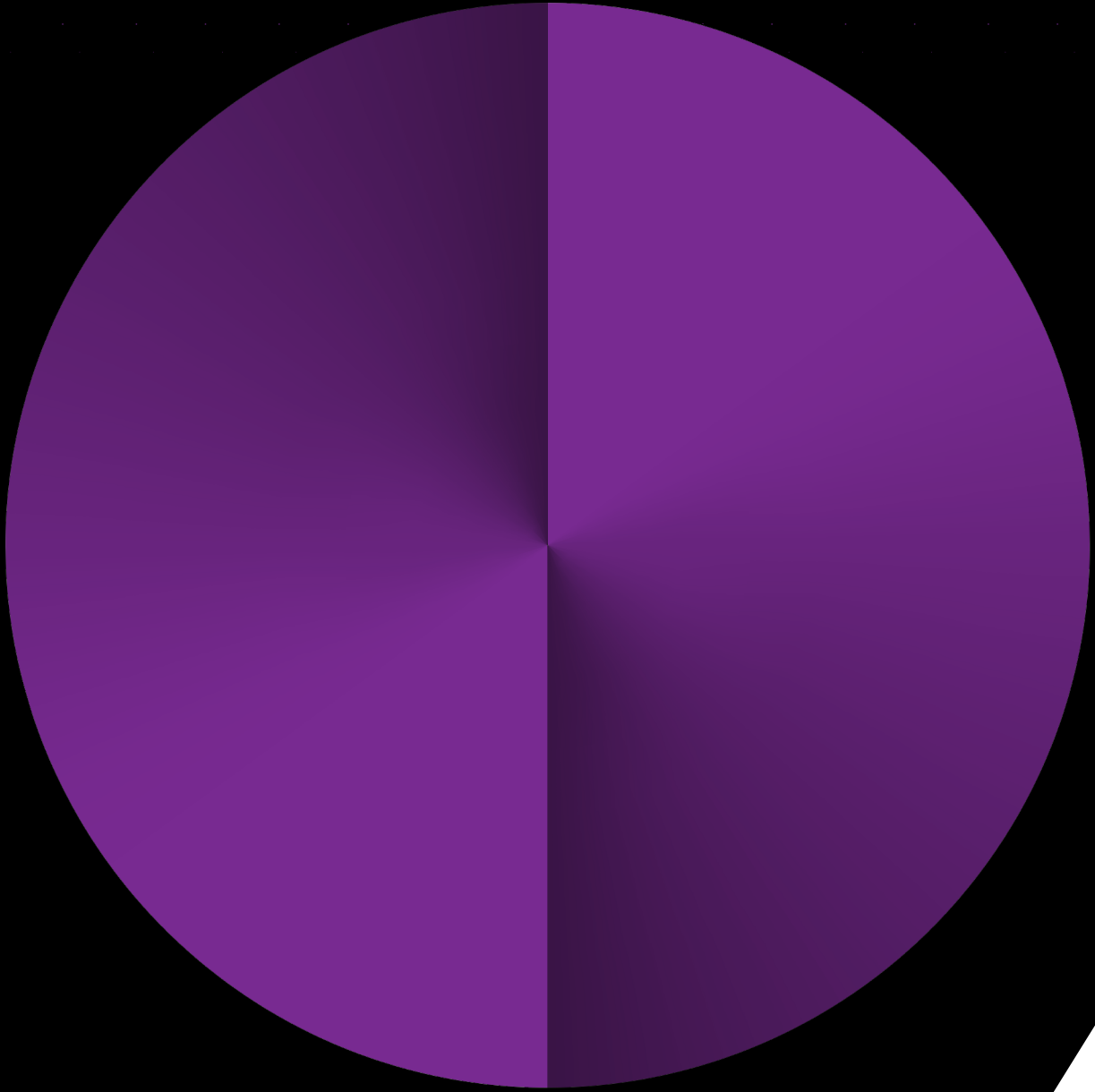


Meeting of the OECD Council at Ministerial Level

Paris, 7-8 June 2017



GOING DIGITAL: MAKING THE TRANSFORMATION WORK FOR GROWTH AND WELL-BEING

Going Digital: Making the Transformation Work for Growth and Well-Being

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KEY MESSAGES FOR MINISTERS

Seizing the opportunities and mitigating the challenges

- We are in the midst of a digital transformation, with 40% of the world population now connected to networks, up from 4% in 1995. The **transformation is at an early stage** with a range of new technologies still to come.
- The **digital transformation can spur innovation and productivity growth across many activities, transform public services, and improve wellbeing** as information, knowledge and data become more widely available. It will be instrumental in addressing pressing policy challenges such as the shift to renewable energy, care for ageing populations and injecting efficiency and transparency into the delivery of government services.
- These benefits go hand-in-hand **with challenges to jobs and skills, to privacy and security, to markets and taxation, to social security systems and public financing**, and to public institutions and social interactions. The speed of change can be alienating to some and fits uneasily with the fixed timeframes, lengthy administrative procedures or adherence to predetermined cycles that can characterise policy making.
- To ensure that policies harness the benefits while mitigating the challenges, policy makers need to be pro-active and act now. Many policies are the legacy of an analogue era and ill-adapted to today's digital era. **This gap between “Technology 4.0” and “Policy 1.0” needs to be closed.** Catching up with the rapid pace of change will also help in "fixing" globalisation.
- Making the digital transformation work will require **inclusive, coherent and well-coordinated policies**, reflecting a multi-stakeholder and whole-of-government approach to policy making, that pro-actively consider those who will benefit from the digital transformation and those who risk being left behind.

Fostering access and effective use

- Fully benefiting from the opportunities linked to digitalisation will require that all individuals, businesses and governments have **reliable and affordable access to digital networks and services**. This requires a wide coverage of digital networks, and targeted measures for disadvantaged people, firms (e.g. certain SMEs) and regions.
- **But mere access to digital networks does not ensure effective use.** Policy will need to help equip people with appropriate skills to use the technology; enable complementary investments in organisational change and process innovation; and foster competition and sound firm dynamics. Sector-specific aspects of the digital transformation also require attention, e.g. in financial services or manufacturing.

- **SMEs face challenges in the use of ICT but also have important opportunities**, such as global e-commerce, to access new markets and improve their performance. Improving their access to finance is particularly important, as are policies to diffuse digital technologies to SMEs, such as technology extension services.
- **Digital trade is creating new economic opportunities**, allowing firms to access new markets, and bringing new goods and services to consumers globally. To seize the opportunities, governments need to work together to facilitate digital trade across borders, whether digitally or physically delivered, address existing cross-border barriers and frictions, and avoid unnecessary new restrictions, including in considering the impacts on market openness of other policies.
- **Trust is fundamental to the success of the digital transformation**. Greater international co-operation in developing coherent strategies for digital security and privacy, and implementing security and privacy risk management frameworks, are essential, as is the protection of consumers engaged in online activities.

Facilitating social adjustment and ensuring inclusion

- **The digital transformation will provide new job opportunities for many but raises challenges for others**, with the risk of growing inequalities in access to jobs. Sound labour, skills and social policies can make it easier for workers to grasp the new opportunities and help navigate the challenges.
- **Workers displaced by the digital transformation should be provided with active job search and adequate income support**, to speed up job finding and reduce the cost of job loss. Such interventions should come early in the unemployment spell, and be coupled with retraining and requalification so that displaced workers can take advantage of new job opportunities arising elsewhere in the economy.
- **Strengthening ICT skills for all workers and citizens is important, but will not be enough to thrive in the digital economy**. Good literacy and numeracy skills are also essential, while other complementary skills are needed, including socio-emotional skills to work collaboratively and flexibly. Skills policies should seek to: ensure initial learning equips all young people with relevant skills (including media competence); encourage flexibility and responsiveness to changing skill needs; promote more effective use of skills within or outside workplaces; and strengthen incentives and opportunities for further learning.
- It is essential to **continuously assess and anticipate changing skill needs** and foster more responsive education and training provision, in order to adapt programmes and pathways offered and guide students towards choices that lead to good employment outcomes.
- New digital business models are creating new job and income opportunities for people who may have no access to regular jobs, but may also offer less promising employment trajectories, less protection and stability and lower access to social protection and training. **Governments need to ensure strong social and regulatory protection for all workers**.
- **Digital technologies can foster social inclusion** by strengthening access to health care, financial services and skills development, and by helping disadvantaged groups connect to such services. At the same time, negative aspects of the digital era, such as Internet-enabled criminal activities, need to be addressed, with policies grounded in respect for human rights and the rule of law.

Leveraging the digital transformation for better policies

- **Governments can leverage digital technologies to re-invent policy design and experimentation**, implementation, monitoring and evaluation, and better serve the needs of citizens, e.g. in fostering smart cities.
- To enable evidence-based policies, **better measurement and analysis of the digital transformation and its impacts are urgently needed.**

Introduction

1. The Going Digital (GD) Horizontal Project was officially launched at the start of 2017. It originated as a vision from the four Chairs of STI policy Committees in the autumn of 2015 as they reflected on the 2017-18 PWB, and gained further support and momentum from a range of sectoral Ministerial meetings, notably on science and technology policy (October 2015), employment (January 2016), skills (June 2016) and the digital economy (June 2016), as well as the Ministerial Council Meeting 2016 and the corresponding statement that "encourage[s] the OECD to develop a horizontal policy strategy on digitalisation, its opportunities and challenges." Following the 2016 MCM, the initiative was further developed and included in the PWB 2017-18 as a Horizontal Project. It was approved by Council at its meeting on 16 November 2016.

2. The overarching objective of the Going Digital project is to help policymakers better understand the digital transformation that is taking place and develop tools to help create a policy environment that enables their economies and societies to prosper in a world that is increasingly digital and data-driven. The project will deliver a whole-of-house perspective on the state, effects, expected benefits and issues raised by digitalisation in different sectors and policy areas, and will provide focused analysis of key cross-cutting issues, e.g.: jobs and skills; productivity, competition and market structure; social challenges and well-being; as well as measurement of the digital transformation (see Annex).

3. The project involves a lead Committee, the Committee on Digital Economy Policy, and benefits from work by thirteen other Committees involved in the Horizontal Project.¹

4. This paper is intended to provide Ministers with a first and preliminary set of policy conclusions that are emerging from OECD work on the digital transformation. Not all policy areas that will eventually be included in the project are covered in detail in this paper, reflecting the current state of the work.

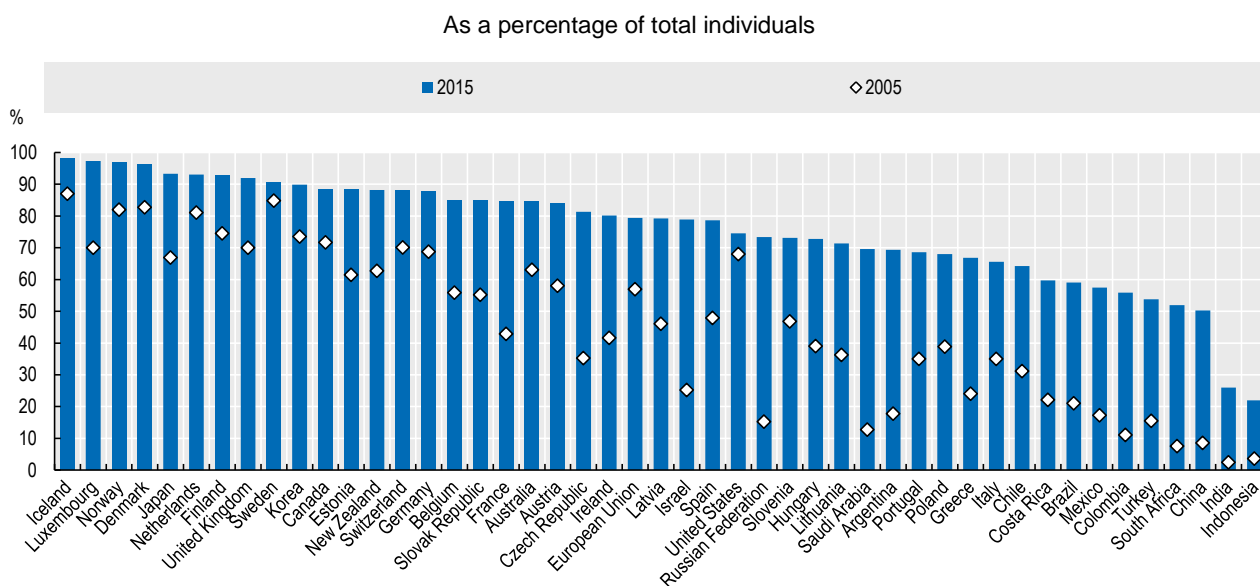
5. Further work will deepen the analysis of key policy issues, and provide more concrete policy recommendations and a roadmap for the OECD to better measure the digital transformation. It will deliver a range of stand-alone reports and policy notes, a report to the 2018 MCM, and a final synthesis report at the end of the project. It will also go "beyond the book" and help countries in the development of national digital strategies; work towards one or more OECD Council Recommendations; and develop a Going Digital toolkit, with an integrated policy framework, practical examples and good practices.

¹ These Committees are the Competition Committee, the Committee on Consumer Policy, the Committee on Industry, Innovation and Entrepreneurship, the Insurance and Private Pensions Committee, the Committee on Financial Markets, the Committee on Fiscal Affairs, the Committee on Scientific and Technological Policy, the Committee on Statistics and Statistics Policy, the Economic Policy Committee, the Education Policy Committee, the Employment, Labour and Social Affairs Committee, the Public Governance Committee, and the Trade Committee. More detail on the project and its governance are available in the first 2017 Horizontal Project Update to Council [[C\(2017\)27/REV1](#)].

Going Digital - What's at Stake?

6. *We are in the midst of the transition towards a digital economy and society.* Although underway for nearly half-a-century, the pace of the digital transformation has quickened in recent years. Digital infrastructures are now nearly fully deployed across OECD countries and growing quickly beyond (Figure 1), and smart phones provide ubiquitous connectivity and computing to many. Internet access has grown, from 4% to 40% of the world's population in 20 years and emerging and developing economies are increasingly using digital technologies to forge ahead in areas like e-commerce, banking and health.

Figure 1. Internet users, 2005 and 2015



Note: 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.

Source: OECD, based on ITU World Telecommunication/ICT Indicators Database and Eurostat Information Society Statistics Database; January 2017.

7. As more people and things become connected through networks, torrents of data are generated, new technologies like blockchain emerge and breakthroughs occur in artificial intelligence, *it is clear that the digital transformation is still only at an early stage.* While many firms now have access to broadband networks, the use of more advanced digital tools and applications within firms still differs greatly across countries, even among the most advanced economies (Figure 2). Moreover, there are important differences between firms within countries (Figure 4).

8. The ongoing digital transformation *has the potential to spur innovation, enhance productivity across a wide range of activities* (Box 1), and *improve wellbeing* as information, knowledge and data become more widely available. These benefits go hand-in-hand with major challenges to the nature and structure of organisations, markets, and social interactions. The digital transformation raises challenges for jobs and skills, market entry and competition, taxation, and invites new thinking on how to preserve fundamentals such as privacy and security, and on how to ensure that the transformation is socially inclusive and sound.

9. Across OECD countries and beyond, the *policy response to the digital transformation has been mixed*. Some are developing a strategic and pro-active approach to leveraging its benefits, working across the full range of government policies, while others have made piecemeal decisions to contain or roll back the consequences of specific incidents (e.g. security breaches) or the impacts of new technologies, applications or business models. In many cases, governments have been caught off-guard - be it by embedded code programmed to evade emission tests, the inherent lack of security in the “Internet of Things”, or tax policy challenges of the digital economy. Within the OECD context, important progress on key aspects of policies for the digital age has been made through a number of recent OECD instruments, such as the *Recommendation of the Council on Principles for Internet Policy Making* [C(2011)154], the *Recommendation of the Council on Digital Government Strategies* [C(2014)88] and the *Declaration on the Digital Economy: Innovation, Growth and Social Prosperity* [C(2016)116], but a whole-of-government approach to the digital transformation is still lacking in most countries.

Box 1. Digitalisation and Productivity - What is the Relationship?

With the broad-based slowdown in productivity growth that is affecting many OECD economies and beyond, the question is whether the current stage of the digital transformation can help strengthen productivity growth going forward. Earlier OECD work found that digital technologies can have considerable impacts on productivity growth, but only when investments in ICT are combined with investments in complementary assets, such as skills, organisational changes and process innovations, i.e. knowledge-based capital (OECD, 2004).

According to Brynjolfsson and McAfee (2011), the recent digital transformation of economic activities has unleashed four main innovative trends: i) improved real-time measurement of business activities; ii) faster and cheaper business experimentation; iii) more widespread and easier sharing of ideas; and iv) the ability to replicate innovations with greater speed and fidelity (scaling-up). While each of these trends is important in isolation, their impacts are amplified when applied in unison. Recent studies continue to point to the strong impacts of the current generation of ICTs on productivity (OECD, 2017a). But these impacts at the firm and industry level have not yet translated into visible impacts at the aggregate level. There are several possible explanations for this.

- First, recent OECD work points to a strong divergence in productivity growth between global frontier firms, which have continued to experience strong productivity performance, and other firms, that have increasingly fallen behind (OECD, 2015a). This growing gap points to a breakdown of the diffusion of technology and its associated knowledge from leading firms to others. Although the OECD work has not yet explored the specific link to digital technologies, the growing gap does seem related to the difficulties for many firms to absorb the wide range of technological changes that are underway and turn those changes into productivity growth, e.g. due to lack of appropriate skills, investments in complementary knowledge-based capital, etc. Moreover, the work points to a lack of structural change and business dynamics in OECD economies, which has slowed down the necessary reallocation of resources across the economy. For example, the share of non-viable old firms has been increasing in many OECD countries, particularly since the financial crisis, while the productivity of the latter group of firms has been falling rapidly relative to “viable” old firms, as well as younger firms in general (Adalet McGowan, et al, 2017; Berlingieri et al, 2017). This is important as earlier OECD work has found that the impacts of ICT on productivity depend on healthy business dynamics (OECD, 2004). ICT-related changes in firms are part of a process of search and experimentation, where some firms and new business models succeed and grow and others fail and disappear.
- Second, the current phase of the digital transformation may not yet have led to increased productivity as the economy has not yet fully absorbed its impacts and the installation process is still underway. This could mean that the impacts might still emerge in the years to come (Van Ark, et al., 2016).
- Third, some of the key impacts of the digital transformation on productivity may not show up in aggregate productivity growth as they do not show up in GDP. Recent OECD work (Ahmad and Schreyer, 2016) finds that, on balance, the accounting framework for GDP looks to be up to the challenges posed by digitalisation. Nevertheless, many practical measurement issues remain, especially with regards to quality adjustment of prices, some of which will be explored in the OECD's work over the coming years.

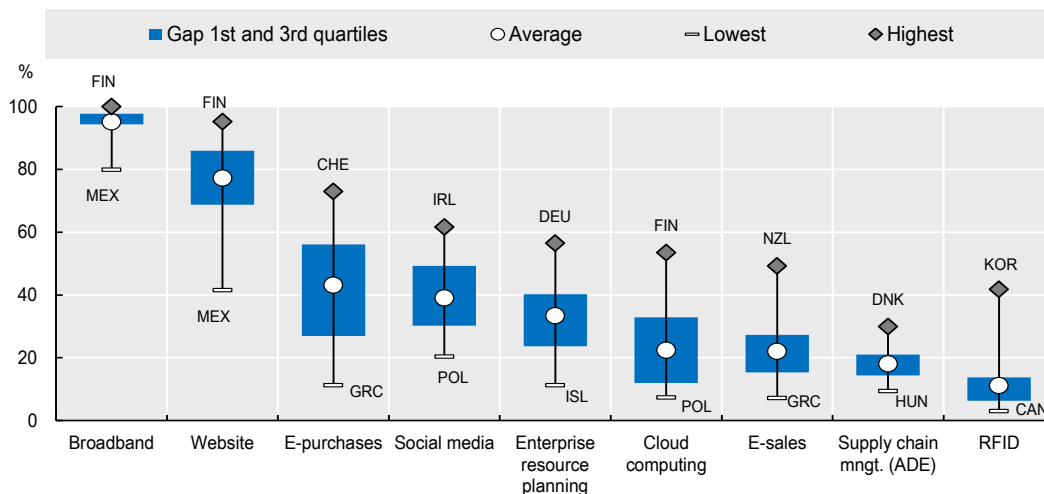
For policy makers, the key point is that the digital transformation is already having important impacts on productivity growth at the firm and industry level. But ensuring that these impacts translate into broader-based, aggregate productivity growth may require additional action, to facilitate the necessary structural change in the economy, and to support firms and workers in the adjustment process.

10. This gap between “Technology 4.0” and “Policy 1.0” needs to be closed. Many policies, and public sectors’ internal processes and dynamics, are a legacy of an analogue era that assumed a physical context and are ill-adapted to the digital era. But, as discussed below, the digital transformation has important impacts on many fundamental drivers of economic and social life (Box 2). Likewise, policy makers sometimes lack an understanding of the changes underway and *seek to make small, incremental changes to existing policies instead of proactively developing new approaches, more adapted to the digital future.*

11. In the global and interconnected digital environment, the *lack of an integrated, whole-of-government approach increases the risk that policies in one area will have unintended, possibly adverse, impacts on another, or that opportunities for synergies that enhance positive effects are missed.* For example, restrictions on ride-sharing schemes can impose barriers for those without cars to get to work, lead to inefficient use of urban spaces, and frustrate policies aimed at supporting the aged. New opportunities like “smart homes” require co-ordination of policies in areas ranging from transport, energy, housing and communications to education and health care. In finance, new regulatory approaches (e.g. “sandboxes”) may be needed to balance the benefits of innovation against the risks to financial stability and consumer protection.

Figure 2. The diffusion of selected ICT tools and activities in enterprises, 2015

Use of selected tools and activities, as a percentage of enterprises with ten or more persons employed



Source: OECD, ICT Database; Eurostat, Information Society Statistics Database and national sources, April 2016.

12. With the ongoing development of big data analytics, machine learning, artificial intelligence and other new technologies, *policy makers must work to ensure that the opportunity offered by the digital transformation is used to improve the well-being of all citizens.* This requires understanding the challenges, working collectively to learn from each other and devising policies that help workers, including civil servants, and society as a whole in adjusting to the transition. The window for action is now, so as to have effective measures and strategies in place when they are needed.

13. Catching up with the rapid pace of the digital transformation will also contribute to a **new and better growth narrative that focuses on improving well-being in increasingly open and digitalised economies.** This will allow preserving the benefits of globalisation and digitalisation while addressing their shortcomings and fostering inclusive growth.

Going Digital - The Scope of the Transformation

14. Digitisation is the conversion of an analogue signal conveying information (e.g. sound, image, printed text) to binary bits.² Once digitised, information can be represented in a universal manner, all microprocessors can process these bits, and it can be stored as data. Once in this form, 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 allows this to occur globally. In contrast, processing 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 data collection and exploitation and enables the infinite use of the non-scarce and non-rivalrous properties of information, which are inherent to its intangible nature (see e.g. OECD, 2015b).

15. Digital technologies have come a long way since the invention of the first computer during World War II and the emergence of the Internet in the 1990s. Some of the key technologies and applications that are driving the digital transformation today include (OECD, 2016a):

- *The Smartphone*: The introduction of the smartphone in 2007 transformed computing by enabling constant mobile connectivity and providing individuals with access to a wide range of new applications and services. It has also enabled the development of the "platform" economy.
- *The Internet of Things*: The Internet of Things (IoT) comprises devices and objects whose state can be altered via the Internet, with or without the active involvement of individuals (OECD, 2015b). 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 and the natural environment, among other applications (OECD, 2016b). 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, 2015b).
- *Big data analytics*: Big data analytics is defined as 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, 2015b). 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.
- *Artificial intelligence*: Artificial intelligence (AI) is defined as the ability of machines and systems to acquire and apply knowledge and to carry out intelligent behaviour. This means performing a broad variety of cognitive tasks, e.g. sensing, processing oral language, reasoning, learning, making decisions and demonstrating an ability to move and manipulate objects accordingly. Intelligent systems use a combination of big data analytics, cloud computing, machine-to-machine communication and the IoT to operate and learn (OECD, 2015c). AI is making devices and systems smart and empowering 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.

² Digitalisation, by contrast, refers to the adoption or increase in use of digital or computer technology by an organisation, industry, country, etc., and thus to the way digitisation is affecting economy and society.

- *Blockchain or distributed ledger technology (DLT)*: Whereas most software protocols support information exchange, blockchain or DLT enables protocols for value exchange, legal contracts and similar applications. It facilitates a shared understanding of value attached to specific data and thus allows transactions to be carried out. In itself, blockchain is a distributed database that acts as an open, shared and trusted public ledger that cannot be tampered with and that everyone can inspect. The combination of transparency of transactions, strict rules and constant oversight that can characterise a blockchain-based network provides the conditions for its users to trust the transactions conducted on it, without the necessity of a central institution. The technology offers the potential for lower transaction costs by removing the necessity of trustworthy intermediaries to conduct sufficiently secure value, legal or other transfers. It could disrupt markets and public institutions whose business model rests on the provision of trustworthy transactions.

16. Many other technologies underpin the digital transformation that is currently underway, including open-source software like Hadoop, 5G, robotics, grid and neural computing, virtual reality, quantum computing, 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. But together, they underpin a wide-ranging and rapid digital transformation of economy and society, and increasingly of governments, in many areas that is leading to shifts in markets and economic behaviour that are fundamentally different from the analogue era that we are used to (Box 2).

Box 2. Vectors of Digital Transformation

The Digital products, interactions, and markets have distinctive characteristics that underlie ongoing economic and social change. These often transformative characteristics can support, or frustrate, policy objectives. Some of the most prominent are listed below under three headings: a) Scale, Scope and Speed; b) Ownership, Assets and Economic Value; and c) Relationships, Markets and Ecosystems. They offer a useful heuristic for understanding digital transformation, related policy challenges, and possible responses.

Scale, Scope and Speed

Scale without 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 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, trivializing the preservation of the past and making it readily probed, indexed, repurposed, resold and remembered.

Ownership, Assets and Economic Value

“Soft” capital: The growing importance of intangible sources of value, especially software and data, has been widely recognized. Physical goods – jet engines, tractors, specialized equipment – can generate and return data so that it becomes a service – or a hybrid of product 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 its intangible, machine-encoded nature, software and data can be stored or exploited anywhere, decoupling value from specific geographic locations, and creating opportunities for policy arbitrage across jurisdictions.

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 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, and this challenges traditional principles of territoriality and sovereignty.

Going Digital - Shaping the Transformation

17. The digital transformation is *challenging almost every aspect of economy and society*, which implies that many different policy areas need to be considered in a whole-of-government response. It requires governments to reach across traditional policy silos and across different levels of government to develop a whole-of-government approach to policymaking. While many policies need to be considered, some key building blocks can be usefully distinguished, namely:

- **Building the Foundations for the Digital Transformation**, which includes policies that affect the broad enabling environment (notably market openness) for the digital transformation, as well as policies that foster accessible digital infrastructures and services.
- **Making the Digital Transformation Work for the Economy and Society.** This focuses on policies that enable the effective use of digital technologies by people, firms and governments, and policies that foster the application of digital technologies in specific activities and policy areas. It also includes policies to foster trust and acceptance, and policies that can help all individuals, including citizens, workers and consumers, as well as society as a whole to 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. Moreover, it includes policies aimed at the use of digital tools to enhance well-being, including by providing more equitable access to public services.
- **Policy Coherence and Strategy Development**, which involves co-ordination among ministries and other bodies at all levels of government, as well as actively involving all key stakeholders in the policymaking process to ensure that all policies are mutually reinforcing and aligned with one coherent and strategic national digital agenda. Moreover, collective action will be needed in several areas to seize the opportunities and tackle the evolving challenges of the digital economy.

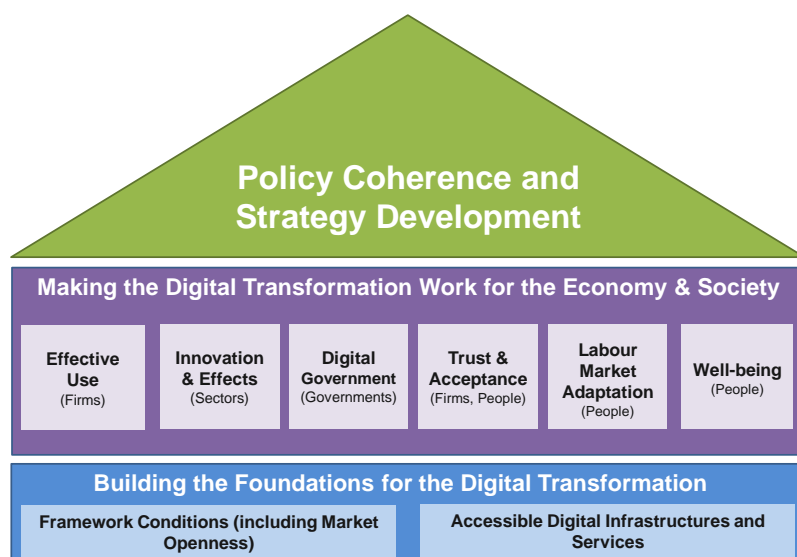
18. A preliminary integrated policy framework for making the digital transformation work, representing these key elements, is shown below (Figure 3). These elements are further discussed in subsequent sections of the paper that will be further elaborated in the next phase of OECD work on the Going Digital project (see Annex). The sections below do not touch yet on the sector-specific implications of the digital transformation, however, e.g. in sectors such as manufacturing, transport, the creative industries or finance. Some of these will be further elaborated in the next phase of OECD work.

19. Countries differ substantially in their starting conditions for the digital transformation, such as the level of economic development, the structural make-up and trade specialisation of the economy, and

geography, but also in their institutional characteristics and approaches to policy, e.g. in regard to the role of government and different private and public actors in the economy. As a result, they face different constraints under which policy responses to their challenges and opportunities need to be developed and different barriers that provide a rationale for policy action. Nevertheless, countries around the world are faced with the ongoing digital transformation and will therefore need to explore policies that can help seize its benefits and mitigate the challenges.

20. The precise nature of the approaches and set of policies needed depends on the stage of development of each country, its economic structure, the capabilities of firms, etc. Moreover, the specific choice and combination of policies will need to be aligned with the capabilities of each country in terms of policy making and policy implementation. Further work in the context of Going Digital project will explore these questions in more detail.

Figure 3. A preliminary integrated policy framework for making the digital transformation work for growth and well-being



Ensuring infrastructure and access for all

21. The first building block for the digital transformation is about ensuring access for all. Digital infrastructures, including efficient, reliable and widely accessible broadband communication networks, data, software, hardware, as well as the services that are provided over the networks, 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, such as fibre networks, and ensure that key complementary enablers are in place (e.g. fibre optic back-haul, sufficient spectrum and increasing uptake of IPv6 Internet addresses).

22. Individuals, businesses (including SMEs), and governments need reliable, affordable and widespread access to digital networks and services to benefit from digital opportunities and boost growth and well-being. While nearly all (95%) adults in Iceland, Norway, Denmark and Luxembourg accessed the Internet in 2015, only half of the adult population did so in Turkey and Mexico, and 20% or less in India

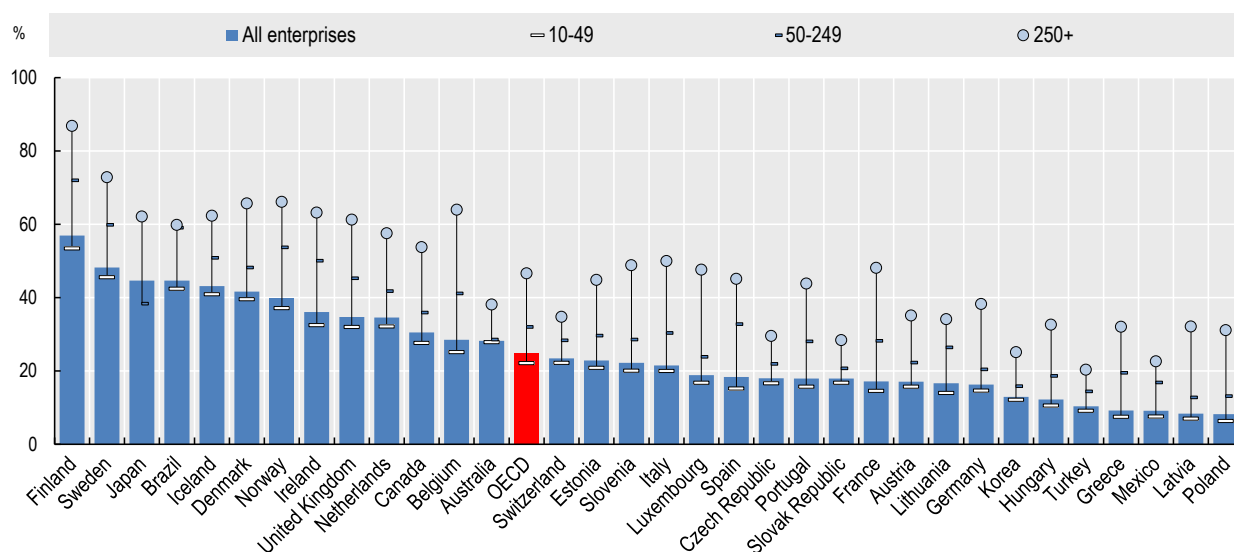
and Indonesia (Figure 1). Differences within countries are linked primarily to age and education, often intertwined with income levels. Gender differences play a smaller role in OECD countries, although women typically lag men in their use of digital technologies. In most OECD countries, uptake by young people is now nearly universal, but older generations typically have much lower levels of uptake. Providing access for all would help people in low- and middle-income countries, those in rural areas and lagging and disadvantaged groups, in benefitting from the education, employment and health opportunities enabled by digital networks. At the same time, ensuring access is not enough, as further discussed below.

23. Businesses also increasingly access and use the Internet. Almost no business today is run without ICTs. In 2015, most businesses in OECD countries had access to the Internet and a web page (Figure 2). However, the use of more sophisticated applications, such as cloud computing, has a much higher variation across countries, with small business lagging significantly in many (Figure 4).

24. Enhancing access for all individuals and businesses at an affordable price requires sound framework policies, effective telecommunications policies that reflect the need for a wide diffusion of digital networks, and additional measures, such as national broadband strategies, that can help reach disadvantaged groups, firms and rural or remote areas. Ensuring sound competition, including through market openness, is also key in this respect. For example, recent telecommunications reforms in Mexico have contributed to lower prices and enhanced access for many households and firms.

Figure 4. Enterprises using cloud computing by firm size, 2016

As a percentage of enterprises in each employment size class



Notes: Cloud computing refers to ICT services used over the Internet as a set of computing resources to access software, computing power, storage capacity and so on.

Sources: OECD, ICT access and use database; Eurostat, Information Society Statistics and national sources, March 2017.

Fostering digital trade and ensuring market openness

25. Another important foundation for the digital transformation rests on market openness. Digitalisation is creating new economic opportunities, allowing firms to access new markets, and bringing new products and services to consumers. It can help reduce transaction costs and enable more goods and

services to be delivered remotely. Moreover, enhanced productivity of enterprises thanks to greater ICT use helps them to succeed better in domestic and foreign markets.

26. Digital trade also opens opportunities for entrepreneurship, innovation and job creation, and digital tools can help firms (SMEs in particular) overcome barriers to their growth, by facilitating payments, enabling collaboration, avoiding investment in fixed assets through the use of cloud-based services, and using alternative funding mechanisms (e.g. crowdfunding).

27. The digital transformation is having a profound impact on international trade: changing how countries trade, altering how products are made and delivered, and also what they trade, including greater bundling of goods and services. Traditional measures affecting market openness remain important; digital trade still involves traditional goods and services crossing borders, and therefore tariffs, trade facilitation and services commitments continue to matter. But how and what we trade is also changing, even exacerbating, the impact of some traditional measures, and new measures are emerging that affect the way digital trade takes place.

28. Market openness underpins the potential benefits from digital trade³, starting with the potential role of foreign suppliers in improving the availability and quality of digital trade enablers, such as digital infrastructure services or IT products. Digital platforms selling goods in global markets are affected by traditional trade facilitation issues (e.g., processes at the border), as well as by the competitiveness and reliability of the transport and logistics sector. The costs of handling of much greater volumes of small packages compared to foregone revenues may also raise issues for governments with the level of the *de minimis* threshold for tariffs. Moreover, the blurring of the lines between goods and services can mean that, if part of the value of a traded good relies on its embedded service, then measures impacting the supply of this service may be as important as measures impacting trade in goods. Similarly, 3D printing is likely to impact trade in goods, but arguably will be affected by market access in the related service. Even where a transaction itself might not seem to be affected by any kind of measures, the disruption of a supporting service can prevent the transaction from occurring (e.g., restrictions on e-payment services for goods trade via digital marketplaces).

29. Growing interconnectedness and a greater demand for just-in-time delivery also means that trade, more than ever, needs to be faster and more reliable. Digitisation of information paves the way for effective identification of risks and management of global supply chains. Large volumes of data can help meet growing demands for the tracking and traceability of products across borders -- facilitating trade in agricultural products, but also requiring interoperability of data exchange systems and harmonisation of e-certificates. Rising automation and a wider use of artificial intelligence may also give rise to new issues about the role of robots as agents in trade transactions.

30. Lastly, with data flows underpinning digitally enabled trade in goods and services, as well as trade facilitation and the ability of companies to organise production globally through global value chains (with a resulting trade in intermediate goods), policies regarding data flows can have important implications for market openness in the digital era. Data flows are increasingly a means of production, as well as an asset that can themselves be traded. Policy design needs to facilitate the movement of data across borders and avoid measures that unduly restrict its movement while respecting the need for privacy and data protection. Trade policy should therefore focus on continuing to ensure that appropriate safeguards are available for pursuing legitimate public policy goals while preserving the significant benefits from an open digital environment.

³ There is currently no agreed definition of digital trade, but a growing consensus that it encompasses digitally enabled transactions in trade in goods and services which can be either digitally or physically delivered and which involve consumers, firms and governments.

31. Digital trade issues are covered under multilateral and plurilateral agreements forged at the World Trade Organisation (WTO). WTO agreements are technologically neutral, so disciplines pertaining to trade in goods under GATT (General Agreement on Tariffs and Trade), or trade in services under GATS (General Agreement on Trade in Services) apply equally in the online and offline worlds.⁴ Yet with rapid changes in technology, and a range of new issues arising, there is a discussion among WTO Members about whether there is a need to update or clarify existing rules and commitments. Indeed, as the digital transformation has progressively deepened, countries have begun to include digital trade issues in preferential trade agreements (PTAs). In addition to specifying that general provisions of the agreement apply in the online world, some PTAs now include specific chapters on digital services, e-commerce and telecommunications.

Making the digital transformation work for firms

32. The second main element of the OECD's preliminary framework relates to policies that can help make the digital transformation work for firms and for the economy more broadly. Access to digital networks provides the foundation for the digital transformation of economy and society, but does not necessarily enable people and firms to use the technology effectively. For people, having the appropriate skills to use and benefit from the technology is key, as further discussed below. Better informing people about the opportunities offered by the digital transformation can also be valuable. For firms, notably SMEs, a wide range of factors need to be addressed, notably skills; complementary investments in knowledge-based capital, including data, organisational capital and process innovation; sound competition and firm dynamics; as well as finance, taxation and regulation.

33. Greater use of digital technologies requires new skills. First, the production of digital products and services requires specialist skills in ICTs to programme software, develop applications and manage networks. Second, workers across an increasing range of occupations need generic and/or advanced ICT skills to use such technologies effectively. Finally, the diffusion of digital technologies is changing how work is done, raising demand for complementary skills such as information processing, self-direction, problem solving and communication. Generic ICT skills and complementary skills are also crucial to individuals' effective use of digital technologies in their daily lives. Effective skills policies, as set out in more detail below, are therefore important to help users make the most of digital technologies and also facilitate the transition from job to job.

34. It is also crucial that governments enable firms to invest in other knowledge-based capital (e.g. data, organisational change, process innovation) to help them realise the full potential of the digital transformation. A range of OECD studies have shown that effective use of digital technologies relies on the degree and scope for organisational changes and process innovation within firms and organisations, as well as sound management and leadership. Closely related is the important role that governments continue to play in supporting the digital transformation itself, notably in undertaking or financing research on the underlying technologies or on key challenges affecting the digital transformation, such as security.

35. Effective use of digital technologies in an economy can also be affected by a lack of firm dynamics, which can lead to the coexistence of poorly performing firms, with very low levels of ICT use, with star performers. Costly delays and slow exit of such poorly performing firms, sometimes supported by government guarantees, and compounded by financial institutions that do not want to realise non-performing loans on their balance sheets, creates a particularly unfavourable environment for effective ICT use in an economy, and will slow down the impact of ICT on growth and productivity. Ensuring sound

⁴ A wide range of WTO agreements are considered relevant to digital trade, including the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), the Agreement on Technical Barriers to Trade (TBT) and the recently concluded Trade Facilitation Agreement (TFA).

competition, including in digital markets, is key in allowing new firms to challenge incumbents, efficient firms to grow, and inefficient ones to exit, thus helping boost economic growth and living standards.

36. The digital economy has brought new business models and rapidly expanding industries. Indeed, never before have leading firms grown so large so quickly, and new businesses are challenging incumbents in novel ways (OECD, 2013a). Competition in the digital economy could be affected by many factors, including network externalities (i.e. the benefit from the network rises with the square of the number of users), which are particularly prevalent in certain markets. These externalities can lead to growing concentration and winner-take-most dynamics in such markets (Autor et al, 2017). In principle, this raises no competition problems if any resulting market power is temporary, not due to anticompetitive behaviour, and/or the resulting rents are eroded by competition, including from other firms and new business models (OECD, 2013a; 2016c). Future OECD work will explore questions related to competition in the digital economy in more detail.

37. The effective use of ICT can also be constrained by other barriers, in particular for SMEs. For example, although many ICT applications, e.g. cloud computing, have become cheap and easily accessible for SMEs, poor access to finance may still limit their scope for investments in the complementary assets and organisational changes that are required. Policies that facilitate access to finance can be useful in this regard, building on the *G20/OECD High-level Principles on SME Financing*. A poor understanding by management of the opportunities offered by digitalisation and a lack of basic digital capabilities can also play a role. Collaboration with larger firms can sometimes help address these challenges. Comprehensive national digital strategies that take into account SMEs, policies that facilitate access to finance, and SME engagement with competency centres and/or technology extension services, can be helpful for SMEs in this regard. National digital security strategies can also help address the specific needs of SMEs by providing them with practical guidance and the appropriate incentives to adopting good practices.

38. Inadequate or outdated regulation may also limit the returns that firms can achieve from their investments in digital technologies, as it can hold them back from entering new markets or developing new products or business models. For example, recent OECD work finds that product market regulation, employment protection legislation, and ICT regulation have significant effects on the uptake of ICT hardware (DeStefano, De Backer and Moussié 2017). More generally, the digital transformation is changing the world faster than many rules and regulations have evolved. Governments could benefit from mechanisms to periodically review their regulatory frameworks and, where appropriate, update them to ensure that they are well-suited to the increasingly digitalised world.

39. The new business models that are emerging from the digital economy, such as e-commerce, app stores, online advertising, cloud computing, participative networked platforms, high speed trading, and online payment services, also raise issues for tax policy, that are important for government and business alike (OECD, 2015). Key features of the digital economy that are potentially relevant from a tax perspective include mobility, reliance on data, network effects, the spread of multisided business models, and a tendency toward monopoly or oligopoly and volatility. While the digital economy and its business models do not generate unique issues for base erosion and profit shifting (BEPS), some of its key features exacerbate BEPS risks.

40. The digital economy also raises broader tax challenges for policy makers. These challenges relate in particular to nexus, data, and characterisation for direct tax purposes, which often overlap with each other. Moreover, the digital economy also creates challenges for value added tax (VAT) collection, particularly where goods, services and intangibles are acquired by private consumers from suppliers abroad. The *Task Force on the Digital Economy* (TFDE), under the auspices of the Inclusive Framework on BEPS, has discussed and analysed a number of potential options to address these challenges, and has drawn some conclusions for tax policy (OECD, 2015). Given that these conclusions may evolve as the

digital economy continues to develop, the TFDE is currently monitoring developments over time in the digital economy and will continue to work on these tax policy issues.

41. The sector-specific aspects of the digital transformation also require close attention from policy makers. The potential impacts of the digital transformation on finance are particularly important in this context. Digital innovations in finance have the potential to disrupt financial intermediation and challenge business models of the traditional financial industry, with the potential to enhance financial inclusion and the ‘democratisation of finance’. They can have cross-cutting effects in a wide variety of sectors and services, including digital banking, consumer and small business financing, payments, insurance and pension provision, and investment management. There are benefits to financial consumers and financial service providers alike. Finance providers mainly benefit from lower cost, improved efficiency and enhanced client relations. Benefits to customers include easier usage and better access to a wider range of products and services at a lower cost.

42. At the same time, these innovations introduce additional challenges for privacy, cybersecurity and consumer protection. New technologies potentially increase digital security vulnerabilities that could undermine customer confidence and trust, and undermine cyber resilience with systemic implications. Policy makers play a key role in unlocking the potential efficiency benefits of financial innovation, while seeking to ensure financial stability and consumer protection, maintain a level playing field for market participants, and ensure consumer and investor confidence and trust. Policy and regulatory approaches may also need to evolve given the potential impact of technology on risks, information asymmetries, and other market dynamics, which may require a rethinking of market failure analysis in the financial sector.

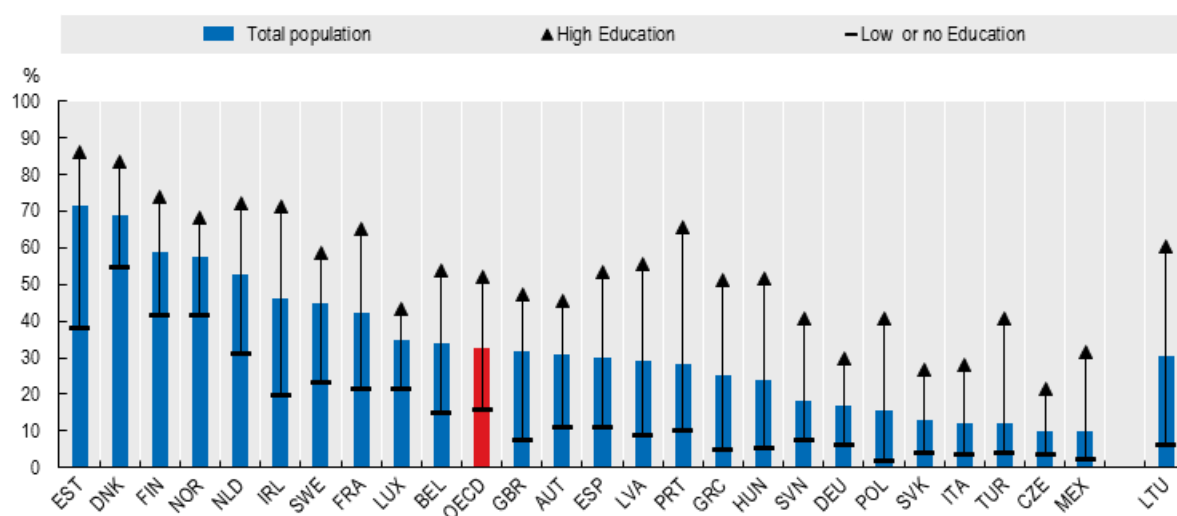
43. Finally, as noted in the *Declaration on the Digital Economy: Innovation, Growth and Social Prosperity* [C(2016)116], there is also an important need for continued multi-stakeholder, consensus-driven approaches to developing global technical standards that enable interoperability and a secure, stable, global, open, and accessible Internet.

Making the digital transformation work for governments

44. The digital transformation of governments and public services implies a shift towards a demand- and data-driven strategy, requiring new forms of partnerships and engagement, new skills and accountability models for the public sector. They offer opportunities to maximise access, reach and quality of public services while empowering beneficiaries and communities – e.g. by engaging them (through online channels, Social Media platforms, or smartphones) in providing feedback on services’ content and quality. Through these mechanisms of public engagement, governments are also leveraging technologies to test open and participatory decision-making mechanisms that can be cost-effective, with the implicit goal of progressively developing a more inclusive and transparent form of governance.

45. Nevertheless, enhancing the use of digital technologies in interactions with the public sector appears to remain an important policy challenge, in particular in some countries (Figure 5). In 2015, about 34% of individuals from OECD member countries submitted filled forms via public authorities’ websites. However, there are persisting differences in the use of digital government services across various population groups. When comparing the level of education of users of digital government services, substantial differences can be found. This can be linked to different needs, but also to stronger or weaker socioeconomic inequality among the population that affects the varying levels of digital skills. Governments need to be aware of these differences in order to develop tailored public service delivery approaches and avoid creating new forms of digital exclusion.

Figure 5. Individuals using the Internet for sending filled forms via public authorities websites in the past 12 months, by education level, 2015



Source: OECD, ICT Database; Eurostat, Information Society Statistics Database and ITU, World Telecommunication/ICT indicators Database, July 2015; Government at a Glance (2017 forthcoming).

46. Beyond the implications for specific policy areas, the wide scope and pace of the uptake of digital technologies and data use across the public sector is putting pressure on governments to consider how to leverage the new digital opportunities to improve their work. There are a number of challenges that OECD governments are facing as they try to advance the digital transformation of their public sectors. These include redesigning how the public sector functions and how actors are provided incentives to collaborate, share and integrate; rethinking policy making processes to make them more open and participatory; and addressing the resulting implications on the management of core processes and activities. Additionally, the governance of ICT use in governments and the regulatory environment concerning these new (potentially disruptive) areas require action. For example, there is a need for strategic public sector investments in digital technologies and management of data value chains (to spur data-driven public sectors) that deliver improved policy outcomes in specific areas. How to secure the alignment of strategic decisions on key projects and investments across policy sectors, in line with the central government’s objectives, is still a challenge for many countries, e.g. in the field of welfare services and social security.

47. Addressing the challenges mentioned above requires overcoming organisational and regulatory barriers to integration, sharing and horizontality of decisions and use of data and digital technologies across the public sector. These questions are at the core of the *Recommendation of the Council on Digital Government Strategies* [C(2014)88], which focuses on the changes and efforts needed in terms of governance and investments in digital technologies and data use. For example:

- **Public service delivery:** The digital revolution disrupts public service delivery in several ways. Not only do citizens expect to access services in a different way, but they increasingly expect to have services that are tailored to their needs and contexts, be accessible in a seamless environment, and to be engaged in their design. This calls for significant interagency coordination and shared resources, such as a common digital identity, enabling public institutions to have comprehensive view of the user’s digital interactions with the public sector, as well as a coherent policy framework for data sharing and re-use in the public sector.

- **New partnerships and ways of solving problems:** Government is no longer necessarily the provider of public services but acts increasingly as a convener that allows for the right solutions to a specific user's problem to emerge delivered by the provider best fit to do it. This enables new forms of collaboration with civil society and the private sector as well as within government to address complex social and economic problems.
- **Resource-sharing:** New digital trends enable a thorough re-engineering of how government works, enabling them to benefit from the effects of scale and network to share infrastructure and resources such as storage, data and processing capability in ways that were not possible before. This is however leading to complex trade-offs, such as balancing privacy and convenience.
- **Data governance:** The growing availability of data enables governments to make more informed and evidence-based decisions on public issues. However, creating a data-driven public sector requires the recognition of data as a strategic asset, the establishment of policies for enhanced access and use of public sector information, building on the *Recommendation of the Council on Enhanced Access and More Effective Use of Public Sector Information* [C(2008)36], and a framework for the whole public administration that helps reap the benefits of evidence-based decision-making and foresight.
- **Accountability:** Digitalisation is a key enabler for robust public expenditure oversight, allowing governments to ensure two-way controls and enhanced accountability of revenues and expenses. By improving data management and leveraging new data processing techniques, countries are trying to better tailor welfare benefits.

48. In particular, enhanced access and (re-)use of public sector information and open government data as well as new data analytics can benefit governments and citizens and contribute to good governance (e.g. by improving public expenditure oversight, service delivery and transparency, upping the fight against fraud and corruption, and by better tailoring welfare benefits) (OECD, 2016d; Ubaldi, 2013). For example, France is using *data mining* to identify and fight fraud in family allowances and social benefits. Many countries are also using digital technologies to detect and prevent *tax fraud and tax evasions*, helping them to better detect crimes, contributing to higher revenue recovery, and enabling synergies that can make tax compliance easier for business and tax administrations (OECD, 2017b). Several countries, among which France, Italy, Spain, the United Kingdom and the United States, have committed to publishing contracting data in open formats as a mechanism to strengthen the governance, transparency and accountability of public procurement (OECD, 2017c, forthcoming).

49. Beyond the many specific applications of digital technologies across different policy areas, the broader advantages of digital tools include potential improvements in policy design and service delivery (e.g. through better targeting the users' needs and preferences), better monitoring and evaluation, using digital tools to facilitate experimentation with new policies at a small scale before their broader implementation, and using digital technologies for policy implementation and reform. Some countries are moving rapidly in this direction - New Zealand and Denmark, for example, are bringing together a wide range of data to better underpin policy development. Similarly, the Mexican Ministry of Social Development is building a new system that crosses household, beneficiary and geographic data to support more accurate targeting of social services. By processing these data, the system may help government identify individuals who qualify for specific social services and have not yet used them as well as those that under-report income to receive assistance (OECD, 2016e).

Helping workers adapt

50. Previous major technological innovations such as the steam engine, electricity and the assembly line were economically and socially disruptive. They often resulted in substantial job losses in the short-term, even if these were more than offset in the long term by the creation of more productive and rewarding jobs, and improvements in living standards (Mokyr, Vickers and Ziebarth, 2015; OECD, 2016f).

51. Today, the digital transformation is already affecting workers. Some jobs are disappearing due to automation, and the skills that are needed are changing for many other jobs. In some cases, entire industries are being disrupted. Digitalisation is reducing demand for routine and manual tasks, while increasing demand for non-routine tasks and for problem-solving and interpersonal skills.

52. At the same time, OECD work suggests that so far, while leading to restructuring and reallocation, ICT has not led to an overall increase in technological unemployment (OECD, 2016g). This is because, if adopted successfully, i.e. if combined with organisational changes and good managerial practices (OECD, 2004), ICTs can contribute to increased productivity, which progressively translates into lower prices and/or new products, higher final demand and higher employment, thus compensating for the initial job displacement. Recent OECD work shows that technological innovation contributes to higher employment levels in both routine and non-routine jobs (Marcolin, Miroudot and Squicciarini, 2016).

53. However, most digital technologies require higher levels of skill than those they displace, implying a process of skill-biased technological change (SBTC). For example, in the United States, the employment share of workers in high-skill occupations increased by 11 percentage points from 26% in 1983 to 37% in 2012 (Tuzemen and Wills, 2013). However, a simple version of the SBTC hypothesis suggests that the share of low-skill jobs should have fallen. Instead, the employment share of low-skill occupations rose from 15% in 1983 to 18% in 2012 in the United States. This pattern has been mirrored in other countries and point to another possible link between technological change, productivity and employment – the ‘hollowing-out’ or job-polarisation hypothesis.

54. Developments in artificial intelligence, robotics, the IoT and Big Data, among other technological advancements may change the nature of the link between technology and employment. Some studies suggest that digitalisation makes it possible that, in the near future, a large proportion of tasks or even entire occupations currently carried out by workers could be performed by machines (Frey and Osborne, 2013). This has led to fears that computers and robots will replace some types of human labour, throwing workers into a “race against the machine” that many are bound to lose (Brynjolfsson and McAfee, 2011).

55. Those jobs relying on a high proportion of automatable tasks are at high risk of being substituted for by new technology, but only if these technologies are taken up by firms, or if firms that do not use the technologies exit. Computers and algorithms mainly substitute for “routine” tasks that can be easily codified, which are typically in middle-skilled jobs. “Non-routine” tasks, either at the top end (conceptual jobs) or at the bottom end (manual jobs) of the skill distribution may therefore remain in demand.

56. As the technology continues to evolve, this is a rapidly moving target, however, and the extent and permanence of hollowing-out remains controversial. Some authors (e.g. Frey and Osborne, 2013) suggest that a large share of occupations is already at risk of being automated. However, such estimates have been criticised on the basis that it is specific tasks rather than occupations that are at risk (Arntz, et al., 2016). Occupations are more likely to evolve – as many have for the past century – to accommodate the penetration of technology rather than face complete substitution (Bessen, 2015). Some studies have estimated that only 9% of jobs may be at a high risk of automation, but that another 25% of jobs could undergo significant change, with between 50% and 70% of the tasks at risk of automation (Arntz et al.,

2016). Workers with the skills to adapt to changes in workplace technologies are at less risk of being left behind. Also, with the productivity gains and adoption of technology, new direct and complementary jobs are likely to be created (Autor, 2015).

57. While the precise impact of the digital transformation remains to be seen, and digital technologies may sometimes mainly augment and complement human capabilities, it is clear that many workers will be displaced. They should be provided with active job search and adequate income support, to speed up job finding and reduce the cost of job loss. Interventions should come early in the unemployment spell, and be coupled with retraining and requalification so that displaced workers can take advantage of new job opportunities arising elsewhere in the economy.

58. Digitalisation is also changing the way work is organised (OECD, 2016h). The ‘platform’, ‘sharing’, or ‘collaborative’ economy, though still small in scale, is allowing businesses to access a larger pool of potential workers and suppliers, with workers increasingly engaged as independent contract workers. This has benefits for some workers, providing them with greater flexibility, and allowing people to earn additional income and access work, sometimes for the first time. At the same time, such jobs rely mostly on non-standard work arrangements (e.g. self-employment, temporary hiring and contract work). Even though the platform “sharing” economy is creating job opportunities for people who may have no access to regular jobs, it may also offer less promising employment trajectories and lower access to social protection or training opportunities. It could also limit worker’s access to union representation and wage setting mechanisms. Policy will need to ensure sufficient social and regulatory protection for all.

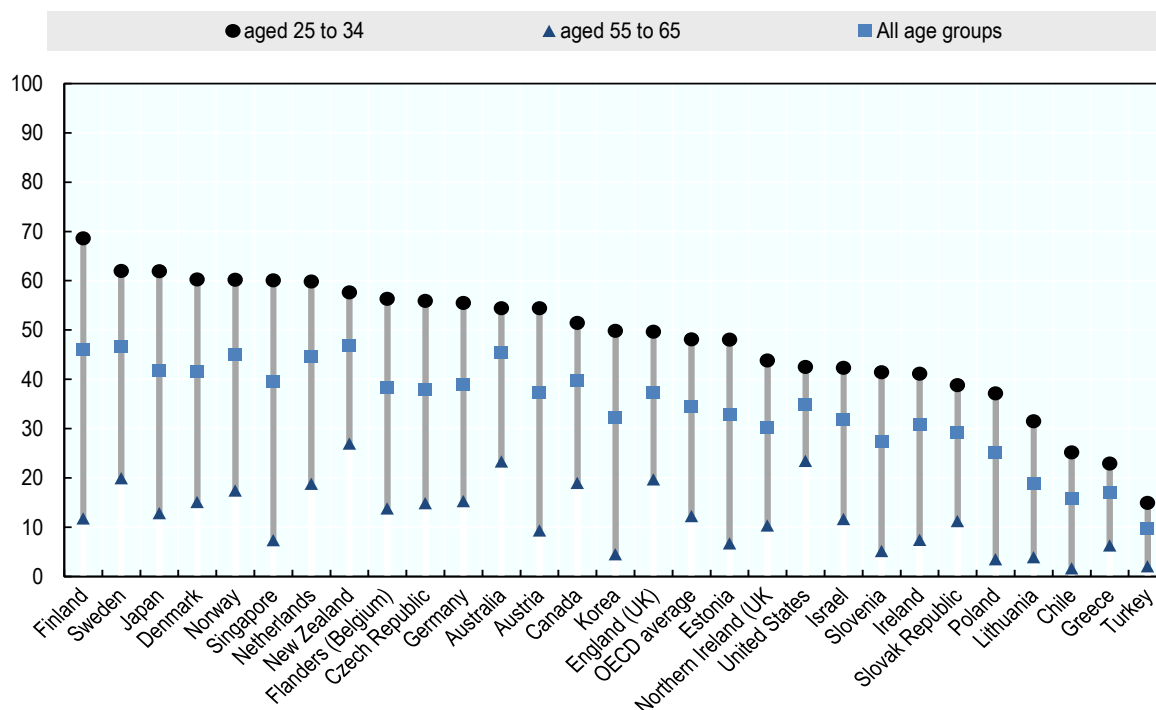
59. The challenge of the adjustment in the labour market will depend on the speed at which the digital transformation unfolds. Compared to earlier industrial revolutions, induced by steam and electrification, the development and international diffusion of digital technologies appears to be transpiring over a shorter time period, potentially complicating the adjustment process. However, it could take considerable time for new technologies, once invented, to diffuse throughout the economy and for their productivity effects to be fully realised. Moreover, the duration of this period is uncertain and depends on a wide range of economic, social and regulatory factors (McKinsey Global Institute, 2017). As discussed in the OECD work on the Next Production Revolution, the past has sometimes seen unrealistic expectations regarding timescales for the delivery and implementation of a number of key technologies. Better understanding and anticipating the coming developments will therefore be important.

Continuously assessing the skills needed for a digital world and adapting formal education and training systems to remain up-to-date

60. Independent of the size of the impact of digitalisation on jobs, it is clear that workers will need different skills, not just more skills (OECD, 2016i). Regardless of the precise number of jobs at risk of automation, continued hollowing-out will disrupt the labour market, leading to job losses in some areas and gains in others. Up-skilling will be part of the answer – the same policy priority as required to respond to skill-biased technological change. But workers will also need a different sort of skill-set. Data from the PIAAC Survey of Adult Skills show that, on average across the 22 countries that implemented the first Survey, 55% of workers lack basic problem-solving skills in technology-rich environments. This suggests weak prospects for these workers, but also for employers’ and for countries’ aiming to capitalise on the opportunities offered by a digital economy (OECD, 2013b). Younger people are better prepared for this environment than older people (Figure 6).

Figure 6. Younger people are better prepared for the digital working environment than older people

Share of 25-34 and 55-64 year-olds performing at Level 2 or 3 in Problem Solving in Technology-Rich Environments, 2012



Source: OECD (2015e), Survey of Adult Skills (PIAAC) (2015).

61. Addressing the challenges arising in an increasingly digital world will require changes to current employment and skills policies. Governments in collaboration with stakeholders must help ensure that the digital economy yields better quality jobs and that both employers and workers have the means to take advantage of new job opportunities. There are four key priorities for skills policies to facilitate take-up of these opportunities and promote inclusive growth:

- Ensuring that initial education equips all students with solid literacy, numeracy and problem-solving skills, as well as basic ICT skills and complementary socio-emotional skills, such as teamwork, flexibility and resilience. Many of these skills are also acquired outside of education and training institutions – for instance, in the workplace – emphasising the need to recognise skills acquired outside formal channels.
- Better assess and anticipate changing skill needs and foster more responsive education and trainings providers in order to adapt programmes and pathways offered and guide students towards choices that lead to good outcomes. Big data, e.g. from the Internet, can be harnessed to complement labour market information systems and monitor changing needs (OECD, 2016j).
- Improve the use of skills across different workplace setting and working arrangements so as to achieve higher productivity and greater competitiveness. Policy can also encourage the use of high performance work practices such as teamwork, work autonomy, training, flexible work hours, etc., within firms and across the economy, as well as fostering the skills needed to support these practices.

- Offer better incentives for individuals and firms to re-skill and up-skill. This also means using the possibilities of new technologies to adapt new job tasks to the skills sets of incumbent workers. At the same time, the diffusion of "on-demand" jobs on digital platforms puts increasing responsibility on individuals to manage their own skills development (OECD, 2016i). Low- and medium-skilled adults are the least likely to participate in training, even though they may face the greatest risk of job loss.

Enhancing trust and social acceptance

62. Trust is fundamental to the functioning of the digital economy; without it, individuals, firms and governments won't be able to use digital technologies, and an important source of potential growth and social progress will be left unexploited. Moreover, the growing dependence of critical infrastructures on digital technologies exposes the very functioning of society to digital security risks.

63. Digital security risk has traditionally been approached as a technical problem but the changing nature and scale of digital security incidents is driving countries to re-evaluate their strategies and policies. In recent years, many governments and stakeholders have emphasised the importance of considering digital security risk as a strategic economic issue for organisations which needs to be addressed at the highest level of corporate governance, as recommended by the *Recommendation of the Council on Digital Security Risk Management for Economic and Social Prosperity* [C(2015)115]. It should be integrated in economic decision making and existing enterprise and government risk management frameworks. This requires a culture of dialogue and co-operation among all stakeholders in organisations. Co-operation is also essential between government, private sector and civil society to foster trust in the digital environment, in particular for the development and implementation of effective national strategies.

64. In today's data-rich environment, new privacy challenges are also emerging. The growing number of entities, such as online retailers, platforms (especially ones that are consumer-facing), Internet Service Providers (ISPs), financial service providers (i.e. banks, credit card companies, etc.), and governments are increasingly collecting vast amounts of personal data. In addition, complementary information can be derived, by "mining" available data for patterns and correlations, many of which do not need to be personal data (Box 3). Advances in data analytics now make it possible to infer sensitive information from data which may appear trivial at first, such as past individual purchase behaviour or electricity consumption. The misuse of these insights can implicate the core values and principles which privacy protection seeks to promote, such as individual autonomy, equality and free speech, and this may have a broader impact on society as a whole. At the same time, it is important to recognize that digital technologies can also enhance privacy and security.

65. While protection by the law is essential, privacy in an increasingly data-driven economy would benefit from a multifaceted strategy, reflecting a whole-of-society vision, and supported at the highest levels of government, as called for in the Recommendation of the Council concerning Guidelines Governing the Protection of Privacy and Trans-border Flows of Personal Data (*Privacy Guidelines*) [C(80)58/FINAL, as amended]. Such strategies need to strike the right balance between the social and economic benefits of enhanced reuse and sharing of data and analytics, and individuals' and organisations' legitimate concerns about such openness, including the protection of privacy and intellectual property rights. Coordinated privacy strategies at the national level would enhance privacy protection in an increasingly data-driven environment.

66. Consumers are increasingly engaging in the digital environment where a large variety of products are available at competitive prices, within and across borders. Consumer engagement online through, for example, product ratings and reviews shapes business reputations, informs other consumers, driving innovation and competition. Continued growth may be fuelled by the emergence of new technology-driven

products and markets, such as 3D printing, the IoT, and “collaborative” digital platforms (or “peer platforms”), which enable consumers to design, produce and sell products themselves.

Box 3. Data - the new resource of the digital economy

More data are being generated every week than in the last millennium. Accelerating digitalisation is leading to growing volumes of data – the equivalent of around 50 000 years of DVD-quality video every day, a figure set to rise as smart devices and the IoT become pervasive – with important implications for economy and society.

On the positive side, data hold the promise of significantly accelerating research and the development of new products, processes, organisational methods and markets – a phenomenon known as data-driven innovation (DDI). This will result in greater productivity across the economy, as available evidence suggests that firms using DDI have raised productivity faster than non-users. DDI can and is already helping address social and global challenges, including climate change and natural disasters, health and ageing populations, water, food and energy security, urbanisation, and issues of public governance.

But the growing role of data comes with considerable challenges and accentuates some of the pressing issues related to digitalisation, like questions of privacy and security. And new concerns are emerging, e.g. around automated decision making, data-driven discrimination, and a “data divide,” based on who owns, collects and analyses the data.

Seizing the benefits from DDI requires government action. Policies are needed to encourage investments in data, promote data sharing and reuse, and reduce barriers to cross-border data flows that could disrupt global value chains, reducing the potential for new market opportunities. They also need to better distinguish different types of data - for example, personal data raise quite different questions than those derived from scientific experiments. There is also a need to find better ways of dealing with the global nature of data flows, understanding that it underpins trade, and the different conceptions of privacy among countries.

Recent OECD work is helping establish good practices and provide guidance to governments on how to manage sensitive data. For example, the recent Recommendation of the Council on Health Data Governance [C(2016)76] calls upon Adherents to develop and implement national health data governance frameworks according to twelve high level principles, setting the conditions for greater harmonisation so that more countries are able to benefit from statistical and research uses of data in which there is a public interest, and from international comparisons.

67. Yet, e-commerce growth will only be possible if consumer trust in a dynamic but complex market is strengthened. In 2014, 75% of consumers accessed the Internet across the OECD, but only one out of two made an online purchase; this untapped potential is even more pronounced across borders. Concerns include the growing complexity of online transactions and related terms and conditions, as well as the uncertainty about where consumers should turn when they suffer detriment as a result of misleading or fraudulent business practices, or unsafe products. They also relate to the wealth of data that consumers' online activities generate, which, while enabling businesses to sketch rich consumer profiles, also brings risks. Policy makers need to stay current with the evolving challenges. The 2016 revisions to the *Recommendation of the Council on Consumer Protection in E-commerce* [C(2016)13] provide a blueprint for fair business practices, information disclosures, payment protections, unsafe products, dispute resolution, enforcement and education. Continued efforts are however needed to assess how to apply consumer protection, product safety and liability frameworks to transactions involving new products and non-traditional actors, and which reflect the growing complexity of online interactions. This can benefit from co-operation among consumer protection and other relevant authorities within and among countries.

68. Beyond these questions, the broader social acceptance of new technologies is also important (OECD, 2017a). In the past, public resistance to novel technologies has emerged, sometimes as the result of distrust in government and regulatory authorities. In this context, it is important that policymakers and

institutions voice realistic expectations about new technologies. Moreover, science advice should be demonstrated to be unbiased and trustworthy. At the same time, broad public engagement about the development of new technologies can help to build understanding across economy and society.

Using the digital transformation to foster well-being

69. Beyond its economic impacts, the digital transformation also has important impacts on broader well-being and can support more inclusive growth.⁵ For example, digital technologies can promote social inclusion by creating better access to quality education, offer new opportunities for skills development, enhance access to health care, or improve access to free and low-cost information, knowledge and data. For example, the Danish OnlineTele is a web-based portal that offers a range of services to vulnerable elderly people, including video communications (one-on-one, one-to-many, many-to-many) that can be used to deliver remote care. Mobile telephony in particular has been used intensively in a number of inclusive innovation initiatives that aim at improving the welfare of lower-income and excluded groups in developing countries (OECD, 2015f). A famous example includes mPesa, which has provided millions of Kenyans with access to basic banking services.

70. More broadly, new digital platforms allow consumers to negotiate better prices for products (as well as identify better quality products). They also facilitate access to key goods and services, e.g. mobility and accommodation, sometimes avoiding consumers from making costly purchases. Digital technologies can also be a significant driver of improved services to vulnerable groups in society (Mickoleit, 2014; OECD/ITU, 2011). For example, opportunities to file taxes and apply for public support online have made application procedures more convenient, benefitting in particular individuals located in remote areas and lower-income and excluded groups who rely on public support. Social media also allows governments to reach specific groups with information most relevant to their needs, offering the potential for better citizen-government communication. Moreover, it helps disadvantaged groups connect and cooperate.

71. But while digital technologies can provide important benefits for broader wellbeing, they cannot fully overcome some of the inherent barriers that prevent certain disadvantaged group from benefiting from these technologies. For example, even though it enhances access to education, there is little evidence that more open education lowers existing inequalities in education opportunities. And older people - that could benefit most from applications in the health area - are less likely to use digital tools than younger ones.

72. The digital transformation also raises some broader challenges. For example, digital technologies like block chain could greatly enhance the ability of a government to manage its payments while reducing the potential for fraud. But they could also enhance the ability to undertake illegal financial transactions. Criminal and terrorist activities have been aided by digital tools that allow for secure messaging alongside broader recruitment possibilities. Further, the 'dark net' is extensively used by criminal organisations for financial crimes and illegal trade. Bitcoin, while it has legal use, can be used to avoid government oversight (e.g. in illegal arms and drug trade).

73. There is also growing recognition of the risks associated with the digital revolution for the role of the democratic nation-state, the social fabric of nations and for individual citizens and their relationship to each other. These risks are compounded by the speed and pervasiveness of these technologies that may sometimes stretch beyond the capacities of society to adapt. The digital transformation can be highly beneficial for wellbeing but the risks of adverse outcomes are real and should not be ignored by policy makers. The challenge is how to maximise the advantages while minimising the negative impacts.

⁵ A broader discussion of policies for inclusive growth is contained in a separate paper for the Ministerial Council Meeting [see C/MIN(2017)3].

Policy coherence and strategy development

74. The digital transformation affects all corners of the economy, society, and government activities. To realise its full benefits, governments need to reach across traditional policy silos and across different levels of government and develop a whole-of-government approach to policymaking. This means more co-ordination when making decisions and implementing policy measures across ministries and levels of government as well as actively involving all key stakeholders, including the business community, trade-unions, civil society and Internet technical community, in the policymaking process as well as implementation and monitoring. By identifying the key policy areas affected by the digital transformation, it will be easier to link up the relevant ministries and government bodies that need to be connected and co-ordinated to ensure that all policies are mutually reinforcing and aligned with one coherent and strategic national digital agenda. The OECD's project on Going Digital intends to support governments in this goal.

Conclusions and Next Steps

75. This paper is intended to provide Ministers with a first and preliminary set of policy conclusions that are emerging from OECD work on the digital transformation. Further work will deepen the analysis of key policy issues, and provide more concrete policy recommendations and a roadmap for the OECD to better measure the digital transformation. Going forward, the Project will deliver a range of stand-alone reports and policy notes, a report to the 2018 MCM, and a final synthesis report at the end of the project. It will also go "beyond the book" and involve roundtables and national discussions to help develop: i) national digital strategies; ii) one or more draft Recommendations of the Council related to the digital transformation; and iii) a Going Digital toolkit, including a final integrated policy framework that would provide countries with practical examples and good practices.

76. Two other aspects of the digital transformation are worth mentioning at this stage. First, the digital transformation will go on for some time and thus continue to disrupt the economy, society and government policy. Better anticipating trends through strategic foresight could assist policy across all policy domains. Foresight processes can also bring benefits in themselves, such as strengthened stakeholder networks. Long-term and pro-active thinking is also essential to help respond to the ongoing transformation. Leaders in business, unions, civil society and government must be ready to examine the policy implications of the transformation and prepare for developments beyond typical election cycles. This also requires constant reflection on how policy priorities might need to evolve, for instance as a consequence of technological change itself.

77. Second, designing better policies for a digital economy and society not only requires better knowledge about the technological changes underway, but also further efforts to improve measurement, evidence and analysis, e.g. as regards growth and productivity. New areas, such as trust, data flows, the IoT and artificial intelligence, are at the next frontier for measurement. All countries need to work together to fill the data gaps and in doing so enable better benchmarking, evidence building, policy development, and the identification and prioritisation of policy review and action. At the same time, new opportunities are emerging thanks to digital technologies, e.g. through the use of big data analytics and non-official data sources. Statistics could be enriched with timelier, more granular and less costly data.

ANNEX - THE GOING DIGITAL PROJECT

The Going Digital (GD) Horizontal Project was officially launched at the start of 2017. It originated as a vision from the four Chairs of STI policy Committees in the autumn of 2015 as they reflected on the 2017-18 PWB, and gained further support and momentum from a range of sectoral Ministerial meetings, notably on science and technology policy (October 2015), employment (January 2016), skills (June 2016) and on the digital economy (June 2016), as well as the Ministerial Council Meeting 2016 and the corresponding statement that "encourage[s] the OECD to develop a horizontal policy strategy on digitalisation, its opportunities and challenges." Following the 2016 MCM call, the initiative was further developed and included in the PWB 2017-18 as a Horizontal Project.

The project aims to help policymakers better understand the digital transformation that is taking place and develop tools to create a policy environment that enables their economies and societies prosper in a world that is increasingly digital and data-driven. To achieve these objectives, the project leverages the unique capacity of the OECD to bring together a wide range of policy communities to collectively identify the opportunities and address the challenges our economies and societies face in a digital world. The Going Digital project will support discussions on the digital transformation at the highest levels – national, regional and international.

The project builds on three main pillars, each designed to break new ground in our understanding of the digital transformation and its effects on our economies and societies:

- **Pillar 1:** An integrated policy framework for making the digital transformation work for growth and well-being and other activities that require collaboration across all policy areas, including insights into some of the new technological and other drivers of the digital transformation and what this implied for policy. This will yield a new narrative, supported by indicators, that provides a whole-of-government view of the digital transformation and how policies may need to adjust to make the most of this for the economy and society.
- **Pillar 2:** Relevant analysis of the digital transformation in specific policy areas (e.g. tax, trade, competition, etc.) and in the broader economy as outlined in the respective work programme of each OECD Committee for 2017-18. A mix of qualitative analysis and quantitative indicators by domain experts will show the extent, nature, benefits and challenges of the digital transformation in each policy area and in the broader economy.
- **Pillar 3:** A set of modules focusing on key cross-cutting issues. This work will involve a “deep dive” into specific cross-cutting to gain key insights into some of the big challenges we face in the digital era and that are at the intersection of more than one policy area. Key modules include jobs and skills in the digital economy, the implications of the digital transformation for productivity, competition and market structure, measuring the digital transformation, and making the digital transformation work for society and well-being.

Going forward, the Project will deliver a range of stand-alone reports and policy notes, a report to the 2018 MCM, and a final synthesis report in Q4 2018 or Q1 2019. It will also go "beyond the book" and involve roundtables and national discussions to help develop: i) national digital strategies; ii) one or more OECD Council Recommendations related to the digital transformation; and iii) a Going Digital toolkit, including an integrated policy framework, practical examples and good practices.

For more information: <http://oe.cd/goingdigital>

REFERENCES

- Adalet McGowan, M., D. Andrews and V. Millot (2017), “The Walking Dead?: Zombie Firms and Productivity Performance in OECD Countries”, *OECD Economics Department Working Papers*, No. 1372, OECD Publishing, Paris. <http://dx.doi.org/10.1787/180d80ad-en>
- Ahmad, N. and P. Schreyer (2016), “Measuring GDP in a Digitalised Economy”, *OECD Statistics Working Papers*, 2016/07, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5j1wqd81d09r-en>.
- Arntz, M., T. Gregory and U. Zierahn (2016), “The Risk of Automation for Jobs in OECD countries: A Comparative Analysis”, *OECD Social, Employment and Migration Working Papers*, No. 189, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5j1z9h56dvq7-en>
- Autor, D. (2015), “Why are there still so many Jobs? The History and Future of Workplace Automation”, *Journal of Economic Perspectives*, Vol. 29, No. 3, pp. 7-30.
- Autor, D. and David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen (2017) “Concentrating on the Fall of the Labor Share”, *NBER Working Paper* No. 23108 January, www.nber.org/papers/w23108#fromrss
- Berlingieri, G., P. Blanchenay, and C. Criscuolo (2017), "The Great Divergence(s)", *Science, Technology and Industry Policy Papers*, 2017, OECD Publishing, Paris, forthcoming.
- Bessen, J. (2015), *Learning by Doing: The Real Connection between Innovation, Wages, and Wealth*, New Haven: Yale University Press.
- Brynjolfsson, E. and A. McAfee (2011), *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies*, W.W. Norton & Company, New York.
- DeStefano, Timothy, Koen de Backer and Laurent Moussiégt (2017) “Determinants of Digital Technology Use by Companies” *OECD Science, Technology and Industry Policy Papers*.
- Frey, C. and M. Osborne (2013), “The Future of Employment: How Susceptible are Jobs to Computerisation?” *Oxford Martin School Working Paper*.
- Marcolin, L., S. Miroudot and M. Squicciarini (2016), “Routine Jobs, Employment and Technological Innovation in Global Value Chains”, *OECD Science, Technology and Industry Working Papers*, No. 2016/01, OECD Publishing.
- McKinsey Global Institute (2017), *A Future that Works: Automation, Employment and Productivity*, McKinsey, San Francisco.
- Mickoleit, A. (2014), “Social Media Use by Governments: A Policy Primer to Discuss Trends, Identify Policy Opportunities and Guide Decision Makers”, *OECD Working Papers on Public Governance*, No. 26, OECD Publishing. <http://dx.doi.org/10.1787/5jxrcmgm0s-en>
- Mokyr, J., C. Vickers and N. Ziebarth (2015), “The History of Technological Anxiety and the Future of Economic Growth: Is this Time Different?”, *Journal of Economic Perspectives*, Vol. 29, No. 3, pp. 31-50.

- OECD (2004), *The Economic Impacts of ICT - Measurement, Evidence and Implications*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264026780-en>.
- OECD (2013a), *Supporting Investment in Knowledge Capital, Growth and Innovation*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264193307-en>
- OECD (2013b), *OECD Skills Outlook 2013: First Results from the Survey of Adult Skills*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264204256-en>.
- OECD (2015a), *The Future of Productivity*, OECD Publishing, Paris.
- OECD (2015b), *Data-Driven Innovation – Big Data for Growth and Wellbeing*, OECD Publishing, Paris.
- OECD (2015c), *Digital Economy Outlook*, OECD Publishing, Paris.
- OECD (2015d), *Addressing the Tax Challenges of the Digital Economy*, OECD Publishing, Paris.
- OECD (2015e), *Adults, Computers and Problem Solving: What's the Problem?* OECD Publishing, Paris..
- OECD (2015f), *Innovation for Inclusive Growth*, OECD Publishing, Paris.
- OECD (2016a), *Science, Technology and Industry Outlook 2016*, OECD Publishing, Paris.
- OECD (2016b), “The Internet of Things: Seizing the Benefits and Addressing the Challenges”, *OECD Digital Economy Papers*, No. 252, OECD Publishing, Paris.
- OECD (2016c), *The Productivity-Inclusiveness Nexus*, OECD Publishing, Paris.
- OECD (2016d) *Digital Government Strategies for Transforming Public Services in the Welfare Areas*, OECD Publishing, Paris.
- OECD (2016e), *Open Government Data Review of Mexico: Data Reuse for Public Sector Impact and Innovation*, OECD Digital Government Studies, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264259270-en>
- OECD (2016f), “Automation and Independent Work in a Digital Economy”, *Policy Brief on the Future of Work*, OECD Publishing, Paris.
- OECD (2016g), "ICTs and Jobs: Complements or Substitutes?", *OECD Digital Economy Papers*, No. 259, OECD Publishing, Paris.
- OECD (2016h), "New Markets and New Jobs", *OECD Digital Economy Papers*, No. 255, OECD Publishing, Paris. <http://dx.doi.org/10.1787/5jlwt496h371-en>.
- OECD (2016i), “Skills for a Digital World”, *Policy Brief on the Future of Work*, OECD Publishing, Paris.
- OECD (2016j), *Getting Skills Right: Anticipating and Responding to Changing Skill Needs*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264252073-en>.
- OECD (2017a), *Enabling the Next Production Revolution - A Summary of Main Messages and Policy Conclusions*, Meeting at the Council at Ministerial Level, OECD.

- OECD (2017b), "Technology Solutions - Tools to Tackle Tax Evasion and Tax Fraud", [CTPA/CFA\(2017\)8/REV1](#), OECD Publishing, Paris.
- OECD (2017c), *G20 Compendium on the use of open data for anti-corruption*. G20 Anti-corruption Working Group. OECD Publishing, Paris, forthcoming.
- OECD/International Telecommunication Union (2011), *M-Government: Mobile Technologies for Responsive Governments and Connected Societies*, OECD Publishing. <http://dx.doi.org/10.1787/9789264118706-en>
- Tuzemen, D. and J. Willis, "The Vanishing Middle: Job Polarization and Workers' Response to the Decline in Middle-Skill Jobs", *Economic Review - Federal Reserve Bank of Kansas City*, Kansas City (First Quarter 2013): 5-32.
- Ubaldi, B. (2013), "*Open Government Data: Towards Empirical Analysis of Open Government Data Initiatives*", OECD Working Papers on Public Governance, No. 22, OECD Publishing. <http://dx.doi.org/10.1787/5k46bj4f03s7-en>
- Van Ark, B., et al, (2016), "Navigating the New Digital Economy: Driving Digital Growth and Productivity from Installation to Deployment", Conference Board, New York.

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