrees in ICT and other STEM fields, a critical aspect to succeed in technology-rich work environments. In 2021, the number of students in Norway graduating in ICT or STEM fields lagged all countries for which data are available, except Brazil. This lag existed despite the government's special emphasis on ICT-related study programmes since 2015. Data indicate a noticeable gender gap, with only 2% of

women graduating in ICT degrees in 2021 compared to 11% of men (Eurostat, 2023[64]). This gender disparity extends to programming skills, with only 21% of women having coding skills compared to 29% of men (OECD, 2024[65]). Norway also trails the OECD average in terms of the availability of workers with AI skills, a critical capability in an increasingly digital economy and society (OECD, 2024[66]).

Figure 24. Top-performing students in science, mathematics and reading

Percentage of 15-16 year-old students, 2022



Source: OECD (2024[103]), "Top-performing 15-16 year old students in science, mathematics and reading", *OECD Going Digital Toolkit*, based on the OECD Programme for International Student Assessment (PISA) Database (*https://oe.cd/pisa*), *https://goingdigital.oecd.org/indicator/52*.

Norway's policy landscape related to Society

Norway is taking action to ensure all segments of society are competent in digital technologies. Norway's "Digital Throughout Life" strategy, published in 2021 and supplemented with an accompanying Action Plan in 2023, identifies and seeks to address a range of issues that might lead to digital exclusion (Norwegian Ministry of Digitalisation and Public Governance, 2021[67]; Norwegian Municipal and District Ministry, 2023[68]). The strategy acknowledges that Norway has a highly skilled population with excellent basic skills and a propensity to use digital technologies regularly.

Despite Norway's overall digital competence, some segments of society tend to be left behind. These include the elderly, those with health challenges, people of working age not in education or employment, and first-generation non-western migrants (particularly women). The strategy proposes several policy measures to address these gaps. First, it seeks to expand basic digital competence training delivered through local hubs such as libraries. Second, it commits to designing digital government services so they are accessible even to those with little or no ICT skills. Third, it plans information campaigns to ensure that schools teach fundamental concepts such as data protection and cybersecurity.

A new long-term strategy sets out a vision for healthcare in Norway. As highlighted in Section 1, Norway is a leader in the sharing of health data and a pioneer in using electronic health records and advanced technologies, like AI, for enhancing innovation in healthcare (Trocin et al., 2022[69]). Last year, the Norwegian government set out its long-term vision for the future of digital health. Norway delivers healthcare through a constellation of different organisations and authorities. With this in mind, the strategy establishes high-level objectives for ensuring digital technologies contribute towards a high-quality, sustainable and innovative health and care sector in Norway. It is hoped the wider Norwegian health and care ecosystem will incorporate these objectives into its strategic planning (Norwegian Directorate of e-health, 2023[70]).

Overall, the action by the Norwegian government to date shows a clear focus on the Society dimension. Norway should ensure that progress in this dimension continues in the next NDS. In addition, while Norway has set a clear target of adapting to the climate transition, it has scope for further policy action to assess how digital technologies can help meet this goal.

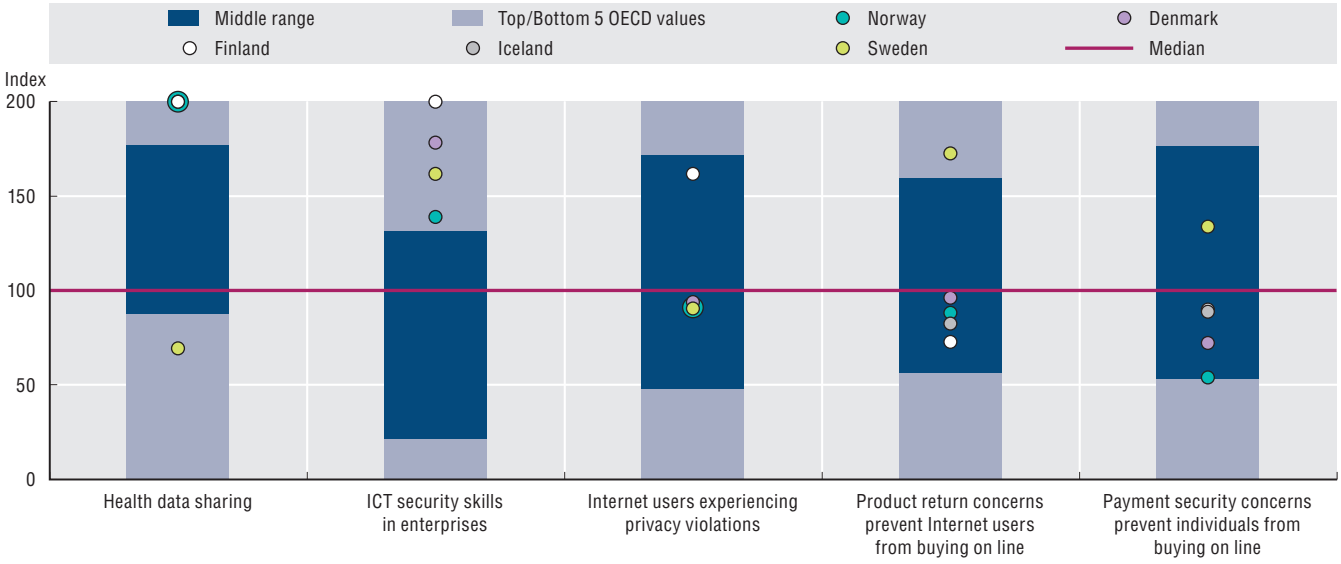
Trust in the digital age

Trust is a vital precondition to ensuring the digital ecosystem flourishes effectively. Citizens and businesses must feel safe, secure and empowered as they interact and share data in digital environments to realise the full potential of data-driven technologies. Policies in the Trust dimension help protect citizens and firms by increasing digital security and protecting user privacy. The number of products and services purchased and consumed on line has grown significantly. As a result, ensuring consumer protection laws are appropriate for new forms of commerce is an important part of this dimension.

Achieving success in the Trust dimension is foundational to many of Norway's digital policy priorities. Norway aims to foster data protection and information security, develop the data economy, increase the digitalisation of SMEs and promote an inclusive digital society in the context of an ageing population. All these objectives rely on adequate protections to allow Norwegian citizens to actively participate on line with confidence. Research also underscores the strong culture of trust and collaboration among public authorities, businesses and citizens in Norway, with the government seen as a trusted data steward (Overby and Audestad, 2022[71]). Norway's performance in the Trust dimension is in the top tier of the best performing OECD countries and in line with Nordic countries for most indicators (Figure 25)[12].

Figure 25. Norway's performance in the Trust dimension

Normalised index of performance relative to the OECD median (index median = 100), 2022 (or latest available)



Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

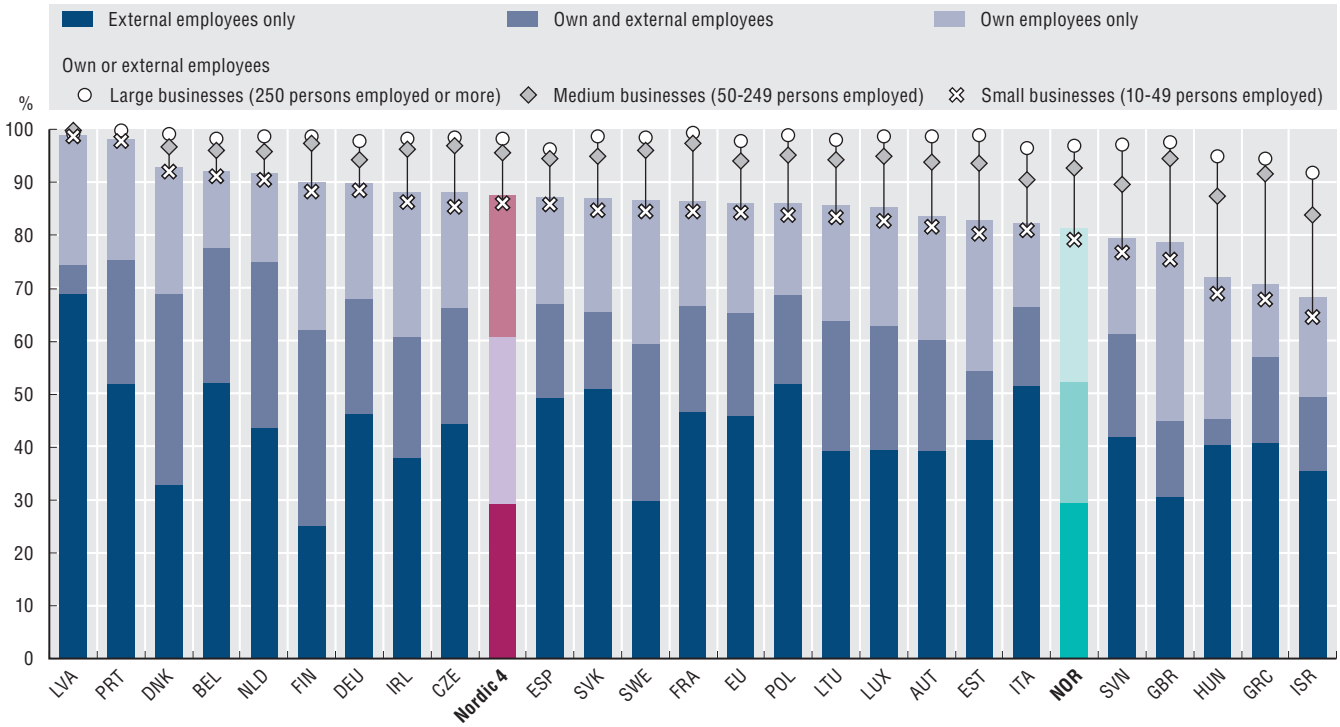
Source: Authors' elaboration based on OECD (2024[104]), "Trust", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/trust*.

Survey data show that Norwegians have high levels of trust in how public agencies handle their personal data (Datatilsynet, 2020[72]). In all, 84% of respondents expressed great or at least some trust in the data-handling practices of public agencies, particularly in the tax and health sectors. In contrast, less than 13% reported similar trust in how private enterprises managed their data. This low level of trust was especially true in those offering services through social media, messaging platforms and search engines. The survey also revealed that over half of respondents refrained from using certain services due to uncertainties regarding data-handling practices. Moreover, the low incidence of personal information or privacy violations, standing at 3%, significantly contributes to fostering a trustworthy environment in Norway (OECD, 2024[73]).

Digital security risk management plays a key role in ensuring trust. Employees engaged in ICT security-related activities, such as testing, training and resolving incidents, are key drivers of cybersecurity risk management. In Norway, the proportion of firms with in-house ICT security (52%) is below the Nordic average (58%). Larger enterprises are more likely to integrate cybersecurity risk management skills into the firm than to outsource to other firms (Figure 26)[23]. Having in-house cybersecurity personnel is not always efficient, especially for small firms. However, cybersecurity skills should exist within the firm or through external service providers. Small firms in Norway lag their Nordic neighbours and many other OECD countries in this respect.

Figure 26. Share of enterprises in which own employees carry out ICT security

All businesses (excludes the financial sector, 10 persons employed or more), 2019



Source: OECD (2024[99]), "Share of enterprises in which own employees carry out ICT related activities", *OECD Going Digital Toolkit*, based on the Eurostat Digital Economy and Society Statistics Comprehensive Database, *https://goingdigital.oecd.org/indicator/60*.

Norway's robust trust culture plays a pivotal role in promoting data sharing across individuals, as well as among private and public sectors (Norwegian Ministry of Local Government and Modernisation, 2021[50]). The country is at the forefront of understanding the growing importance of data sharing as a basis for developing the digital economy. Successful data-sharing initiatives have already made an impact in various sectors, including banking and agriculture. Endeavours like "AquaCloud" and "Trondheim" underscore the potential to enhance efficiency in industries such as fish farming and maritime (Norwegian Ministry of Local Government and Modernisation, 2021[74]).

Norway's policy landscape related to Trust

The fourth version of Norway's cybersecurity strategy covers many elements in the Trust dimension. From a policy perspective, the Trust dimension is dominated by the 2019 National Cyber Security Strategy for Norway (Norwegian Ministry of Justice and Public Security and Norwegian Ministry of Defence, 2019[75]), which is backed by NOK 1.6 billion of investment. Norway's inaugural cybersecurity strategy in 2003 was one of the first of its kind in the OECD. The fourth and most recent iteration aims to protect Norwegian citizens and businesses by both expanding national cyber capabilities and building individuals' cybersecurity awareness and skills. It contains more than 50 separate policy measures – from establishing a national cybersecurity centre to recommending 10 ways for companies to improve their cyber hygiene. Overall, it is a comprehensive strategy, covering a significant amount of the domains in the Trust dimension. At the same time, uncertainty related to cyber risks persists (see Figure 3), highlighting the need to stay focused on keeping people, firms and the government secure.

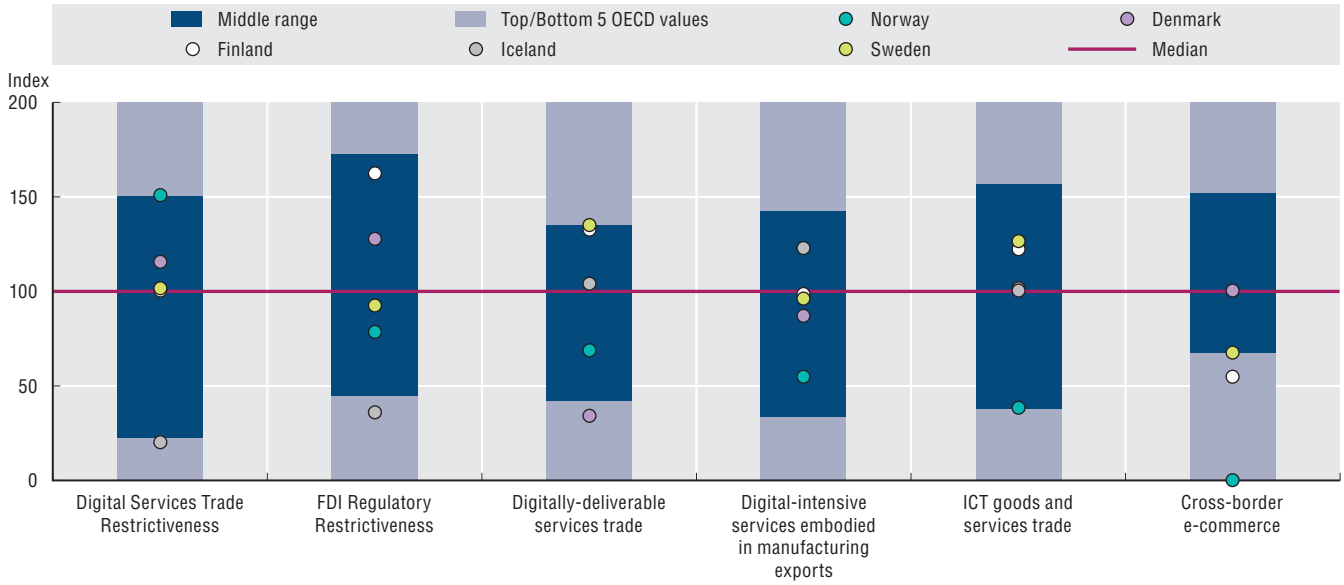
Beyond security issues, Norway uses EU regulations for some areas in the Trust dimension. Notably, as a European Economic Area country, Norway follows the General Data Protection Regulation (GDPR) (European Union, 2016[76]). The GDPR is an important standard for empowering individuals to control their personal data, and has been replicated in many jurisdictions. While much of the GDPR is standard for all participating countries, some areas such as enforcement allow derogations. Consequently, in April 2023, Norway introduced legislation to provide additional protection to consumers of online services (Norwegian Ministry of Justice and Public Security, 2023[77]), based on similar EU legislation enacted in 2019 (European Union, 2019[78]).

Market openness in digital business environments

Digital technologies transform the way firms interact with each other and their consumers, enabling them to grow by expanding into new markets. They help open new frontiers for trade and competition, facilitating co-ordination of global value chains. As frontier technologies, applications and processes diffuse through open markets, open trade and investment regimes can create new avenues to upgrade technologies and skills rapidly, and increase specialisation. Norway has prioritised developing its data economy, which is related to the Market openness dimension. Overall, Norway's performance in the Market openness dimension ranks in the lowest tier among OECD countries and falls below the level of other Nordic countries (Figure 27)[12].

Figure 27. Norway's performance in the Market openness dimension

Normalised index of performance relative to the OECD median (index median = 100), 2022 (or latest available)



Note: Norway's performance is compared to the median value observed in the OECD area, i.e. the middle position among OECD countries for which data are available.

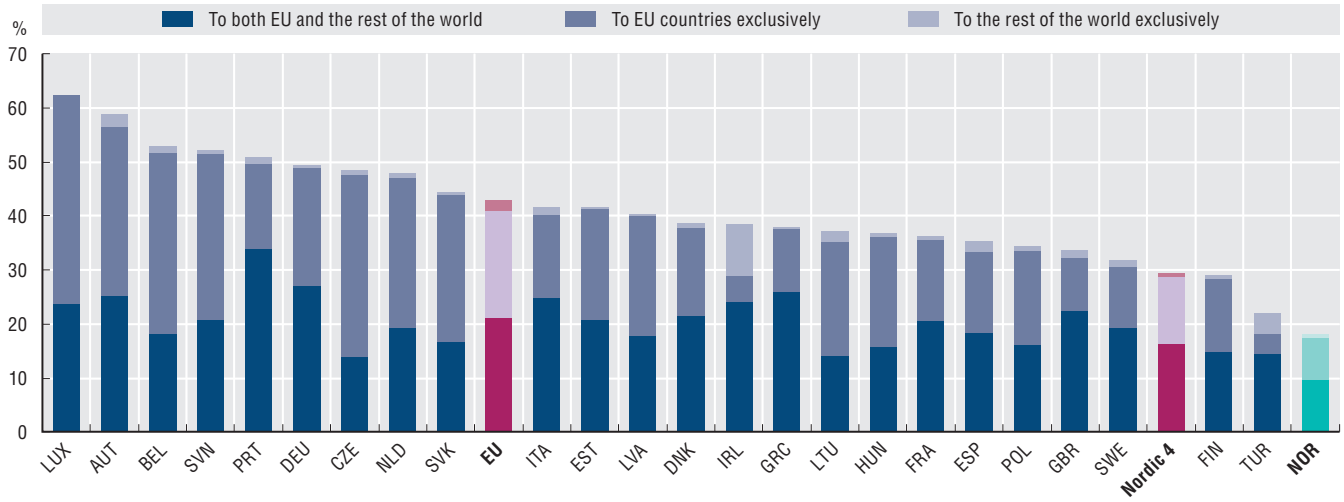
Source: Authors' elaboration based on OECD (2024[94]), "Market openness", *OECD Going Digital Toolkit*, *https://goingdigital.oecd.org/dimension/market-openness*.

As its economy shifts from oil and gas, Norway needs policies to ensure SMEs can grow into global exporters. Norway's exports rely heavily on natural resources, with crude oil and natural gas contributing to 73% of total exports of goods in 2022.[24] Only 2% of exports in 2022 were ICT goods and services, such as computers, communication and consumer electronic equipment, well below the Nordic average of 8% (OECD, 2024[79]). As Norway's economy continues its transition away from oil and gas, new companies, including those in service industries, are beginning to emerge. Helping these companies grow from high-potential innovative SMEs to large global exporters requires a dedicated policy response. Such firms, for example, need better access to international risk-tolerant and patient capital[25]. Financial markets and competition must also enable new market entrants to thrive, while protecting citizens from any negative impacts.

E-commerce lags in Norway in comparison to other Nordic and OECD countries. As digital transformation accelerates, e-commerce emerges as a promising avenue for businesses to reach diverse markets. However, cross-border e-commerce sales in Norway have consistently remained among the lowest among countries for which data is available since 2010, hitting a record low of 18% in 2020 (Figure 28)[26]. Digitalisation also increases exports of digitally deliverable services. However, Norway exhibits low shares of such services, representing only 23% of total commercial services trade in 2020. This was below the OECD (30%) and Nordic (31%) averages (OECD, 2024[80]). The low share of cross border e-commerce sales and digitally deliverable services suggests an inward orientation, driven either by explicit trade barriers or other factors. Since 2017, for example, there has been growing concern in Norway about payment security on line in contrast to a declining trend observed on average across Nordic and OECD countries (OECD, 2023[81]).

Figure 28. Share of businesses making e-commerce sales that sell across borders

All businesses (exclude financial sector, ten persons employed or more), 2020



Source: OECD (2024[98]), "Share of businesses making e-commerce sales that cross borders", *OECD Going Digital Toolkit*, based on the Eurostat Digital Economy and Society Statistics Comprehensive Database, *https://goingdigital.oecd.org/indicator/72*.

Norway could reduce barriers to foreign investment in the financial services sector to enhance innovation. Reducing barriers to international investment is key for advancing digital transformation. Such investments not only allocate resources to more productive uses, but also foster an environment in which firms improve their efficiency. The OECD FDI Regulatory Restrictiveness Index measures statutory restrictions on FDI. Overall, Norway's FDI restrictiveness (0.08) slightly exceeds Nordic (0.07) and OECD averages (0.06). Notable restrictions are observed in the financial services sector (0.07) compared to neighbouring countries like Finland (0.01), and Denmark and Sweden, both of which have no restrictions in this sector (OECD, 2024[82]). This underscores areas in which Norway may consider improving its regulatory environment to attract more international investment to become more digital and innovative.

Norway's policy landscape related to Market openness

Norway has no dedicated policy initiatives related to Market openness within its digital policy landscape. However, the government set up Innovation Norway to improve innovation and digitalisation in Norwegian businesses and help them expand abroad. Innovation Norway provides financing, training, advice, and promotion and networking for businesses in Norway, alongside tourism promotion. In 2022, it contributed over NOK 7.1 billion to development and innovation in industry and commerce. Of this, NOK 1.5 billion was allocated to companies less than three years old. It has offices in 23 different countries and works closely with Norwegian consulates to assist Norwegian businesses to access, and develop in, overseas markets.

Market openness appears to be one of the ripest areas for development of Norwegian digital policy. Stakeholder feedback characterises the Norwegian economy as traditionally insular and dominated by larger companies in traditional goods-based industries such as fossil fuels and fish. As discussed in the Innovation section, Norway clearly has vast innovative potential. Past success stories such as the ed-tech unicorn Kahoot! have shown what is possible. For companies like Kahoot! to continue to grow and thrive, further development of Market openness policies is essential.

Section 4

POLICY RECOMMENDATIONS FOR A MORE DIGITAL, INNOVATIVE AND INCLUSIVE NORWAY

4. POLICY RECOMMENDATIONS FOR A MORE DIGITAL, INNOVATIVE AND INCLUSIVE NORWAY

Drawing on the research and analysis in this report, as well as input from Norwegian ministries, agencies and external stakeholders, this section highlights policy recommendations to achieve a more digital, innovative and inclusive Norway. These recommendations are structured around six areas that might inform its next national digital strategy (NDS): encouraging digital technology adoption and skills development; prioritising digital innovation; maximising the potential of data while maintaining Norway's strong culture of trust; harnessing the potential of digital technologies for society; preparing for next generation networks and a future of unlimited connectivity everywhere; and designing holistic digital policies within effective governance and monitoring mechanisms. These priorities will help realise the vision of the Norwegian government for a sustainable welfare society that safeguards a safe and simple everyday life for citizens and the non-governmental sector a strengthened business sector and a better and renewed public sector.

Encourage technology adoption and skills development to ensure a more digital-intensive economy and resilient workforce

- **Promote adoption of digital technologies among small and medium-sized enterprises (SMEs).** Norwegian firms are ahead of many other countries in the use of digital technologies, including cloud computing, Internet of Things (IoT), big data analytics and artificial intelligence (AI). Yet a lack of expertise and risk aversion makes SMEs less likely adopters of these technologies. To boost productivity and facilitate the move to an economy characterised by greater digital intensity, Norway could adopt policies to increase adoption and effective use of general-purpose digital technologies targeted at SMEs. Raising awareness of information and communication (ICT) skills training programmes, such as those offered by organisations like Digital Norway, can play a key role in this respect. At the same time, SMEs often lack awareness about digital business models. This gap can be remedied by facilitating integration of SMEs into local knowledge and global skills and innovation networks.
- **Empower people with the right mix of skills to succeed in a digital world of work.** Skills shortages mean Norway should concentrate in areas of high demand (and low supply). The lack of workers equipped with the skills to become ICT specialists and ICT-intensive users starts with the relatively low level of graduates in science, technology, engineering and mathematics (STEM) fields. Norway's performance in foundational skills of the young in mathematics, science and reading has also declined. Policies are needed to ensure that people are equipped with the right mix of skills to thrive in a highly digital economy and society. This includes policies that integrate AI and data-related skills into educational programmes and promote training for individuals at all skill levels. It is likewise important to ensure that Norwegians can transfer such skills as they transition from one job to the next. These efforts should be co-ordinated with private sector needs to avoid mismatches between available and demanded skills. They should also be accessible to people throughout their education and working lives.

Prioritise innovation to create a more digital Norway

- **Encourage a culture of experimentation and risk taking.** Digital technologies and data help improve productivity across sectors, but this requires experimentation and risk taking. Policy experimentation, including agile regulation and regulatory sandboxes, can promote innovation while protecting consumers, even in traditional and established sectors less inclined to experiment. Norway can leverage regulatory sandboxes in place, like those in AI and financial services, to share learnings and best practices across relevant government agencies. It should also review insolvency regimes to ensure risk taking is not unduly penalised with the aim of increasing entrepreneurship, innovation and productivity.
- **Reduce the regulatory burdens on start-ups and young firms.** Norway should re-evaluate regulations that may not fit the digital age, such as those that require a physical presence or a minimum scale, or seek to address information asymmetries. In addition, it should consider the promise of new digital financing solutions, such as peer-to-peer lending and platform-based financing, to complement venture capital (VC) and traditional debt and equity financing options for small and young firms.
- **Incentivise VC investment and support firms in scaling up.** Norway has one of the lowest levels of VC investment relative to gross domestic product (GDP) of any OECD country; small innovations have proven hard to scale up. Measures aimed at increasing the pool of domestic VC funding while also attracting VC investors from abroad can help achieve this objective. Tax incentives or preferential visas can be especially useful.
- **Promote investment in research and development (R&D).** Innovation in the digital age relies on a range of inputs from both the public and private sectors, including basic research, R&D, skills and intangible assets (e.g. patents, organisational capital, data and software). Norway lags its Nordic peers on business R&D expenditure and should therefore prioritise measures such as tax credits to incentivise private sector investment in digitalisation beyond the pilot stage.
- **Harness the potential of "GovTech".** Norway could aim to reintegrate a GovTech function back into its public sector to support identification and development of innovative solutions to public sector challenges. This is especially relevant for areas like AI and the green transition (OECD, forthcoming[83]). In particular, Norway could consider reviving the

StartOff programme from the 2025 national budget onwards, focusing on a digital government priority to maximise its impact and return on investment (Norwegian Directorate for Administration and Financial Management (DFØ), 2024[84]). The forthcoming NDS represents an opportunity to consider whether more could be done to help grow the GovTech ecosystem in Norway.

Maximise the potential of data, while maintaining Norway's strong culture of trust

- **Leverage Norway's culture of trust to incentivise data sharing.** While Norway has made good progress on data sharing in sectors such as health and banking, it has untapped potential in other areas, especially in the oil and gas, fisheries and construction sectors. Enhancing access to, and sharing of, data requires balancing benefits with risks and considering legitimate private, national and public interests. The use of contractual agreements, restricted data-sharing arrangements and data portability may be helpful in this respect. Engaging stakeholders and fostering collaboration among communities can strengthen trust between companies and contribute to an increased willingness to share data. Communities combining both data users and holders can facilitate data sharing and help optimise data re-use. However, attention is required to address the risk of anti-competitive effects that could result from data-sharing partnerships among (potential) competitors.
- **Realise the potential of open government data to drive digital innovation.** The public sector is a large producer and consumer of data, and there is significant potential for governments to use digital technologies and data to innovate. As one of the most important moves to drive innovation, the public sector can enhance access to public sector data. In particular, Norway could prioritise the systematic use of common standards for information management to support data quality and re-use and implementation of the "once only" principle (OECD, forthcoming[83]). Norway could also consider collecting official statistics to help measure the impact of data-sharing initiatives, including open data on the Norwegian economy and society (OECD, forthcoming[83]).
- **Take a multifaceted approach to monitoring and addressing cyber risks.** Increase awareness and promote good risk management practices through public and private efforts. This is especially true for SMEs that often lack the capacity to properly protect themselves from cyber incidents. Norway can also assess how the country characterises uncertainty related to cyber risks using the Google Trends Cybersecurity Uncertainty Index. In this way, it could tailor training programmes to the types of cyber threats and incidents that create the most uncertainty.
- **Support the development of data-related skills and infrastructure.** The shortage of data-related skills and competences is a critical bottleneck for the effective use and provision of data by Norwegian firms, especially SMEs. Norway could consider supporting development of skills with initiatives that integrate with those that establish data infrastructure. This includes support for the development and provision of statistical and analytical methods and tools.

Harness the potential of digital technologies for society

- **Increase digital inclusion through policies targeted at the groups most in need.** While Norway has much to celebrate about its success in bridging digital divides, there are still opportunities to increase inclusivity. Norway's increasing educational inequality in foundational skills, such as mathematics, science and reading, and the significant gender gap in ICT specialists, point to the need to improve the skills mix in Norway. Norway could scale up policy measures outlined in Norway's "Digital Throughout Life" strategy and the related "Action Plan for Increased Inclusion in a Digital Society". Implementation of digital literacy programmes through local hubs, for example, can help increase inclusivity, particularly for the elderly. Programmes focused on equipping people with the necessary abilities to navigate digital environments safely, including media literacy skills, are also important.
- **Discourage e-waste production and encourage e-waste recycling**. Norway has placed great importance on preparing for the digital and green transitions, and has made significant progress in the adoption of zero- and low-emission technologies. However, stronger incentives could help discourage e-waste generation and encourage e-waste recycling. "Pay-as-you-throw schemes" charge businesses based on the amount of waste they produce. Expanding such schemes could encourage e-waste reduction and proper e-waste management practices. Increasing recycling capacity and creating incentives for use of secondary raw materials, through tax incentives or procurement policies, could also help with the green transition.

Prepare for next generation networks and a future of unlimited connectivity everywhere

- **Upgrade fixed and mobile networks to 5G and beyond.** Norway has excellent 4G connectivity and good fixed broadband connectivity, but meeting increasing demand requires ongoing investment in fixed networks. Norway's connectivity targets recognise the need to upgrade to 5G and fibre to the home. This will require investments by the Norwegian

government and private sector in broadband to prepare for ever-more people, things and technologies going on line. Government investment is needed in high-speed fixed and mobile networks or additional incentives for private investment, including by competitive tendering, tax exemptions, low-interest loans or lower spectrum fees, such as in Norway's 2021 spectrum auction.

- **Close geographic connectivity divides by focusing on the underserved.** Expand access in rural and remote places to connect everyone. While rural areas in Norway are increasingly connected to broadband, not all connections are of sufficiently high quality for future connectivity needs, such as 8K streaming to multiple devices. Mechanisms like passive infrastructure sharing and co-investment can help expand coverage, depending on local market conditions. Given Norway's unique geography, the Norwegian government may wish to consider the role that alternative communications technologies, such as satellite broadband and high-altitude platforms, could play in the wider connectivity ecosystem to connect underserved areas.
- **Foster competition and reduce red tape.** Norway has three mobile operators and a competitive telecommunications market, but market dynamics move quickly. As Norway continues the transition from 4G to 5G, simplifying administrative procedures would facilitate the rollout of key infrastructures, such as towers, masts and small cells.
- **Support businesses to improve their connectivity.** Given that most Norwegian businesses do not have the highest speed broadband connections (download speeds of at least 1 Gbps), the Norwegian government may wish to consider policy initiatives to incentivise businesses to upgrade their connectivity, such as connection vouchers or information campaigns.

Design holistic digital policies within effective governance and monitoring mechanisms

- **Use the Framework as the basis for designing future digital policies co-ordinated by the forthcoming NDS.** The Norwegian government should consider how the Framework can be used as a guide to digital policy development. Norway's forthcoming NDS should co-ordinate all major digital policies effectively within Norway's digital policy landscape, ensuring coherence and alignment with future policy developments. Norway should dedicate a budget to each policy measure in the forthcoming NDS rather than repurpose existing budgets. This would help ensure that policy initiatives are properly implemented.
- **Integrate relevant digital policies in the Jobs and Market openness dimensions into Norway's digital policy landscape.** Norway should consider whether it needs additional policy development in these dimensions to achieve a whole-of-government approach to digital policy making. Alternatively, it could better integrate relevant existing policies into its digital policy landscape by, for example, ensuring they are co-ordinated with the forthcoming NDS.
- **Foster interministerial co-operation in the field of digital transformation and continue to involve stakeholders in digital policy design and implementation.** Norway should build on the success of its first dedicated digital ministry by ensuring all ministries work together to increase digitalisation throughout the entire Norwegian economy. This will involve combining the domain-specific knowledge of each individual ministry and body under the auspices of the Ministry of Digitalisation and Public Governance, which will deliver clear leadership. Norway should continue its strong tradition of involving stakeholders in the policy process.
- **Monitor progress using the OECD Going Digital Toolkit as Norway's national digital dashboard.** Norway should continue to monitor and evaluate digital performance, using results to iterate and improve the digital policy landscape to ensure that policy priorities are achieved. The indicators on the OECD Going Digital Toolkit could be used in this context, complemented by more granular indicators in key areas.
- **Strengthen a whole-of-government approach to the adoption of digital technologies in the public sector**. While Norway is a leader in digital governance compared to OECD countries, it could do more to enhance its digital government maturity. For example, as the government explores the integration of data-driven technologies like AI to enhance public services, Norway could advance its digital maturity by expanding algorithmic transparency initiatives (OECD, forthcoming[83]). This could include development of an open algorithm register,[27] with comprehensive details about the algorithms used across various public sector entities. Such measures would contribute to greater transparency and accountability in the use of digital technologies. In so doing, it would optimise benefits for both the government and the citizens it serves (OECD, forthcoming[83]).

Annex A. Mapping Norway's major digital policies in force

Table A.1. Norway's digital policy landscape

Name	Description	Date	Budget	NDS linkage	Responsible entity	Dimension
Meld. St. 28 (2020-2021) Our common digital foundation – Mobile, broadband and Internet services	This report to the Storting presented the government's broad policies on electronic communications on topics such as: – mobile and broadband coverage – frequency allocations – security and resilience – market regulation	2021-present	599 000 000 NOK/ Dedicated/Annual	Co-ordinated	Ministry of Local Government and Regional Development, Nkom	Access
Optional coverage obligation – discount in auction price for high-speed broadband in rural areas	In September 2021, the Nkom auctioned spectrum licences in the 2.6 GHz and 3.6 GHz bands. A discount in auction price was available to bidders that committed to providing broadband services with download capacity of at least 100 Mbps in rural areas. Altibox, Ice, Telia and Telenor all chose to accept this commitment, and will receive a total discount of up to NOK 560 million, pending on fulfillment of the coverage obligation. The buildout period is until 1 July 2015. In this manner, the assignment of the 2.6 GHz and the 3.6 GHz bands was an important step towards the government goal of making high-speed broadband available to all households and businesses in Norway.	2021- present	560 000 000 NOK/ Dedicated/ Multi-year/four years to spend	None	Ministry of Local Government and Regional Development, Nkom	Access
Security and resilience scheme	The government supports increased security and resilience in electronic communications networks through an annual grant that is allocated to several purposes: – Agreements with providers regarding resilience measures and equipment. – A reinforced electronic communication programme, establishing at least one area in selected municipalities with reinforced electronic communication services for local crisis management, as well as for the rest of the population. This aim is achieved by securing backup power for a minimum of three days to base stations and important transmission hubs in designated areas, and in some cases also through establishing an alternative connection to base stations. From 2014 to 2023, reinforced electronic communication has been established, or is under establishment, in more than 90 municipalities spread across the country. New municipalities will be included in 2024. – Measures for strengthening the resilience of electronic communication in vulnerable regions. The aim of the programme is to identify measures that will significantly increase the robustness of the electronic communication in rural areas, by preventing outages of electronic communication services and improving the way outages are managed. The measures following risk and vulnerability analyses for a specific rural area can, for example, be to increase the number of connection routes in the transport networks and strengthen security at key points in electronic communication networks. – Covering costs related to implementation and operation of an emergency alert system based on cell broadcast-technology in the networks of the mobile network providers. In addition to the above-mentioned measures running over multiple years, funds from the scheme have been used over the last few years to – strengthen the security for telecommunications services on the Norwegian continental shelf, through several measures to increase the security for telecommunication infrastructure that support the Norwegian oil and gas production – strengthen communications to and from Svalbard – improve the backup solution for communications at Svalbard – support establishment of a new fibre cable from Norway to Denmark – upgrade the solution for priority in the mobile providers' networks for users that perform tasks that are critical to the society (from 2G to 4G and 5G and also including data sessions).	2006- present	188 000 000 NOK/ Dedicated/ Annual	Co-ordinated	Ministry of Local Government and Regional Development, Nkom	Access

Table A.1. Norway's digital policy landscape *(cont.)*

Name	Description	Date	Budget	NDS linkage	Responsible entity	Dimension
Broadband support scheme	The government supports broadband rollout in rural areas through a state aid measure, with a yearly grant depending on Parliament's budget decision. For 2024, NOK 400 million has been allocated to the scheme. The measure has contributed to a high coverage of fast broadband in Norway, approximately 95 percent For 100 Mbps for the country as a whole.	2018- present	400 000 000 NOK/ Dedicated/ Annual	Yes	Ministry of Local Government and Regional Development, Nkom, regional authorities	Access
Data as a resource – Meld. St. 22 (2020-21). Report to the Storting (White Paper).	This report to the Storting presents the government's policy for value creation using data as a resource. The government wants Norway to leverage the potential of data to enhance value creation, create new jobs and to improve public sector efficiency. Better use of data is important if Norway is to succeed in the transition to a more sustainable society and a greener economy. The government's ambition is to see increased data sharing within the private sector and between the private and public sectors. Data now account for an increasing proportion of value creation in most Norwegian industries and sectors, but the private sector must become even better at using its own data and at sharing data with others. Greater access to and better use of data within the private sector can help start-ups, growth companies and established businesses develop new business models, products and services. This, in turn, can help make Norwegian business and industry more competitive, both nationally and internationally.	2021- present	300 000 000 NOK/ Repurposed/ Annual	Yes	Ministry of Local Government and Regional Development	Innovation
Norwegian Data Centres	Strengthen the promotion of Norway as a data centre nation. Make it easier to establish data centres in Norway by publishing a guide in English for foreign actors. Facilitate sustainable development of the data centre industry in Norway.	2021-present	None	Co-ordinated	Ministry of Local Government and Regional Development	Innovation
Sandbox for responsible artificial intelligence	The main mission for the Data Protection Authority's regulatory sandbox is to stimulate the innovation of responsible AI. The sandbox provides free guidance to a handful of carefully selected companies, of varying types and sizes, across different sectors, in exchange for full openness about the assessments that are made.	2020-present	4 000 000 NOK/ Dedicated/ Annual	None	Datatilsynet	Innovation
The National Strategy for Artificial Intelligence	The strategy should serve as a framework for both public and private entities seeking to develop and use AI. The strategy focuses on specifying what is meant by AI and on describing some areas where it will be important for Norway to exploit the opportunities offered by AI. AI is constantly evolving. For this reason, no specific time period is applied to the strategy. There will be a need to adjust and evaluate the strategy at appropriate intervals, in line with technological and social developments.	2020-present	None	Yes	Ministry of Local Government and Regional Development	Innovation
An innovative public sector – Culture, leadership and competence. Meld. St. 30 (2019-2020). White Paper to the Storting	The White Paper on Innovation in the Public Sector (2019-20) addresses important features of the development in this field, the present situation, the need for change and government policy to foster innovation in the public sector. The government's goal is an efficient public sector that provides good services to its citizens, enjoys a high level of trust in the population and finds new solutions to societal challenges in co-operation with citizens, business and industry, research environments and civil society. To achieve this goal, the government has developed three principles to foster public sector innovation: – Politicians and public authorities need to grant freedom of action and provide incentives for innovation. – Leaders must develop a culture of and competence in innovation, where people have the courage to think differently and learn from mistakes and successes. – Public agencies must seek new forms of collaboration.	2021-present	10 000 000 NOK/ Repurposed/ Annual	Yes	Ministry of Local Government and Regional Development	Use, Society
Meld. St. 5 (2022 – 2023) Report to the Storting (White Paper) Long-term plan for research and higher education 2023–2032	The long-term plan sets objectives and priority areas with a ten-year perspective and contains more concrete goals for the efforts in the current four-year plan period. The first long-term plan for research and higher education was put forward in 2014 (Meld. St. 7 (2014-2015)). Since its introduction, the plan was revised in 2018 and 2022. Parliament adopted the current plan that will apply for 2023-32. Missions have been launched in the current long-term plan as a new instrument in Norwegian research and innovation policy. The first two missions are on sustainable food and inclusion of more children and young people in education, employment and society.	2023-32	None	Co-ordinated	Ministry of Education and Research	Innovation

Table A.1. Norway's digital policy landscape *(cont.)*

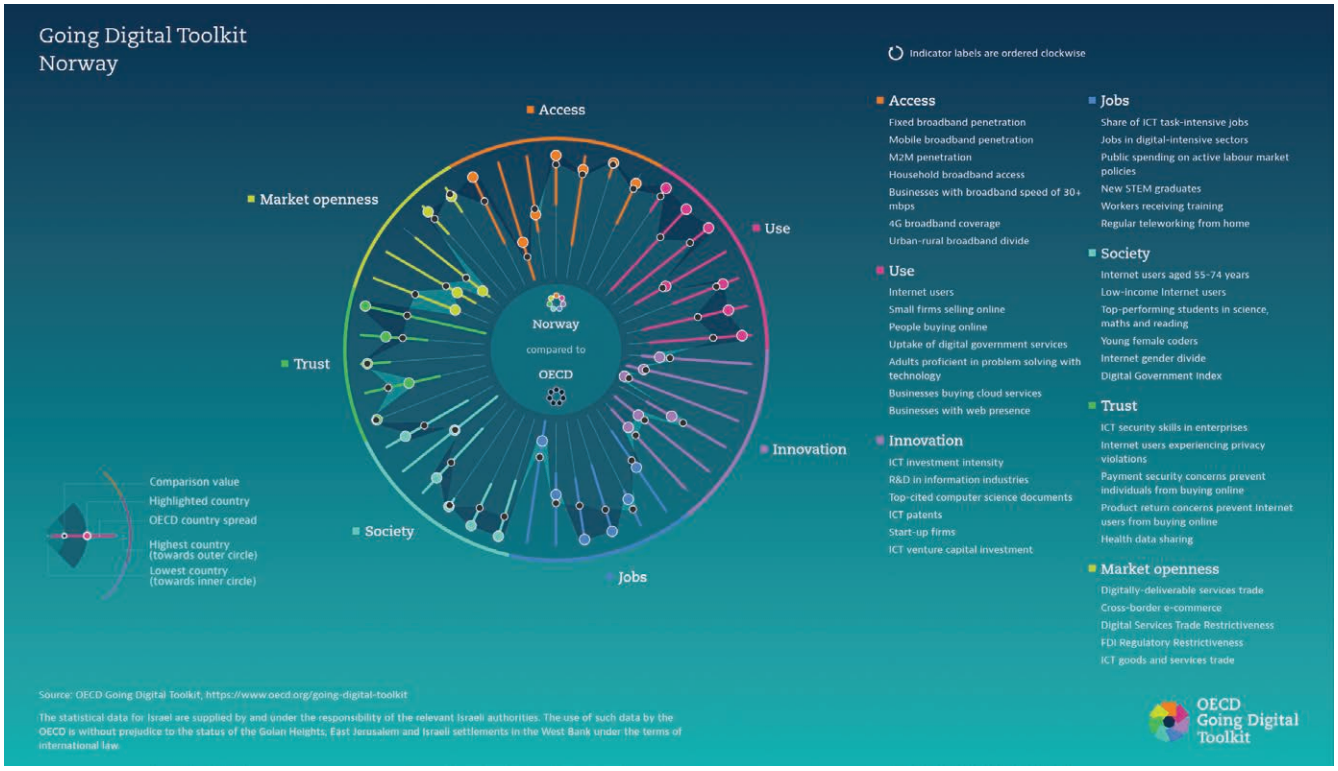
Name	Description	Date	Budget	NDS linkage	Responsible entity	Dimension
Finanstilsynet's regulatory sandbox	In the regulatory sandbox, fintech firms are given the opportunity to launch new, innovative products, technologies and services while being followed up by Finanstilsynet. Among other things, the firms will learn which permissions are required. The purpose of the sandbox is to: – help innovative businesses gain increased knowledge about the relevant regulations – help raise Finanstilsynet's understanding of new technological solutions in the financial market – enable technological innovation and open up for new players.	2018-present	None	None	Finanstilsynet	Innovation
National Strategy for eHealth	The national e-health strategy is the healthcare sector's joint strategy for digitalisation and should contribute to common overall priorities and increased execution ability in the e-health sector in Norway. It should be in line with political guidelines and provide direction for the actors' own strategies and plans in the area of digitalisation. The strategy points out a long-term direction at the same time as it should be adapted to experience and changes in circumstances. A vision has been defined that sets the overall direction for what we are going to achieve with the digitalisation work in the healthcare sector. Furthermore, it defines three overarching goals that clarify which effects digitalisation, and this strategy, will contribute to: – Quality and coherence of the services – A sustainable health and care sector – Power to innovate.	2023-present	None	Yes	Norwegian Ministry of Health and Care Services, The Directorate of e-health	Innovation, Society
National Cyber Security Strategy for Norway	This strategy is intended to address the challenges that will inevitably arise in conjunction with the rapid and far-reaching digitalisation of Norwegian society.	2019-present	1 600 000 000 NOK/ Repurposed/ Multi-year/four years to spend	Yes	Ministry of Justice and Public Security, Ministry of Defence	Trust
One digital public sector. Digital strategy for the public sector 2019-2025	The strategy defines the common goals and focus areas for digitalisation activities towards 2025 and will support digital transformation throughout the entire public sector. Goals/focus areas: – seamless services and user-centric focus – increased data sharing and value creation – clear and digitalisation-friendly regulations – a common ecosystem for national digital collaboration – governance and co-ordination for a more seamless public sector – enhanced co-operation with the public sector – increased digital competence in the public sector.	2019-2025	1 000 000 000 NOK/ Repurposed/ Annual	Yes	Ministry of Local Government and Regional Development	Use, Society
Digital throughout life. National strategy to improve digital participation and competence in the population	This strategy aims to prevent digital exclusion in Norway. A linked document, the "Action plan for increased inclusion in a digital society", is also relevant.	2021-present	15 000 000 NOK/ Repurposed/ Annual	Yes	Ministry of Local Government and Regional Development	Use, Society, Jobs
Meld. St. 14 (2022–2023) Report to the Storting (White Paper) Overview of skills needs in Norway	The White Paper on skills needs in Norway addresses a structural shortage of labour and unmet demand for several central and critical competences, and the necessity to prioritise in education and skills policy. In the White Paper, the government presents its following priorities: (1) competence that is necessary for a highly productive and competitive business life; (2) competence that is necessary to carry out the green transition; (3) competence that is necessary to have good welfare services throughout the country and to handle the demographic development, balanced against the need for labour in other sectors of society; and (4) to qualify and mobilise more of those outside the workforce. The White Paper consists of 48 measures.	2023-present	None	None	Ministry of Education and Research	Use, Society, Jobs

Notes: Norway's National Digital Strategy "Digital Agenda for Norway" is excluded given it will be replaced by a new strategy under development. Policies developed under the auspices of the Norwegian Ministry of Local Government and Regional Development now fall under the responsibility of the Norwegian Ministry for Digitalisation and Public Governance.

Source: OECD 2024 Digital Economy Outlook Questionnaire and the Norwegian government.

Annex B. Indicator overview for Norway

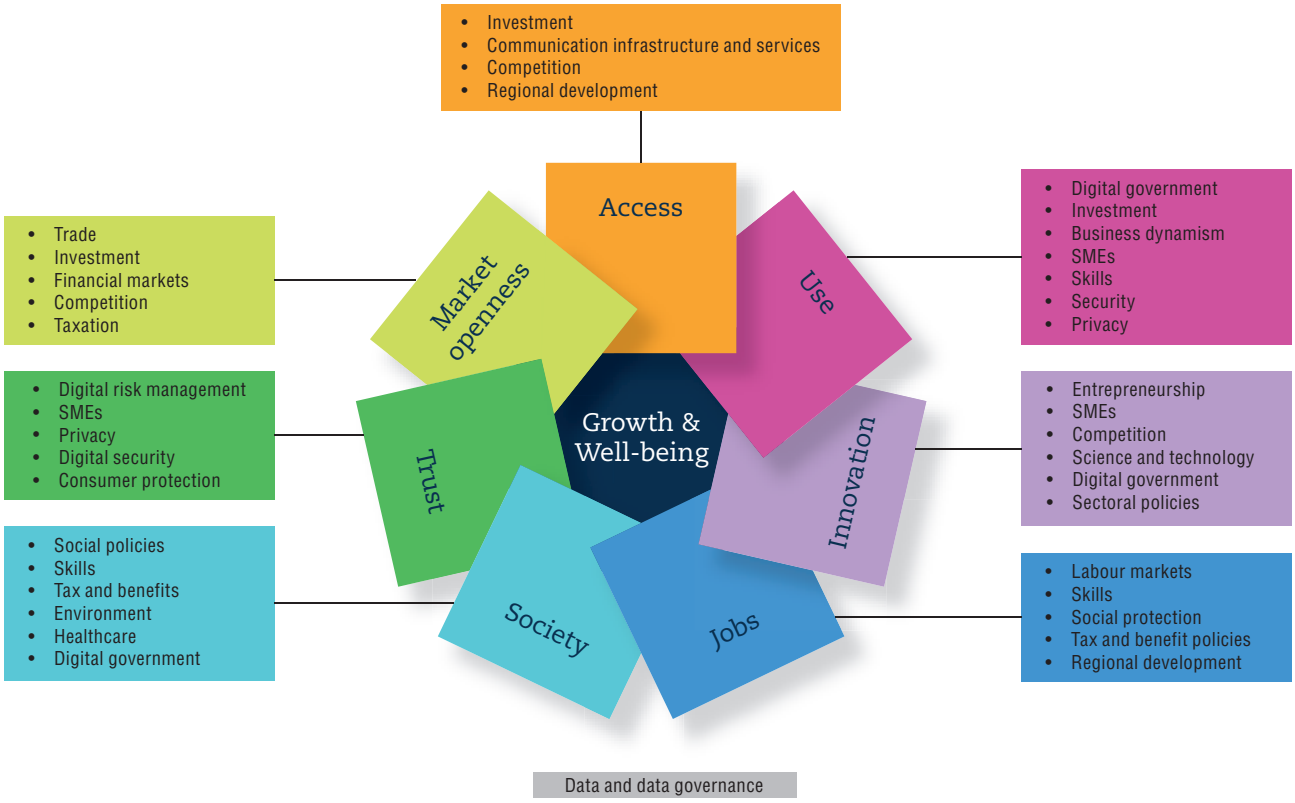
Figure B.1. Norway's digital dashboard in the OECD Going Digital Toolkit



Source: OECD (2024[95]), "Norway", OECD Going Digital Toolkit, *https://goingdigital.oecd.org/countries/nor*.

Annex C. Mapping policy domains to the Framework

Figure C.1. Concordance between the dimensions and policy domains of the Framework



Note: Gender policies are considered in social policies under the Society dimension.

Source: Gierten and Lesher (2022[20]).

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Notes

1. Mobile broadband penetration includes subscriptions to mobile broadband networks that provide download speeds of at least 256 kilobits per second (e.g. using Wideband Code Division Multiple Access (WCDMA), High Speed Packet Access (HSPA), Code Division Multiple Access (Evolution-Data Optimised) (CDMA2000 1x EV-DO), Worldwide Interoperability for Microwave Access (WiMAX IEEE 802.16e) and Long-Term Evolution (LTE)), and excludes subscriptions using only General Packet Radio Service (GPRS), Enhanced Data for Global Evolution (EDGE) or Code Division Multiple Access (Single-Carrier Radio Transmission Technology) (CDMA 1xRTT) networks. The data reflect the number of active handset-based and computer-based (USB/dongles) mobile broadband subscriptions to the public Internet, due either to including a recurring subscription fee for data/Internet access or the subscriber having accessed the Internet in the last three months. Broadband subscription penetration rates do not provide information about the prices that users pay, realised connection speeds or whether there are restrictive data caps. Countries performing well in one measure may be weaker in another. Mobile broadband subscriptions data are provided to the OECD by communications regulators that collect them directly from network operators according to common definitions. The OECD average is based on a simple average of all available member states. Similarly, the Nordic 5 is a simple average of the values from the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).
2. National health datasets surveyed by the OECD contain personal data on hospital and mental hospital in-patients; emergency healthcare, primary care and formal log-term care data; prescription medicines data; cancer, diabetes and cardiovascular disease registry data; and mortality data. Not all countries have national health datasets covering each of these areas. Domestic stakeholders include healthcare providers; the government; universities and non-profit research centres; and for-profit businesses. International stakeholders include foreign governments, universities and non-profit research centres. A summary of the results of the OECD Questionnaire on Health Data Development and Governance can be found in: Oderkirk, J. (2021[106]). "Allowing some sharing" refers to the share of datasets present in each country that allow sharing with at least one of the above stakeholders. Maximum (100%) sharing potential is achieved when all of the national health datasets present in a country are shared with all of the above stakeholders. A percentage of sharing potential of less than 100% indicates that one or more of the health datasets present in the country do not allow sharing with one or more of the above stakeholders. A percentage of sharing potential of 0 indicates that no sharing of the health datasets present is permitted. Sharing does not necessarily imply fully open access to a dataset; sharing is usually subject to privacy protections such as de-identification and stakeholders must apply and be approved to access a dataset. The Nordic 4 is a simple average of the values from Denmark, Finland, Norway and Sweden.
3. The figures comprises two distinct elements: the primary line represents the index itself, quantifying the level of uncertainty associated with cyber incidents in Norway. The secondary line depicts the trend component, derived from seasonal decomposition, which effectively isolates and highlights the underlying long-term trends in the index data.
4. For panels A-C, the Nordic 5 is a simple average of the values from the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden). For Panel D, the Nordic 4 is a simple average of the values from Denmark, Finland, Norway and Sweden.
5. More information available at: *www.ssb.no/transport-og-reiseliv/landtransport/statistikk/bilparken/artikler/fire-av-fem-nye-biler-i-2022-var-elbiler* (accessed on 4 March 2024) (Statistisk sentralbyrå [Statistics Norway], 2023[108]).
6. E-waste refers to all items of electrical and electronic equipment that have been discarded as waste without the intent of re-use. It includes cooling and freezing equipment, screens and monitors, lamps, large equipment (e.g. washing machines and solar panels), small equipment (e.g. vacuum cleaners, microwaves and electronic toys), and small IT and telecommunications equipment (e.g. mobile phones, personal computers and printers). The Global E-Waste Monitor estimates stocks of e-products for each country and the amounts being discarded in each year. Due to a lack of direct data on sales of e-products, new additions to the stock are estimated based on imports less exports. Domestic production is also included for EU countries and Norway. National authorities provide recycling and re-use figures to Eurostat under the Waste Electrical and Electronic Equipment directive, based on surveys and administrative data from waste collectors and treatment facilities. The Nordic 5 is a simple average of the values from the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).

7. For "Visiting or interacting with public authorities' websites" and "Downloading official forms", data refer to 2023 except for Canada, Colombia and Mexico (2022), Iceland and the United States (2021), and Israel and the United Kingdom (2020). For "Sending filled forms via public authorities' websites", data refer to 2023 for Switzerland, to 2022 for Canada and Mexico, to 2020 for the United Kingdom and to 2021 for the other countries. For Israel, data refer to individuals aged 20 and over instead of 16-74. For "Visiting or interacting with public authorities' websites", in the Social Survey 2020, the question was asked without time limit: "Do you use the sites of government bodies, ministries, the National Insurance Institute, etc.?". For "Downloading official forms", data relate to the following question: "In the past twelve months, did you make use of online forms, such as filling them out online, downloading them or sending them on government websites?". For Mexico, for "Visiting or interacting with public authorities' websites", the following categories are considered: "communicate with the government", "consult government information", "download government formats", "fill out or send government forms", "perform government procedures" and "comment on government consultations". For the United States for "Visiting or interacting with public authorities' websites", the CPS Supplement uses the previous six months as the reference period. The Nordic 5 is a simple average of the values from the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).
8. The total number of major policy initiatives differs from the numbers indicated by the black line because some policy initiatives are relevant to more than one dimension as they contain specific measures that relate to domains that cut across various framework dimensions. As a result, some policy initiatives are included more than once. A full breakdown of the policy initiatives considered and how they were mapped to the Framework dimensions can be found in Annex C.
9. For visualisation purposes, the contributions of any sectors that acted as a drag on economic growth in the period analysed are plotted below the x-axis (i.e. in negative space) to indicate that their contribution was contractionary. In contrast, any sectors that contributed positively to value-added growth are plotted above the x-axis (i.e. in positive space), including in cases where value-added growth in the country was negative overall. Data for Germany, Latvia, Lithuania, Norway, Portugal and Switzerland relate to 2017.
10. Digital intensity is defined according to the taxonomy described in: Calvino et al., (2018[107]). High digital-intensive sectors include (ISIC Rev.4 Divisions): Transport equipment (29 to 30); Telecommunications (61); IT and other information services (62 to 63); Financial and insurance activities (64 to 66); Professional, scientific and technical activities; administrative and support service activities (69 to 82); and other service activities (94 to 96). Medium-high digital-intensive sectors include (ISIC Rev.4 Divisions): Wood and paper products; printing (16 to 18); Machinery and equipment (26 to 28); Furniture, other manufacturing, repair and installation of machinery and equipment (31 to 33); Wholesale and retail trade, repair of motor vehicles and motorcycles (45 to 47); Publishing, audiovisual and broadcasting activities (58 to 60); Public administration and defence; compulsory social security (84); and Arts, entertainment and recreation (90 to 93). Medium-low digital-intensive sectors include (ISIC Rev.4 Divisions): Textiles, wearing apparel, leather and related products (13 to 15); Chemical, rubber, plastics, fuel products and other non-metallic mineral products (19 to 23); Basic metals and fabricated metal products, except machinery and equipment (24 to 25); Education (85); and Human health and social work activities (86 to 88). Low digital-intensive sectors include (ISIC Rev.4 Divisions): Agriculture, hunting, forestry and fishing (01 to 03); Mining and quarrying (05 to 09); Food products, beverages and tobacco (10 to 12); Electricity, gas and water supply, sewerage, waste management and remediation activities (35 to 39); Construction (41 to 43); Transportation and storage (49 to 53); Accommodation and food service activities (55 to 56); and Real estate activities (68).
11. The ICT sector is defined as the following three divisions of the 2-digit ISIC Rev.4 industry classification: Computer, electronic and optical products (D26), Telecommunications (D61), Information technology and other information services (D62-63/D62T63). The OECD average is calculated based on 27 countries: Austria, Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Mexico, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom and the United States.
12. For 4G broadband coverage, because there are nine countries with maximum values, the top five are all 200. Consequently, no top tier area is visible in the figure. All indicators are standardised into indices and presented on a common scale ranging from 0 to 200, where 0 represents the lowest OECD value, 100 denotes the median value and 200 signifies the highest value. This standardisation ensures comparability across indicators, facilitated by an established methodology (OECD, 2014[85]). Benchmark charts further elucidate the distribution by highlighting the positions and spread of the top five and bottom five OECD values. When data are not available, the country's

relative position does not figure on the graph. Given X_t^c the indicator for country c at time t, and X_t^{Max}, X_t^{Med} $X_t^{c\,Min}$, the respective OECD maximum, median and minimum values for this indicator, the country index I_t^c is calculated as follows: *If* $X_t^c > X_t^{Med}$ *then* $I_t^c = 100 + (X_t^c - X_t^{Med})/(X_t^{Max} - X_t^{Med}) * 100$; *If* $X_t^c < X_t^{Med}$ *then* $I_t^c = 100 - (X_t^c - X_t^{Med})/X_t^{Min} - X_t^{Med}) * 100$.

13. The data refer to uptake of fixed broadband by firms in the year indicated, although some countries may use different periods and the period may vary over time. The OECD ICT Access and Usage Databases include data from Eurostat. In 2020, Eurostat changed the way this survey question is asked, which may affect responses. The Nordic 4 is a simple average of the values from Denmark, Finland, Norway and Sweden.
14. Machine-to-machine SIM cards refer to SIM cards that are sold specifically for use in machines and devices (e.g. smart meters and surveillance cameras) and are not part of a consumer subscription.
15. Data relate to 2023, except for IoT (2021). Data refer to "data analytics" instead of "big data analytics" for the Nordic 4 countries. For all panels, the Nordic 4 is a simple average of the values from Denmark, Finland, Norway and Sweden.
16. The Nordic 4 is a simple average of the values from Denmark, Finland, Norway and Sweden.
17. The Scimago Journal Rank indicator is used to rank documents with identical numbers of citations within each class. This measure is a proxy indicator of research excellence. Estimates are based on fractional counts of documents by authors affiliated to institutions in each economy. Documents published in multidisciplinary/generic journals are allocated on a fractional basis to the ASJC codes of citing and cited papers. The field Computer Science comprises the following sub-fields: Artificial Intelligence, Computational Theory and Mathematics, Computer Graphics and Computer-Aided Design, Computer Networks and Communications, Computer Science Applications, Computer Vision and Pattern Recognition, Hardware and Architecture, Human-Computer Interaction, Information Systems, Signal Processing and Software.
18. Information industries combines the OECD definitions of the "ICT sector" and the "content and media sector", described in: (OECD, 2011[86]). While this definition includes detailed (three- and four-digit) ISIC Rev.4 industrial activities, in this analysis it is approximated by the following ISIC Rev.4 (two-digit) Divisions, due to limited data availability: "Computer, electronic and optical products" (26), "Publishing, audiovisual, and broadcasting activities" (58 to 60), "Telecommunications" (61) and "IT and other information services" (62 to 63).
19. More information available at: *www.ssb.no/en/arbeid-og-lonn/sysselsetting/statistikk/arbeidskraftundersokelsen* (accessed on 25 January 2024) (Statistisk sentralbyrå [Statistics Norway], 2024[109]).
20. ICT specialist occupations are identified by three-digit classes of the 2008 revision of the International Standard Classification of Occupations (ISCO-08): Information and communications technology service managers (133), Electrotechnology engineers (215), Software and applications developers and analysts (251), Database and network professionals (252), Information and communications technology operations and user support (351), Telecommunications and broadcasting technicians (352) and Electronics and telecommunications installers and repairers (742). The Nordic 5 is a simple average of the values from the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).
21. Norway's performance is in line with the average for OECD countries. There was a record drop in performance in mathematics, reading and science.
22. Top performers in science, mathematics and reading are students aged 15-16 years who achieved the highest level of proficiency (i.e. Levels 5 and 6) on the OECD PISA assessment. The Nordic 5 is a simple average of the values from the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden).
23. Small firms are defined as enterprises that have between 10 and 49 employees, medium firms as enterprises with between 50 and 249 employees, SMEs as enterprises with between 10 and 249 employees, and large firms as enterprises with 250 or more employees. For Canada, medium-sized enterprises have 50-299 employees and large have 300 or more employees. For Japan, data refer to enterprises with 100 or more employees instead of 10 or more. Medium-sized firms have 100-299 employees and large firms have 300 or more employees. The Nordic 4 is a simple average of the values from Denmark, Finland, Norway and Sweden.
24. More information available at: *www.norskpetroleum.no/en/production-and-exports/exports-of-oil-and-gas* (accessed on 15 February 2024) (Norwegian Petroleum, 2023[110]).
25. Risk-tolerant and patient capital refer to investments by investors willing to fund riskier business models with short-term returns that are not guaranteed.

26. An e-commerce transaction is the sale or purchase of goods or services, conducted over computer networks by methods designed to receive or place orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted on line. An e-commerce transaction can be between enterprises, households, individuals, governments, and other public or private organisations (OECD, 2011[86]). E-commerce sales (orders received over computer networks) include orders for goods or services placed via a website or apps and sales made via Electronic Data Interchange type messages, but do not include sales via manually typed e-mail orders. For Mexico, data refer to businesses receiving orders via the Internet, instead of over computer networks. The data refer to businesses making e-commerce sales that also sell across borders in the year indicated, although some countries may use different periods and the period may vary over time.
27. Examples include the Netherlands' Algorithm Register and Canada's Algorithmic Impact Assessment tool (OECD, forthcoming[83]).

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Shaping Norway's Digital Future

As the pace of technological change accelerates, reaching the digital frontier – and staying there – is increasingly challenging. This report analyses Norway's digital performance, policies and priorities to inform the development of a new national digital strategy that seeks to sharpen Norway's competitive edge and ensure that digital transformation benefits all Norwegians. It outlines the digital priorities and trends that will shape Norway's digital future and maps its digital policy ecosystem. The report further assesses Norway's digital performance based on the OECD Going Digital Toolkit dashboard of indicators and analyses its digital policies through the lens of the OECD Going Digital Integrated Policy Framework. It concludes with policy recommendations to achieve a more digital, innovative and inclusive Norway.

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