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Chapter 1

Going digital

The digital transformation is high on the global agenda and OECD countries are working towards making the transformation work for the economy and society. This chapter provides an introduction to the digital transformation, with a discussion of how it affects multiple policy areas, a presentation of key policy and measurement building blocks that can be considered for developing an integrated policy framework, and an analysis of the current state of national digital strategies that are being implemented across the OECD.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

The digital transformation is high on the global agenda

From the 2016 G7, OECD and G20 ministerial events to the 2017 G20 Ministerial, the digital transformation has now firmly taken root on the global agenda. There is broad recognition at the highest level of government in many countries and among global leaders that digitalisation is transforming our lives. There is an equally widespread sense of the urgency to marshal the digital transformation to achieve more inclusive and sustainable prosperity.

The OECD Cancún Ministerial on the Digital Economy held in June 2016 was a milestone in this process, with ministers from 43 countries concurring that digitalisation can hold the key to a brighter future, and calling for a whole-of-government approach to unlocking its benefits for growth and well-being, and kick-starting a new policy-making era as the best path to enabling the digital transformation to benefit all, in all countries.

This first chapter sets the scene for the *OECD Digital Economy Outlook 2017*. It brings forward the main messages from the Cancún Ministerial, describes the new wave of digital technologies that drive the ongoing transformation of economies and societies, and identifies avenues to understand how the digital transformation manifests itself and affects policies. It further explores key policy and measurement building blocks for the digital transformation, and examines the state of current digital national strategies against this background.

The 2016 Cancún Ministerial on the Digital Economy has set the OECD agenda for the digital transformation

The Cancún Ministerial provided a forum to discuss how to harness the economic and social benefits of the digital economy in countries of various levels of development. Several countries from Latin America and the Caribbean, from Africa and Asia joined OECD countries at the event. All recognised that the digital transformation that has been underway for a few decades is stretching to the whole economy and society in many countries, with digital infrastructures nearly fully deployed in the OECD zone, Internet access grown from 4% to 40% of the world's population in just 20 years, and emerging and developing economies are increasingly using digital technologies in areas from e-commerce to agriculture and banking.

Overall, ministers agreed that unlocking the benefits of the ongoing digital transformation requires addressing the challenges created by this transformation, in particular for jobs, skills and trust. They also stressed the urgency for governments to be proactive and to adopt a policy-making approach whereby all stakeholders are invited to the table to develop and implement a clear way forward to shape the digital transformation, one which builds on a fully integrated policy approach. Throughout the event, participants highlighted the need to fill the data deficit and better measure the breadth, pace and consequences of the digital transformation and the effectiveness of related policy actions.

Box 1.1. **The main messages from the Cancún Ministerial**

It is urgent to develop a strategic vision and fully integrated policy approach to digitalisation to better understand how it is transforming our lives, how we can unlock its benefits and how we can help those in danger of being left behind. In doing so, we should consider the following:

- Internet openness drives social, economic and cultural development.
- Stimulating digital innovation across the economy is essential.
- There are many opportunities to improve networks and services through convergence of different communication technologies.
- It is critical to ensure we have the appropriate frameworks to enable tomorrow's Internet of Things.
- Consumer trust is a key element of boosting growth of the digital economy.
- Managing digital security and privacy risk is needed for economic and social prosperity.
- All stakeholders have a role to play in facilitating new markets and new jobs in the digital age.
- Greater use of digital technologies increases demand for new skills.

Source: OECD (2016a), "Meeting the policy challenges of tomorrow's digital economy", *www.oecd.org/internet/ministerial*.

Finally, the 43 countries that endorsed the Ministerial Declaration (see Annex 1.A2) committed to work with the OECD and all stakeholders to:

- help preserve the fundamental openness of the Internet while concomitantly meeting certain public policy objectives, such as the protection of privacy, security, intellectual property and children on line, as well as the reinforcement of trust in the Internet
- identify, develop and activate the mix of skills needed to enable inclusive participation in an increasingly digitalised economy; and analyse new work arrangements enabled by digital technologies and their implications for job quality and labour relations
- develop privacy and data protection strategies at the highest level of government that incorporate a whole-of-society perspective while providing the flexibility needed to take advantage of digital technologies for the benefit of all; and support the development of international arrangements that promote effective privacy and data protection across jurisdictions, including through interoperability among frameworks
- assess the effects of digital transformation on society and on all parts of the global economy to identify expected benefits and challenges, and to examine how national strategies and policies can address these transformations and take advantage of innovation to help bridge digital divides
- strengthen the collection of internationally comparable statistics on the adoption and use of broadband infrastructures and digital services together with the use of digital technologies by firms and individuals across the economy and society; and contribute to developing new metrics for the digital economy, such as on trust, skills and global data flows.

Many of these ambitions were reaffirmed at the 2017 OECD Ministerial Council Meeting, where countries specifically recognised the need to promote and protect the global free flow of information; the importance of global, market-relevant technical standards; the need to

enhance the international dialogue on privacy and digital security, intellectual property rights and consumer protection; as well as high-speed broadband connectivity (OECD, 2017a).

The digital transformation of the economy and society

From the outset, two technological pillars, digitisation and interconnection, have been driving the digital transformation, complemented by a growing ecosystem of inter-related technologies. Digitisation is the conversion of an analogue signal conveying information (e.g. sound, image, printed text) to binary bits. Although still costly to digitise or collect, information can be represented in a universal manner, and it can be stored as data. Digital data can be used – processed, stored, filtered, tracked, identified, duplicated and transmitted – infinitely by digital devices without degradation, at very high speeds and at negligible marginal cost. The Internet has led to growing interconnections that allow this to occur globally. In contrast, processing and disseminating analogue information is slow and the variety of formats (e.g. paper, film reel, magnetic tapes, etc.) severely limits links, combinations and replication. In short, digitisation reduces physical constraints to information sharing and exploitation (see, for example, OECD [2015a]).

An ecosystem of digital technologies drives the ongoing transformation of economies and societies

Digitisation and interconnection have been empowered by exponentially growing computing power, with the number of transistors per square inch in an integrated circuit having doubled every 18 to 24 months, or a 100-fold improvement in a decade, for nearly 50 years (Moore's Law). This growth is well illustrated by the mainstreaming of the smartphone since 2007 and is further accelerated by computing delivered via the cloud as a service. Combined with constant mobile connectivity, a wide range of new products, applications and services has emerged over the past decade, forming a growing ecosystem of technologies and applications, which, through increasing use by individuals, firms and governments, is driving the digital transformation (OECD, 2016b). Key components of this ecosystem are:

- The Internet of Things (IoT), which comprises devices and objects whose state can be altered via the Internet, with or without the active involvement of individuals (OECD, 2015a). It includes objects and sensors that gather data and exchange these with one another and with humans. The networked sensors in the IoT serve to monitor the health, location and activities of people and animals and the state of production processes, the efficiency of city services and the natural environment, among other applications (OECD, 2016c). The number of connected devices in and around people's homes in OECD countries is expected to increase from 1 billion in 2016 to 14 billion by 2022 (OECD, 2015a). These devices are a key source of data that are feeding big data analytics.
- Big data analytics, which is a set of techniques and tools used to process and interpret large volumes of data that are generated by the increasing digitisation of content, the greater monitoring of human activities and the spread of the IoT (OECD, 2015a). It can be used to infer relationships, establish dependencies, and perform predictions of outcomes and behaviours. Firms, governments and individuals are increasingly able to access unprecedented volumes of data that help inform real-time decision making by combining a wide range of information from different sources. Big data analytics also enable machine learning, a driver of AI.

- AI can be understood as machines performing human-like cognitive functions. Its rapid diffusion is driven by recent strides in machine learning, an AI discipline that automatically identifies patterns in complex data sets. AI is making devices and systems smart and empowers new kinds of software and robots that increasingly act as self-governing agents, operating much more independently from the decisions of their human creators and operators than machines have previously done. AI is expected to help solve complex questions, generate productivity gains, improve the efficiency of decision making and save costs.
- Blockchain is a decentralised and disintermediated technology that facilitates economic transactions and peer-to-peer interactions. In addition to supporting information exchange, it enables protocols for value exchange, legal contracts and similar applications. Permissionless blockchains such as Bitcoin function as a tamper-proof distributed database and act as an open, shared and trusted public ledger that cannot be tampered with and can be inspected by everyone. The combination of transparent transactions, strict rules and constant oversight that characterise a blockchain-based network provides the conditions for its users to trust the transactions conducted on it, without the need for any trusted authority or intermediary operator.

Many other technologies underpin the current digital transformation, including cloud computing, open-source software like Hadoop, robotics, grid and neural computing, virtual reality, etc. Some of these have applications in almost all sectors of the economy and can be considered true "general-purpose" technologies. Others have more narrow applications in specific sectors. Together they are combinatorial and form an ecosystem of technologies that underpin a wide-ranging and rapid digital transformation of the economy and society, and increasingly of governments, in many areas, and which is leading to shifts in markets and economic behaviour that are fundamentally different from the analogue era to which we are used.

Identifying avenues to understand how the digital transformation affects policies

Underpinned by digitisation, interconnection and the growing ecosystem of digital technologies, digitalisation is transforming our economies and societies by changing the ways people interact, businesses function and innovate, and governments design and implement policies. Ongoing work by the OECD to help understand how the digital transformation affects policies proposes a preliminary set of "vectors of digital transformation" to identify core properties and cross-cutting effects of this transformation as it manifests itself across society, economic sectors and policy areas (Box 1.2).

Each of these suggested vectors can have policy implications in more than one, and often in several, areas. For example, the effects of scale without physical mass may challenge policies that target "big" or "small" firms by measures of mass, such as the number of employees, and more generally provoke a debate about what qualifies as being *de minimis* and exempt from certain policies (e.g. duties, taxes, social costs), or "small" and thereby qualified for certain benefits or subsidies. Digital businesses that attain large scale, notably platforms that benefit from network externalities and economies of scope, can lead to market concentration and winner-take-most dynamics at least for a period of time. Digital firms' ability to asymmetrically acquire and analyse data, including across an ecosystem of products, may raise policy questions from traditional concerns over privacy to appropriate competition policy for entities whose central role in data acquisition and analysis may present a barrier to entry for other firms. Finally, while platforms concentrate markets on line, they also foster decentralisation of activity at the edge of networks, e.g. in the "gig

economy", which can complicate the enforcement of rules designed for large entities rather than for microenterprises or the self-employed, and can raise issues of working conditions and social protection. Finally, digital businesses often scale fast, outpacing policy making and legal or regulatory review, and benefit from possibilities for regulatory arbitrage.

Box 1.2. **Vectors of digital transformation**

Digital products, interactions and markets have distinctive characteristics that underlie ongoing economic and social change. These often transformative characteristics can support, or challenge, policies. Ongoing work by the OECD has identified some of the most prominent characteristics in a proposed set of eight "vectors of digital transformation", listed below under three headings: 1) scale, scope and speed; 2) ownership, assets and economic value; and 3) relationships, markets and ecosystems. These "vectors" are suggested to improve the understanding of the digital transformation and related policy implications.

1. Scale, scope and speed

Scale with little mass: While digital products and services have diverse economic characteristics (e.g. networks, semiconductors, smartphones, computing), core digital elements – software, data and standards – stand out. Fixed costs contrast with low, close to zero, marginal costs. Combined with the global reach of the Internet, this allows firms and platforms to scale very quickly, often with few employees, tangible assets or a geographic footprint.

Panoramic scope: The digitisation of functions allows for unprecedented complexity in products (the smartphone) and services (a huge catalogue of offerings). Standards enable components and products from different sources to work together, furthering economies of scale and scope, from combining, processing and integrating digital resources at a global level.

Temporal dynamics: It is often observed that digital technology accelerates communications, commerce, the diffusion of information and innovation, and changes in economic and social practices. However, the implications are far more complex: digital acceleration takes place against legacy time frames, slow institutional processes, entrenched behaviours and limited human attention. Technology also enables the manipulation of time, facilitating the preservation of the past and making it readily probed, indexed, repurposed, resold and remembered.

2. Ownership, assets and economic value

"Soft" capital: The growing importance of intangible sources of value, especially software and data, has been widely recognised. Physical goods – jet engines, tractors, specialised equipment – can generate and return data so that it becomes a service – or a hybrid of good and service. This is coupled with the emergence of platforms that allow firms and individuals to rent out or share their real capital easily.

Value mobility: As a result of their intangible, machine-encoded nature, software and data can be stored or exploited anywhere, decoupling value from specific geographic locations.

3. Relationships, markets and ecosystems

Intelligence at the edges: The "end-to-end" principle of the Internet has moved the intelligence of the network from the centre to the periphery. Armed with computers and smartphones, users can design and construct their own networks through mailing lists, hyperlinks and social networks, creating distinct communities. But they must typically take on responsibilities that used to reside in the centre (e.g. privacy and security).

Platforms and ecosystems: Digital technology enables expanded interactions and behaviour among individuals, communities, businesses and governments. This has propelled the development not only of direct relationships, but of digitally empowered multi-sided markets, commonly known as platforms. Some of the largest platforms are linked with varying degrees of integration, interoperability, data sharing and openness, essentially serving as proprietary ecosystems.

Loss of place: Value mobility and the global reach of the Internet enable value creation, transaction and interaction regardless of location and borders.

The effects of "soft" capital, including the hybridisation of goods and services, can have implications for policies directed at encouraging investment, such as tax incentives, accounting rules for (accelerated) depreciation and subsidies for foreign direct investment, as well as measures of investment, which in many cases were designed for tangible, physical capital residing in the jurisdiction, not for intangibles or investment that become part of a service that may be purchased from abroad. This further challenges trade policy that relies on a distinction between trade in goods (e.g. a computer) and services ("software as a service", or the cloud), while increasingly data flows allow a good to be offered as a complement to a service package. More generally, the intangible nature of bits and their ability to be stored in any location that depends less on a physical as opposed to a logical determination, creates opportunities for policy arbitrage across jurisdictions and challenges policies that rely on the geographic location of the digital activity where value creation occurs. This includes, for example, corporate and labour taxation, trade and its dependence on rules of origin, antitrust enforcement based on well-defined markets, labour regulations formulated around employees and employers in a particular place, and education policy and its focus on teachers or students in a particular school or district. Lastly, value mobility and the global reach of the Internet enable value creation, transaction and interaction regardless of location and borders, which may challenge traditional principles of territoriality, geographically based communities and sovereignty.

Key policy and measurement building blocks for the digital transformation

The digital transformation is progressively challenging every aspect of the economy and society, requiring many different policy areas to be considered simultaneously in an integrated approach and forcing governments to reach across traditional policy silos and across different levels of government to develop a whole-of-government vision and strategy. As identified in a 2017 report for the OECD Council at ministerial level, key actions to be taken for developing an integrated policy framework are to ensure that the foundations for the digital transformation are in place and that policies across all areas enable the digital transformation for the economy and society (OECD, 2017b).

This section provides indicators that are being developed under the OECD-wide project "Going Digital: Making the Transformation Work for Growth and Well-being". These indicators can help to assess where a country stands in relation to the foundations of the digital economy and its capability to seize the benefits of the digital transformation. These indicators will evolve as new insights are gained from ongoing work on measurement, economic analysis and policy evaluation. Additional indicators to assess policy coherence and strategy development will be developed in the context of the Going Digital project.

Building the foundations for the digital transformation

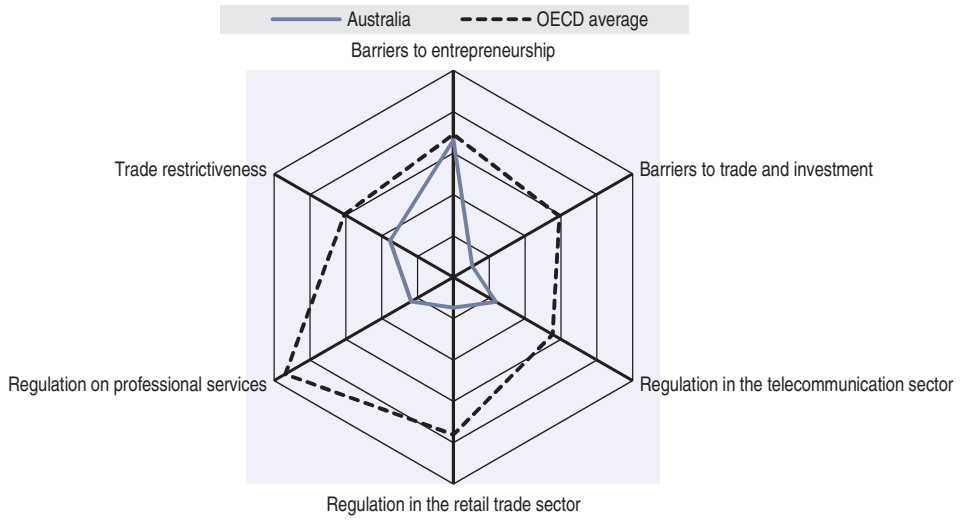
Framework conditions

The digital transformation does not occur in isolation; it is shaped by, and contributes to shaping, the broader economy and society as a whole. Framework policies play an important role in ensuring that the conditions exist for the digital transformation to flourish. Open trade and investment regimes create new avenues for rapidly upgrading technologies and skills, and increasing specialisation. Efficient, open financial markets help to allocate financial resources to firms investing in the digital transformation, while competitive product markets foster consumer welfare, allow new firms to challenge incumbents, efficient firms to grow and inefficient ones to exit. Well-functioning labour markets can support the inevitable

structural change. More broadly, sound macroeconomic policies help reduce uncertainty and create an enabling environment for the digital economy to grow.

Figure 1.1 shows some selected indicators of framework conditions: the strength of barriers to entrepreneurship, trade and investment and the restrictiveness of regulations on telecommunications, professional services, retail trade and international trade. By way of illustration, the figure compares the above indicators in one of the best-performing countries (Australia) with the OECD average. All indicators in Australia are in line with or below the OECD average, suggesting that framework conditions in Australia are more favourable to the creation of innovative start-ups, new business models and new services enabled by digital technologies.

Figure 1.1. **Framework conditions for the digital transformation**



Note: All indicators have been standardised and range between 0 and 1.
Sources: Author's calculations based on OECD, *Product Market Regulation Database*, *www.oecd.org/economy/pmr* and OECD, *Services Trade Restrictiveness Index Regulatory Database*, *www.oecd.org/tad/services-trade/services-trade-restrictiveness-index.htm* (accessed March 2017).

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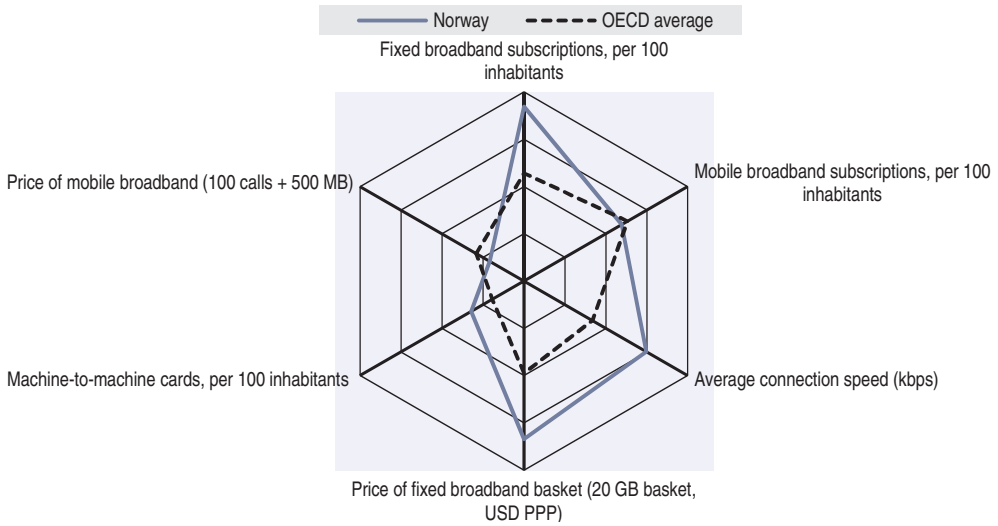
Accessible digital infrastructures and services

Digital infrastructures, including efficient, reliable and widely accessible broadband communication networks and services, data, software, and hardware, are the foundations on which the digital economy is based. It is essential that governments promote investment in digital infrastructures and competition in the provision of high-speed networks and services, ensuring that key complementary enablers are in place, e.g. fibre optic backhaul, sufficient spectrum and increasing uptake of Internet Protocol version 6 (IPv6) Internet addresses. Individuals, businesses (including small and medium-sized enterprises [SMEs]) and governments need reliable and widespread access to digital networks and services to benefit from digital opportunities.

Figure 1.2 shows some selected indicators of access to and quality of digital infrastructures and telecommunication services: the number of fixed and mobile subscriptions per 100 inhabitants, their average connection speed, some selected price measures for fixed and mobile broadband, as well as the number of machine-to-machine SIM cards, which is a proxy for the IoT. By way of illustration, the figure compares the above indicators in one

of the best-performing countries (Norway) with the OECD average. Norway performs better than the OECD average on all the indicators, except for the price of the fixed broadband basket (20 Gigabytes [GB]), which is more expensive in real terms (based on purchasing power parity). Higher fixed broadband prices may reflect higher average speeds, but may also slow down the development of new digital services delivered through fixed broadband.

Figure 1.2. **Access to digital infrastructures**



Notes: All indicators have been standardised and range between 0 and 1. GB = Gigabyte; kbps = kilobits per second; PPP = purchasing power parity.
Sources: Author's calculations based on OECD, "Broadband database", *OECD Telecommunications and Internet Statistics* (database), *www.oecd.org/sti/broadband/oecdbroadbandportal.htm* (accessed July 2017), Akamai, *www.akamai.com* (accessed July 2017) and Teligen/Strategy Analytics, *https://www.strategyanalytics.com/access-services/networks/tariffs---mobile-and-fixed#.WaP9_Xr57ql* (accessed July 2017).

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Making the digital transformation work for the economy and society

This building block focuses on policies that help enable the effective use of digital technologies by workers, firms and governments; policies that foster innovation and help address challenges in specific sectors of the economy; and policies that promote the use of digital technologies to improve the functioning of governments and public service delivery. It also includes policies to foster trust in and acceptance of digital technologies, and policies that can help all individuals, including citizens, workers, consumers and society adjust to the digital transformation, including by ensuring that all people have the skills they need to adapt to and excel in an increasingly digital world. It also includes policies that use digital tools to enhance well-being, including by providing more equitable access to public services, such as healthcare.

Effective use

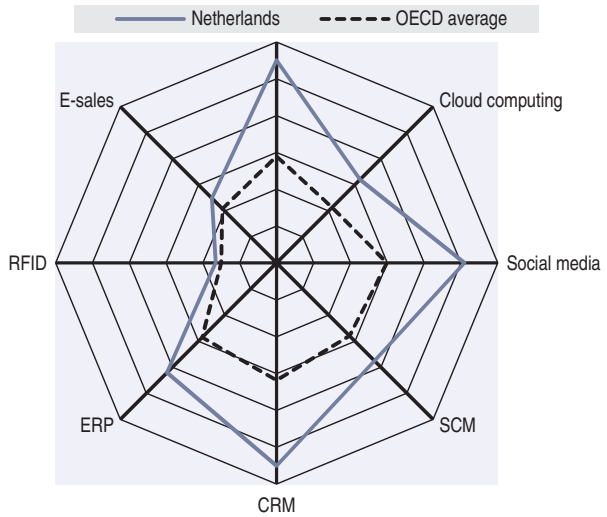
Access to digital networks provides the technical foundation for the digital transformation of the economy and society, but does not by itself necessarily ensure effective use. Other factors also need to be addressed, notably skills. Effective use of digital technologies requires a wide range of skills, including information and communication technology (ICT) specialist skills, generic ICT skills and complementary skills such as information processing, self-direction, problem solving and communication. Effective use also requires firms to take into

account in their decision-making and operational processes the specific risks related to the use of digital technologies, particularly with respect to digital security (e.g. theft of trade secrets, disruption of operations, reputational damages, financial losses, etc.) and privacy protection. It is also crucial that governments encourage organisational change, including investments in data and other knowledge-based capital, to realise the full potential of the digital transformation. A lack of firm dynamics, which can lead to the co-existence of poorly performing firms with very low levels of ICT use and star performers, is another important contributor to effective use.

Figure 1.3 shows the proportion of firms using common digital technologies or engaged in selected online activities: big data, cloud computing, social media, supply-chain management, customer relationship management (CRM), enterprise resource planning (ERP), radio frequency identification and e-sales. By way of illustration, the figure compares these indicators in one of the best-performing countries (the Netherlands) with the OECD average. Digital uptake in the Netherlands is above the OECD average for all usages, particularly big data, CRM and social media. This comparison suggests a stronger orientation of Dutch firms towards social network advertising and data-based marketing.

Figure 1.3. **Business uptake of digital technologies**

As a percentage of enterprises with ten or more persons employed



Notes: All indicators have been standardised and range between 0 and 1. RFID = radio frequency identification; ERP = enterprise resource planning; CRM = customer relationship management; SCM = supply-chain management.

Sources: Author's calculations based on OECD, *ICT Access and Usage by Businesses* (database), *http://oe.cd/bus* (accessed July 2017) and Eurostat, *Digital Economy and Society* (database), *http://ec.europa.eu/eurostat/web/digital-economy-and-society/data/comprehensive-database* (accessed February 2017).

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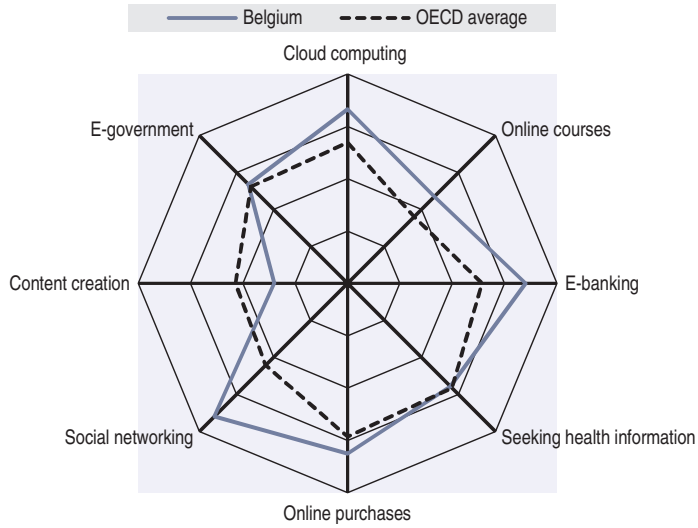
Figure 1.4 shows the proportion of Internet users using common digital technologies or engaged in selected online activities: cloud computing, online courses, health-related searches, e-banking, online purchases, social networks, content creation and e-government. By way of illustration, the figure compares these indicators in one of the best-performing countries (Belgium) with the OECD average. In Belgium, social networks, cloud computing, e-banking and online courses are more diffused among individuals than the OECD average while fewer people create content on line or search for health-related information on line.

Figure 1.4. **Use of digital technologies by Internet users**

As a percentage of Internet users aged 16-74



Note: All indicators have been standardised and range between 0 and 1.

Sources: Author's calculations based on OECD, *ICT Access and Usage by Households and Individuals* (database), *http://oe.cd/hhind* (accessed July 2017) and Eurostat, *Digital Economy and Society* (database), *http://ec.europa.eu/eurostat/web/digital-economy-and-society/data/comprehensive-database* (accessed February 2017).

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Figure 1.5 compares selected indicators of digital skills, tertiary education and training in one of the best-performing countries (Finland) with the OECD average. While graduation rates and the demand for ICT specialists are in line with the OECD average, the proportion of individuals with high ICT skills and firms offering ICT training are significantly higher in Finland. This suggests that Finland has invested and continues to invest in the skills necessary to foster productivity and growth in the digital economy.

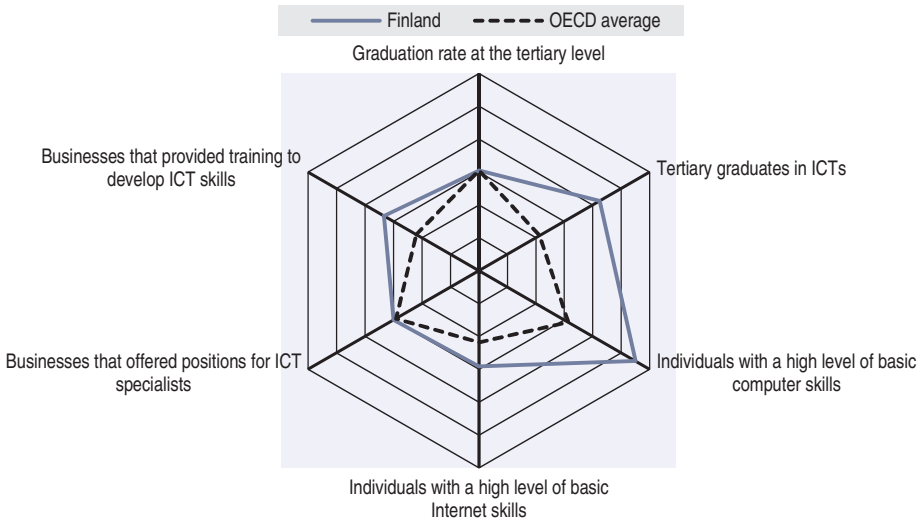
Innovation and effects of digital technologies in specific sectors

Digital technologies can help foster economic growth, including through positive "spillover effects" within and across sectors. Technologies, smart applications – including data analytics – and other innovations in the digital economy can also improve services and help address policy challenges in a wide range of areas, including education, finance, insurance, health, transportation, energy, agriculture and fisheries, both between and within countries. Digital technologies contribute not only to innovation in goods and services, but also to innovation in processes, business models and organisational arrangements.

Figure 1.6 compares several indicators of ICT-related innovation and ICT specialisation in one of the best-performing countries (Sweden) with the OECD average. While Sweden is close to the OECD average in terms of its share of ICT trademarks and ICT research and development (R&D) expenditures, the ICT shares of total value added and employment as well as the proportion of ICT specialists are significantly higher. The comparison highlights Sweden's strong specialisation in the production of ICT products relative to other OECD countries.

Figure 1.5. **Digital skills, tertiary education and training**

As a percentage of all graduates, 16-74 year-old individuals or enterprises with ten or more persons employed



Notes: All indicators have been standardised and range between 0 and 1. ICT = information and communication technology.

Sources: Author's calculations based on OECD, *Education Database*, *www.oecd.org/education/database.htm* (accessed July 2017) and Eurostat, *Digital Economy and Society* (database), *http://ec.europa.eu/eurostat/web/digital-economy-and-society/data/comprehensive-database* (accessed June 2017).

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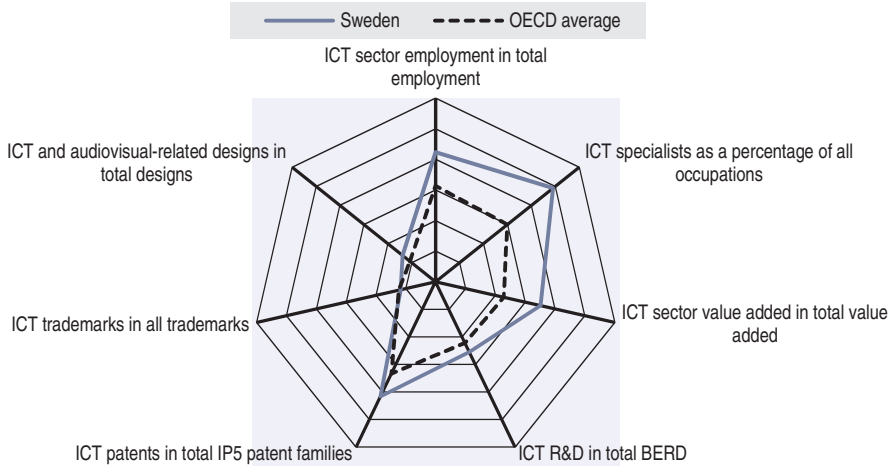
Figure 1.6. **ICT-related innovations**



Notes: All indicators have been standardised and range between 0 and 1. The Five Intellectual Property (IP5) offices comprises the European Patent Office (EPO), the Japan Patent Office (JPO); the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO) and the United States Patent and Trademark Office (USPTO). BERD = business expenditure on research and development.

Sources: Author's calculations based on OECD, *STAN: OECD Structural Analysis Statistics* (database), ISIC Rev.4, *http://oe.cd/stan* (accessed July 2017); Australian, Canadian and European labour force surveys and the *United States Current Population Survey* (accessed July 2017); OECD, "STAN R&D: Research and development expenditure in industry - ISIC Rev. 4", *STAN: OECD Structural Analysis Statistics* (database), *http://dx.doi.org/10.1787/stan-data-en* (accessed June 2017); and OECD, *STI Micro-data Lab: Intellectual Property* (database), *http://oe.cd/ipstats* (accessed July 2017).

StatLink *http://dx.doi.org/10.1787/888933584450*

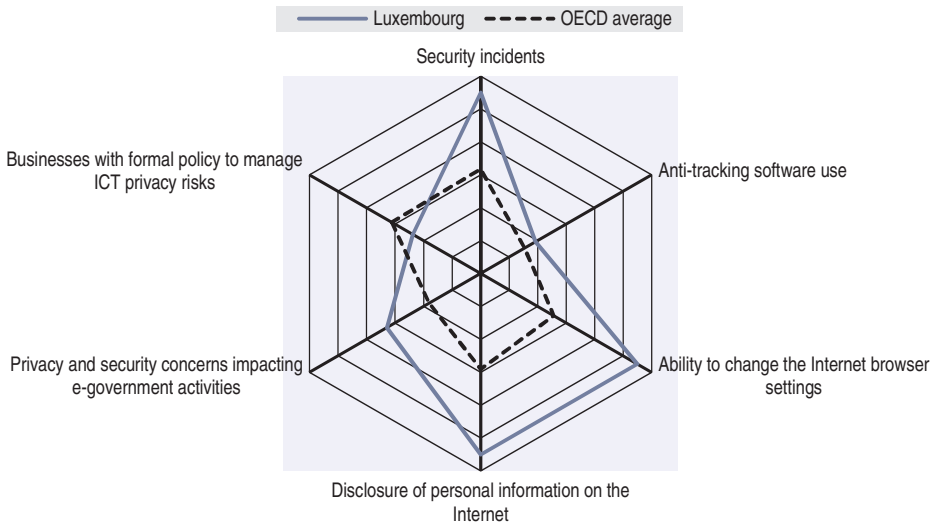
Trust and acceptance

Trust is fundamental to the functioning of the digital economy; without it, individuals, firms and governments won't use digital technologies, and an important source of potential growth and social progress will be left unexploited. Greater co-operation in developing comprehensive and coherent national strategies for digital security and privacy across the economy and society, with a focus on issues such as personal data protection, resilience of critical infrastructures (e.g. water, energy, finance), incentives (e.g. cyber insurance, public procurement), public health and safety, SMEs, and related skills development, are essential. At the same time, it is important to continue to effectively protect consumers engaged in e-commerce and other online activities for the digital economy to flourish.

Figure 1.7 compares selected indicators of digital security and trust in one of the best-performing countries (Luxembourg) with the OECD average. Awareness of digital security risks in Luxembourg seems higher than for the OECD average, reflecting a higher frequency of security incidents. Behaviours and technologies to protect users against these risks are also more diffused. Yet, the proportion of business with no formal policies to manage ICT privacy risks and of individuals having disclosure of personal information on the Internet is higher than the average.

Figure 1.7. **Digital security and trust**

As a percentage of 16-74 year-old individuals or enterprises with ten or more persons employed



Notes: All indicators have been standardised and range between 0 and 1. ICT = information and communication technology.

Sources: Author's calculations based on OECD, *ICT Access and Usage by Households and Individuals* (database), *http://oe.cd/hhind*, OECD, *ICT Access and Usage by Businesses* (database) *http://oe.cd/bus* (both accessed July 2017) and Eurostat, *Digital Economy and Society* (database), *http://ec.europa.eu/eurostat/web/digital-economy-and-society/data/comprehensive-database* (accessed February 2017).

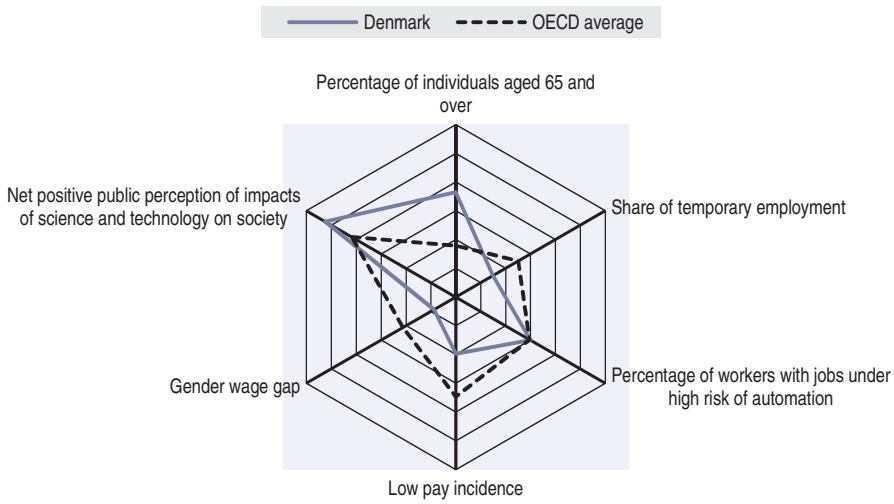
StatLink *http://dx.doi.org/10.1787/888933584469*

Societal adjustment to the digital transformation

The economy and society are being deeply affected from the digital transformation. On the one hand, automation may reduce employment in some occupations while job platforms may increase non-standard jobs, i.e. short-term, part-time or low-paid jobs, and widen the gender wage gap. On the other hand, e-services, particularly e-health, may help society to address the challenges of the aging population and increasing social expenditures.

Figure 1.8 compares some selected indicators of societal aspects in one of the best-performing countries (Denmark) with the OECD average. The share of temporary employment, low-paid jobs and the gender wage gap are significantly smaller in Denmark than the OECD average. The proportion of elderly individuals, who may benefit the most from e-health, is higher. Also, positive perceptions about the impact of science and technology on society are more widespread in the public opinion.

Figure 1.8. **Digitalisation and society**



Note: All indicators have been standardised and range between 0 and 1.

Sources: Author's calculations based on UN (2015), *World Population Prospects: The 2015 Revision*, *www.un.org/en/development/desa/publications/world-population-prospects-2015-revision.html*; OECD, *Employment and Labour Market Statistics* (database), *www.oecd-ilibrary.org/employment/data/oecd-employment-and-labour-market-statistics_lfs-data-en* (accessed March 2017); Arntz, M., T. Gregory and U. Zierahn (2016), "The risk of automation for jobs in OECD countries: A comparative analysis", *http://dx.doi.org/10.1787/5jlz9h56dvq7-en* and OECD (2015b), *OECD Science, Technology and Industry Scoreboard 2015: Innovation for Growth and Society*, *http://dx.doi.org/10.1787/sti_scoreboard-2015-en*.

StatLink *http://dx.doi.org/10.1787/888933584488*

The current state of national digital strategies

This section provides an overview of the current state of NDSs in OECD countries and partner economies. It also presents countries' priorities among policy objectives for developing the digital economy and society, and the main challenges that governments perceive while working towards these objectives. Key findings include that: NDSs have become the norm across OECD countries and policy objectives to develop the digital economy and society, largely pursued by NDSs, are a high priority; many governments are monitoring the implementation of their NDS and are on track in most measured areas; and, despite some commonalities, current approaches to govern national digital strategies (NDSs) significantly differ across countries.

National digital strategies have become the norm across the OECD

Of the 32 OECD countries and the 6 partner economies that answered the *OECD Digital Economy Outlook* Policy Questionnaire in 2016, all of them indicated that they have an NDS, agenda or programme, except for the United States, which takes a decentralised, market-driven approach to its digital strategy.[1] Almost two-thirds of NDSs are stand-alone strategies, while the remaining ones are a component of a broader national strategy,

e.g. a national innovation strategy, and in many cases the NDS interacts with other strategies, such as for innovation. Most European OECD countries have aligned their NDS with the Digital Agenda for Europe, the European Digital Single Market Strategy, the Europe 2020 Strategy, the European Union eGovernment Action Plan, or a combination thereof (Box 1.3). More than two-thirds of all countries had an NDS prior to the current one. Almost all of the countries with a first NDS have built on or replaced previous policies or strategies with their NDS. Currently, on average, NDSs have a time frame for implementation of seven years and are about halfway to being implemented, either with a budget directly associated with the NDS (two-thirds) or more indirectly via budgets of ministries and agencies involved in implementation (the remaining third).

Box 1.3. **The EU Digital Single Market**

One of the European Commission's ten political priorities is the completion of the Digital Single Market through a strategy that aims to open up digital opportunities for people and business and enhance Europe's position as a world leader in the digital economy. Today, the European Digital Market is made up of 54% of US-based online services, 42% of national online services and only 4% of European Union (EU) cross-border online services.

A Digital Single Market would ensure the free movement of persons, services and capital, individuals and businesses to seamlessly access and exercise online activities under conditions of fair competition, and a high level of consumer and personal data protection, irrespective of their nationality or place of residence. The Digital Single Market can create opportunities for new start-ups and allow existing companies to better seize the advantage of a market of over 500 million people. Completing a Digital Single Market could contribute EUR 415 billion a year to Europe's economy, create jobs and transform public services.

The Digital Single Market Strategy was adopted on 6 May 2015 and includes 16 specific initiatives delivered by the Commission in January 2017. Legislative proposals are now being discussed by the co-legislator, the European Parliament and the Council.

The Digital Single Market Strategy is built on three pillars:

1. **Access**: better access for consumers and businesses to digital goods and services across Europe.
2. **Environment**: creating the right conditions and a level playing field for digital networks and innovative services to flourish.
3. **Economy and society**: maximising the growth potential of the digital economy.

The evolution of EU member states' performance in digital developments is tracked by the Digital Economy and Society Index (DESI), which is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU member states in digital competitiveness. Member states' progress is monitored in the context of the Digital Single Market strategy.

Source: EC (2017), "Digital Single Market", *https://ec.europa.eu/digital-single-market/en/digital-single-market* (accessed 2 May 2017).

Policy objectives pursued by national digital strategies are high priority

Policy objectives for the development of the digital economy and society and which are largely pursued by NDSs are a high priority across all countries. Table 1.1 shows a priority ranking of 15 policy objectives, based on responses from 35 countries. Overall, 68% of the objectives were considered to be a high priority, 15% medium-high, 14% medium,

and only 3% low or medium-low priorities. On the one hand, this might imply that most of these objectives are high priorities for governments; on the other, it could indicate a lack of prioritisation among these objectives in many countries. Strengthening e-government services and further developing telecommunication infrastructure rank the highest for 2017. When considering expected priorities over the next three to five years, strengthening security moves up two positions and further developing telecommunication infrastructure drops by three (Table 1.1, second column). Table 1.1 also provides the number of countries that mention the listed objectives as part of their NDS (third column) as well as additional objectives that are not covered in the priority ranking but are frequently mentioned as objectives of NDSs (bottom of the table).

Table 1.1. **Priority ranking of policy objectives for digital developments**

Policy objectives	Priority in 2017	Next 3-5 years	National digital strategy objectives
	Ranking	Expected change	Number of countries
Strengthening e-government services	1	Same	21
Further developing telecommunication infrastructure	2	↓ 3	22
Promoting ICT-related skills and competences	3	Same	16
Strengthening security	4	↑ 2	18
Enhancing access to data, including PSI and OGD	5	↑ 1	6
Encouraging the adoption of ICTs by businesses and small and medium-sized enterprises in particular	6	↓ 1	3
Encouraging ICT adoption in specific sectors, e.g. healthcare, education	7	↑ 1	3
Strengthening privacy	8	Same	5
Strengthening digital identities	9	Same	2
Promoting the ICT sector, including its internationalisation	10	Same	2
Promoting e-commerce across the economy	11	↓ 1	5
Tackling global challenges, e.g. Internet governance, climate change	12	↑ 1	1
Strengthening consumer protection	13	↓ 1	0
Advancing e-inclusion, e.g. of elderly and disadvantaged groups	14	↑ 1	4
Preserving Internet openness	15	Same	4
Additional objectives of national digital strategies			
Fostering science, innovation and entrepreneurship			16
Ensuring access to the Internet, services and information			12
Developing digital content and culture			10
Increasing the use of digital technologies			10
Developing a sound regulatory approach for digital environments			3

Notes: Both the current ranking and the expected changes over the next three to five years should be considered with caution, given a weak differentiation among the indicated priorities. ICT = information and communication technology; PSI = public sector information; OGD = open government data.

Achieving these objectives can be a goal in itself; however, several countries consider their achievement to contribute to reaching higher level objectives, such as gross domestic product (GDP) growth (Brazil, Denmark, Germany, Israel, Japan, Mexico, Slovenia, Sweden), jobs (Denmark, Germany, Latvia), productivity (Finland, the Russian Federation, Switzerland), competitiveness (Estonia, Latvia, the Netherlands, the Russian Federation), quality of life and well-being (Estonia, Lithuania, the Netherlands, the Russian Federation, Turkey), democracy and transparency (Sweden, Switzerland), inclusiveness and inclusion (the People's Republic of China, Israel, Norway, Slovenia, Sweden), or combating climate change and fostering sustainable development (Sweden, Switzerland).

Challenges in working towards these objectives

Governments face several challenges working towards the policy objectives listed in Table 1.1. For 2017, among the 10 main challenges identified by 31 countries, the three most prominent are: 1) a lack of awareness, implementation and enforcement; 2) insufficient skills, training and education; and 3) co-ordination, including multi-stakeholder, multi-lateral and multi-level governance co-ordination (see Table 1.A1.1 in Annex 1.A1). This aggregate view hides more detailed information, which reveals that the top three challenges are quite different for each policy objective (see Table 1.A1.2 in Annex 1.A1). Looking three to five years ahead, the expected top 3 challenges are the same as for 2017, but notable changes occur in the order of the 10 main challenges that countries expect and in the expected challenges per policy objective.

Approaches to governing national digital strategies vary across countries

Current approaches to governing NDSs vary across countries. Information from 35 countries provides an overview of the responsibilities allocated for the development, co-ordination, implementation, and monitoring of NDSs (Table 1.2). The lead on strategy development is often taken by a ministry or body that is not dedicated to digital affairs, while only a minority of countries so far is charging a ministry or body that is dedicated to digital affairs. Almost all countries engage multiple private stakeholders and public bodies to contribute input to developing their NDS. Strikingly, only few countries (Austria, Luxembourg, Mexico, the Slovak Republic) have a single high-level government official, e.g. in the Prime Minister's Office, Presidency or Chancellery, or a ministry or body dedicated to digital affairs to co-ordinate their NDS. However, effective co-ordination is essential for developing and implementing a whole-of-government approach with an NDS. The implementation of the NDS is the responsibility of several ministries, bodies or institutions in the majority of countries, and in some, multiple stakeholders are involved in implementing it. Bodies responsible for monitoring the implementation of the NDS tend to be the same as those who lead the development and the co-ordination of the NDS.

Table 1.2. **National digital strategy governance**

Number of countries that have allocated respective responsibilities

	Lead the development	Contribute input	Co-ordinate	Implement	Monitor
Government, e.g. Prime Minister, Presidency, Chancellery, Ministerial Council	4	0	5	1	6
Digital affairs ministry or body or ministerial position	8	1	10	3	8
Ministry or body not dedicated to digital affairs	15	2	13	1	11
Several ministries, bodies or institutions	6	14	5	26	7
Multiple public and private stakeholders	1	17	0	3	0

Many governments are monitoring the implementation of their national digital strategy

Many governments have set up measurable targets within a specific time frame to monitor the implementation of their NDS, and most are making good progress towards reaching their targets. Table 1.3 presents the main categories of the targets that 24 OECD countries and 5 partner economies have set up. On average, monitoring started in 2013, and the time frame for reaching determined targets are between six and eight years. The greatest number of targets was set up for measuring progress in broadband infrastructure

development and performance, and the fewest for ICT skills and other skills development (Table 1.3). Some countries monitor the implementation of their NDS via a supranational index, such as the European Union's Digital Economy and Society Index (DESI), and others have built their own aggregate digitalisation index, such as Germany and Mexico.

Table 1.3. **National digital strategy targets and progress in implementation**

Target category[1]		Percentage of targets reached as of 2016	Target year
1	Broadband infrastructure development and performance	66%	2020
2	Public sector services and performance	78%	2020
3	Internet and services uptake	56%	2020
4	Use of digital technologies	62%	2018
5	E-commerce (firms, individuals) and digital business processes	52%	2020
6	ICT skills and other skills development	65%	2019

1. Ordered by the number of targets set up per category.

Notes: This table is based on information from 31 countries on 173 monitored target values. National and supranational aggregate indices are not taken into account in the table. In addition to the target categories listed in this table, several governments have set up targets on ICT sector development, digital content promotion, and privacy and personal data protection; however, the number of targets and corresponding data are insufficient to constitute meaningful averages for these categories.

Progress, as measured by 2016, shows that in each target category, on average, more than 50% of the targets had been reached. This corresponds to an average annual progress for all targets combined of slightly over 100%. Areas in which governments are least on track towards reaching their targets include Internet and services uptake and e-commerce. Specific measures that countries put in place to implement their NDS are discussed in Chapter 2.

Note

1. The United States approaches digital economy policy through a portfolio strategy: it has a collection of policies, regulations and laws that are associated with specific issues and/or sectors that together support the evolution and enhancement of the digital economy. Elements include, in no particular order, policies relating to telecommunication and the Internet, digital privacy, cybersecurity, big data, smart information technology (IT) delivery, open data, IT R&D, educational technology, online education, and environmental information systems. The portfolio strategy is evidenced at both the national (federal) and subnational (state and local) levels. It can be described in a variety of ways; key dimensions include: 1) digital access and participation – broadband, wireless and other telecommunication plus support for inclusive access; 2) openness – open access to government data, open access to results of federally funded research, and the free flow of information and commerce; 3) trustworthiness – cybersecurity, reliability and resilience, privacy, protection of civil liberties in the online and big data environments, protection of intellectual property rights. The United States nurtures the continued development and improvement of the technologies that underlie the digital economy and that contribute to advancing the above dimensions.

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ANNEX 1.A1

Challenges to achieving policy objectives for digital developments

Table 1.A1.1. **Main challenges to achieving policy objectives for digital developments**

More prominent →	Main challenges in 2017		Main challenges over the next three to five years	Less prominent →
	Awareness, implementation, enforcement	1	Awareness, implementation, enforcement	
	Skills, training, education	2	Co-ordination, including multi-stakeholder, multi-lateral and multi-level governance co-ordination	
	Co-ordination, including multi-stakeholder, multi-lateral and multi-level governance co-ordination	3	Skills, training, education	
	Policy design and measures	4	Public investment or funding	
	Laws or regulation	5	Technical, including standards and interoperability	
	Technical, including standards and interoperability	6	Trust, including privacy, security, consumer protection	
	ICT adoption, business digitalisation, innovation	7	Laws and regulation	
	Public investment or funding	8	Policy design and measures	
	Private investment or access to finance	9	ICT adoption, business digitalisation, innovation	
	Trust, including privacy, security, consumer protection	10	Private investment or access to finance	

Note: This table presents a ranking of the most frequently mentioned challenges to achieve the policy objectives listed in Table 1.1. The ranking is based on information from 31 countries with 344 observations for 2017 and 286 observations for the next three to five years.

Table 1.A1.2. **Top three challenges per policy objective**

Policy objectives	In 2017			Next 3-5 years		
	Top 3 challenges			Top 3 challenges		
Strengthening e-government services	5	3	8	1	2	6
Further developing telecommunication infrastructure	9	1	8	10	4	1
Promoting ICT-related skills and competences	2	1	3	3	1	10
Strengthening security	1	4	2	1	4	5
Enhancing access to data, including PSI and OGD	4	6	5	1	5	7
Encouraging the adoption of ICTs by businesses and small and medium-sized enterprises in particular	2	9	7	9	1	3
Encouraging ICT adoption in specific sectors, e.g. healthcare, education	1	4	3	1	3	5
Strengthening privacy	5	1	4	1	7	6
Strengthening digital identities	1	5	8	1	5	2
Promoting the ICT sector, including its internationalisation	x[1]	2	7	8	7	3
Tackling global challenges, e.g. Internet governance, climate change	1	3	4	2	1	10
Promoting e-commerce across the economy	4	7	2	6	3	9
Strengthening consumer protection	5	1	3	1	2	7
Advancing e-inclusion, e.g. of elderly and disadvantaged groups	2	1	3	1	3	4
Preserving Internet openness	5	4	6	x[1]	9	10

1. Refers to "Incentives", a challenge that is not among the ten main challenges listed in Table 1.A1.1.

Notes: This table presents the three most frequently mentioned challenges for each digital economy policy objective, based on the ranking of the main challenges for 2017 and for the next three to five years presented in Table 1.A1.1. ICT = information and communication technology; PSI = public sector information; OGD = open government data.

ANNEX 1.A2

Ministerial Declaration on the Digital Economy: Innovation, Growth and Social Prosperity ("Cancún Declaration")

WE, the Ministers and representatives of Argentina, Australia, Austria, Belgium, Canada, Chile, Colombia, Costa Rica, the Czech Republic, Denmark, Ecuador, Egypt, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States, and the European Union, assembled in Cancún, Mexico, on 22-23 June 2016;

COMMITTED to the rule of law and respect for human rights, to advancing freedom and democracy, and to increasing economic, civic and social opportunities for all;

RECOGNISE that the world economy is becoming ever more digital; that growing use of and investment in digital technologies and knowledge-based capital is profoundly transforming our societies;

RECOGNISE that the digital economy is a powerful catalyst for innovation, growth and social prosperity; that our shared vision is to promote a more sustainable and inclusive growth focused on well-being and equality of opportunities, where people are empowered with education, skills and values, and enjoy trust and confidence;

RECOGNISE that advancing our vision relies on the participation of all countries and on collective action to seize the opportunities and tackle the evolving challenges of the digital economy;

RECOGNISE in this regard, that we need to adopt holistic and whole-of-society approaches that encompass coherent evidence-based policies to stimulate investment in higher speed broadband connectivity, reduce barriers to use of digital technologies, foster research, innovation and new business opportunities, strengthen trust, promote job quality and address skill needs;

RECOGNISE that the 1998 Ministerial Conference on Electronic Commerce in Ottawa and 2008 Ministerial on the Future of the Internet Economy in Seoul helped pave the way for the digital economy to flourish through a successful combination of policies developed in close collaboration with experts from business and industry, trade-unions, civil society and the Internet technical community through their advisory committees; and that we need to continue working closely together and with all stakeholders;

RECOGNISE that the OECD Recommendations of the Council on Principles for Internet Policy Making, Consumer Protection in E-commerce, Digital Security Risk Management for Economic and Social Prosperity, Cryptography Policy and Protection of Privacy and Transborder Flows of Personal Data, which all stem from multi-stakeholder cooperation, provide a robust foundation for guiding the development of coherent policies for an increasingly digitalised economy;

FURTHER RECOGNISE in this regard, the important contribution of the Internet Governance Principles of the NETmundial Multistakeholder Statement;

UNDERLINE the critical need for continued multi-stakeholder, consensus-driven approaches to developing global technical standards that enable interoperability and a secure, stable, global, open, and accessible Internet; and the equally critical ongoing need for open, transparent and inclusive processes in global multi-stakeholder Internet governance;

FURTHER UNDERLINE that our initiatives to support the digital economy also help attain the United Nations 2030 Agenda for Sustainable Development and the outcomes of the World Summit on the Information Society and its ten year review; and that we need to promote gender equality and be inclusive of vulnerable or disadvantaged groups;

DECLARE that we will:

1. **Support the free flow of information** to catalyse innovation and creativity, support research and knowledge sharing, enhance trade and e-commerce, enable the development of new businesses and services, and increase people's welfare through policies, grounded in respect for human rights and the rule of law, that reinforce the Internet's openness, in particular its distributed and interconnected nature, while respecting applicable frameworks for privacy and data protection, and strengthening digital security;
2. **Stimulate digital innovation and creativity** to spur growth and address global social issues through coordinated policies that promote investment in digital technologies and knowledge-based capital, encourage availability and use of data, including open public sector data, foster entrepreneurship and the development of small and medium enterprises, and support the continued transformation of all economic sectors, including public services;
3. **Increase broadband connectivity and harness the potential of interconnected and converged infrastructures and digital services** to bridge digital divides and foster innovation by adopting technologically neutral frameworks that foster investment in broadband networks, protect consumers, promote competition and enable opportunities for all;
4. **Embrace the opportunities arising from emerging technologies and applications** such as the Internet of Things, cloud computing, digital transformation of manufacturing and data analytics, while addressing their economic and social effects, and assessing the appropriateness of policy and regulatory frameworks, and of global standards;
5. **Promote digital security risk management and the protection of privacy at the highest level of leadership** to strengthen trust, and develop to this effect collaborative strategies that recognise these issues as critical for economic and social prosperity, support implementation of coherent digital security and privacy risk management practices, with particular attention to the freedom of expression and the needs of small and medium enterprises and individuals, foster research and innovation and promote a general policy of accountability and transparency;

6. **Stimulate and help reduce impediments to e-commerce within and across borders** for the benefit of consumers and businesses by adopting policies and regulatory frameworks that strengthen consumer trust and product safety, promote competition and support consumer-driven innovation, and enable co-operation among consumer protection and other relevant authorities within and among countries;
7. **Take advantage of the opportunities arising from online platforms** that enable innovative forms of production, consumption, collaboration and sharing through interactions among and between individuals and organisations, while assessing their social and economic benefits and challenges as well as the appropriateness of related policy and regulatory frameworks;
8. **Spur the employment opportunities created by the digital economy** by reducing barriers to investment in and adoption of digital technologies in all economic sectors, promoting an attractive and agile business environment, in particular for new digital entrants, adapting labour policies and programmes to foster job quality and social protection, in particular in new work arrangements facilitated by digital technologies, and by continuing to address job displacement and mitigate the related social cost especially for vulnerable groups;
9. **Strive for all people to have the skills needed to participate in the digital economy and society** through policies that improve the capacity of educational and training systems to identify and respond to the demand for general and specialist digital skills; that facilitate up- and re-skilling through lifelong learning and on-the-job training; and that promote digital literacy as well as inclusive and effective use of ICTs in education and training;

FURTHER DECLARE that we will deliver on our objectives in a timely manner in close co-operation with all stakeholders, and that, with the support of the OECD, we will share experiences and work collaboratively to:

- help preserve the fundamental openness of the Internet while concomitantly meeting certain public policy objectives, such as the protection of privacy, security, intellectual property and children online, as well as the reinforcement of trust in the Internet;
- identify, develop and activate the mix of skills needed to enable inclusive participation in an increasingly digitalised economy; and analyse new work arrangements enabled by digital technologies and their implications for job quality and labour relations;
- develop privacy and data protection strategies at the highest level of government that incorporate a whole-of-society perspective while providing the flexibility needed to take advantage of digital technologies for the benefit of all; and support the development of international arrangements that promote effective privacy and data protection across jurisdictions, including through interoperability among frameworks;
- assess the effects of digital transformation on society and on all parts of the global economy to identify expected benefits and challenges, and to examine how national strategies and policies can address these transformations and take advantage of innovation to help bridge digital divides;
- strengthen the collection of internationally comparable statistics on the adoption and use of broadband infrastructures and digital services together with the use of digital technologies by firms and individuals across the economy and society; and contribute to developing new metrics for the digital economy, such as on trust, skills and global data flows;

INVITE the OECD to further develop its work related to the digital economy, and in this regard, to build on its work in other areas, including the OECD Skills Strategy and the update of the OECD Jobs Strategy;

CALL ON the OECD to continue to provide us with strong evidence and the innovative analysis needed to develop sound policies to achieve our objectives and contribute to a flourishing digital economy.

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