Going Digital: Shaping Policies, Improving Lives

Digital technologies and data are transformational. People, firms and governments live, interact, work and produce differently than in the past, and these changes are accelerating rapidly. How can we realise the immense promises of digital technologies and data for growth and well-being in a fast evolving world? This report charts the road ahead. It identifies seven policy dimensions that allow governments – together with citizens, firms and stakeholders – to shape digital transformation to improve lives. It also highlights key opportunities, challenges and policies related to each dimension, offers new insights, evidence and analysis, and provides recommendations for better policies in the digital age.


This publication is a contribution to the OECD Going Digital project which aims to provide policymakers with the tools they need to help their economies and societies prosper in an increasingly digital and data-driven world.

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Summary
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Digital technologies and data are transformational. People, firms and governments live, interact, work and produce differently than in the past, and these changes are accelerating rapidly. How can we realise the immense promises of digital technologies and data for growth and well-being in a fast evolving world? *Going Digital: Shaping Policies, Improving Lives* charts the road ahead. It identifies seven policy dimensions that allow governments – together with citizens, firms and stakeholders – to shape digital transformation to improve lives (Figure 1). Each of these dimensions brings together multiple interrelated policy areas that require effective co-ordination to realise the promises of digital transformation. The report also highlights key opportunities and challenges related to each dimension, offers new insights, evidence and analysis, and provides recommendations for better policies in the digital age.

**Figure 1. Going Digital Integrated Policy Framework**

- **Key cross-cutting recommendations**
  - Shape digital transformation and improve lives using the Going Digital Integrated Policy Framework.
  - Bridge divides to allow people and firms to take advantage of digital opportunities. Ensure access to high-quality and affordable broadband for all and close the digital gender, age, income and education gaps.
  - Empower people with the skills needed to succeed in a digital economy and society. Get ready for a massive training challenge, fundamentally rethink education systems, foster foundational skills and life-long learning, address concerns around emerging forms of work, and improve social protection to ensure that no one is left behind.
  - Enhance access to data to drive digital innovation among people, firms and governments, while taking into account legitimate national, private and security interests; promote interoperable privacy regimes to facilitate cross-border data flows.
  - Embrace a global digital agenda that addresses new and complex issues, including competition dynamics; privacy; data and cross-border data flows; inequalities and their relationship with digital transformation; trust in government; democracy in the digital age; the future of the firm; and better measurement of digital transformation.
Enhancing access to communications infrastructures, services and data

Demands on networks are growing as more people, things and activities go online. By 2022, there will be three connected devices per person around the globe. In December 2017, mobile broadband subscriptions rose above one subscription per inhabitant for the first time (Figure 2), and over the course of 2017 mobile data usage more than doubled in many countries. The Internet of Things is on the rise, with machine-to-machine subscriptions having almost doubled across the OECD over 2014-17.

Even as increasingly more connections are wireless, the speed and rate of download of these connections ultimately depends on the capacity of fixed networks, which take on the “heavy lifting” of the increasing demands on wireless networks. In 2016, about 60% of data uploaded and downloaded on devices such as smartphones used fixed networks through Wi-Fi or small, low-power cellular base stations. However, in many countries, networks may not be ready to support projected demand; currently, there are only 7 fibre subscriptions per 100 people across the OECD. In particular, rural areas lag behind urban and other areas in access to fast fixed broadband. In addition, access to data increasingly underpins digital transformation.

Figure 2. There are more mobile broadband subscriptions than people in the OECD

Mobile broadband subscriptions, per 100 inhabitants, by package type, December 2017

Per 100 inhabitants

Data and voice
Data only
Breakdown not available
All technologies, 2012

Note: See Statlink for figure notes.


Enhancing access: What matters most for policy?

- Promote competition to drive investment in communications infrastructures and services. Depending on local market conditions, the presence of more mobile network operators (e.g. four rather than three) can result in more competitive and innovative services, and passive infrastructure sharing and co-investment can help extend coverage.
- Ensure technical enablers are in place, such as Internet exchange points, efficient allocation of spectrum, and new generation Internet protocol addresses. Reduce administrative barriers to investment such as burdensome licensing requirements and complex rights of way.
- Boost connectivity in rural and remote areas, for example by investing directly in high-speed fixed networks or incentivising private investment, including by competitive tendering, tax exemptions, low interest loans or lower spectrum fees.
- Enhance access to and sharing of data, while balancing its benefits with the risks, taking into account legitimate national, private and security interests, for example through contractual agreements, restricted data sharing arrangements, data portability, and open government data.
Increasing effective use of digital technologies and data

Most people and organisations use digital tools, but often far from their full potential. While 72% of individuals use the Internet for email, less than 60% visit or interact with public authorities’ websites and only 9% take online courses. Nearly all firms are connected, but only 11% of small firms perform big data analysis compared to 33% of large firms (Figure 3). Skills are key to closing the gap in sophisticated Internet use, including of digital government services, and wider diffusion of advanced digital tools in firms. However, only 31% of adults have sufficient problem-solving skills to thrive in a digital world. In addition, mistrust remains a barrier to use: security concerns hold back around 15% of EU citizens from Internet banking and ordering goods or services online.

Figure 3. Large potential remains for diffusion of digital tools among firms, especially small and medium-sized enterprises

Diffusion of selected digital tools among firms, by firm size, as a percentage of all firms, 2018

Note: See Statlink for figure notes.


Increasing effective use: What matters most for policy?

- Close the usage gap between those with high versus low education levels and empower everyone with a mix of skills to thrive and trust in a digital world. To do so, it is important to review education and training systems and better exploit the possibilities of digital learning.

- Boost diffusion of digital tools to drive productivity growth in firms, and small and medium-sized enterprises in particular, by promoting investment in digital technologies and intangible assets (e.g. patents, software) and fostering business dynamism and structural change that encourages adoption.

- Shift from an e-government to a holistic and user-driven digital government approach, while further improving online public services and ensuring coherent use of digital technologies and data across all parts and levels of government.

- Address mistrust to increase online engagement by raising awareness and empowering people and businesses to better manage digital risks.
Unleashing data-driven and digital innovation

Data-driven and digital innovation are on the rise. In the first half of 2018, artificial intelligence start-ups received 12% of private equity investment worldwide and the share is increasing in all major economies. The VC industry appears to evolve quickly – the People’s Republic of China (hereafter “China”), for example, went from having almost no venture capital investments in AI in 2015 to being the second largest recipient in 2017. Not all countries innovate in the same way or to the same extent: over 2013-16, about 60% of China’s patents were in information and communications technologies (ICTs) compared to about 33% of OECD countries’ patents.

The private sector contributes the lion’s share of research and development (R&D), a key driver of digital innovation. R&D spending by business represented almost three-quarters of all R&D expenditure in 2016, or 1.6% of GDP on average across the OECD, with information industries contributing about one third (Figure 4). However, in 2017 government spending on R&D across the OECD was 8% below the levels in 2009 in real terms. Digital-intensive sectors like the ICT sector, which have higher shares of young firms than other sectors in most OECD countries, are particularly dynamic and innovative.

Figure 4. R&D, especially in information industries, is a key driver of digital innovation

Business R&D expenditure, total and information industries, as a percentage of GDP, 2016

Note: See Statlink for figure notes.

Source: See StatLink [https://doi.org/10.1787/888933915126].

Unleashing innovation: What matters most for policy?

- Boost entrepreneurship by reducing regulatory burdens for start-ups and facilitating access to finance for new and young firms through a mix of venture capital, debt and equity financing, and digital financing solutions such as platform-based lending.
- Re-evaluate regulations that may not be fit for the digital age, such as those that require a physical presence or minimum scale, or seek to address information asymmetries.
- Incentivise investment in basic R&D and intangible assets, including skills, organisational capital, data, software and patents, such as through R&D tax credits and intellectual property systems that are well-suited to the digital age.
- Foster knowledge diffusion through open innovation and open science initiatives, and promote open government data, for example through “open by default” policies, to stimulate innovation across the economy.
- Encourage policy experimentation and new business models across sectors, including through agile regulation and flexible application or enforcement of regulation (e.g. regulatory “sandboxes”), while protecting consumers.
Ensuring good jobs for all

Labour markets and the world of work are transforming. An estimated 14% of jobs across the OECD face a high likelihood of automation and another 32% are likely to experience significant change over the next 10 to 20 years. However, so far concerns about massive technological unemployment have not materialised, employment rates are at a record high in many countries, and digital-intensive sectors contribute to job creation. Between 2006 and 2016, total employment in the OECD grew by 6.9%, a net gain of about 38 million jobs, of which highly digital-intensive sectors contributed four out of ten, or 16 million, jobs (Figure 5). Emerging forms of work arising in tandem, such as “gig work” in platform markets, still represent only a very small share of overall employment.

Figure 5. Digital-intensive sectors contribute to job creation

Contributions to changes in total employment, by digital intensity of sectors, 2006-16

Note: See StatLink for figure notes.


Over the last decade, demand for cognitive skills such as written and oral expression, numeracy, reasoning and complex problem solving has increased, while demand for routine and physical abilities decreased significantly. Some skills are particularly valued in digital work environments, such as science, technology, engineering and mathematics skills as well as self-organisation, management and communication skills. However, the proportion of graduates in ICT, science, mathematics, engineering, and creative fields of study vary considerably across countries, from over 40% to 20% or less (Figure 6).

Figure 6. Key fields of study to prepare people for a digital world of work

Tertiary graduates, by field of education, as a percentage of all tertiary graduates, 2016

Note: See StatLink for figure notes.

Source: See StatLink https://doi.org/10.1787/888933915221.
High-skilled workers tend to benefit from technological change because their skills are often transferable to other jobs or more likely to complement technology. In turn, low-skilled workers often face greater urgency to up-skill or re-skill because their jobs are more likely to be affected by automation, as more routine-intensive occupations frequently require lower skills. Transitions into occupations at low or medium likelihood of automation are possible for all workers, but not necessarily acceptable in that some transitions may require people to accept wage cuts and/or jobs that are below their skill set.

While low-skilled workers tend to be most in need of training, only 40% of them currently receive firm-based training compared to 73% of high-skilled workers. Training low-skilled workers not only fosters the diffusion of digital technologies in firms and, in turn, productivity, but also tends to be less costly than re-training high-skilled workers, when taking into account the opportunity cost of training.

Not all workers who transition into new occupations, enter the labour market for the first time, or re-enter after an unemployment spell, will necessarily find a new job in the short-term. Adequate social protection is thus crucial to enable a successful and fair transition for all, including for displaced workers. Despite social protection’s essential role in ensuring that no one is left behind, average spending on training for the unemployed and workers at risk of involuntary unemployment across the OECD is only 0.13% of GDP.

<table>
<thead>
<tr>
<th>Ensuring good jobs: What matters most for policy?</th>
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<tbody>
<tr>
<td>• Promote successful and fair transitions from declining to expanding jobs by striking a balance between flexibility and mobility on the one hand, including through wage incentives for workers to move from low- to high-productivity firms, and job stability on the other, including through social dialogue.</td>
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<td>• Review labour market policies and institutions to ease firms’ adjustment of their workforce and to facilitate job-to-job transitions for workers, while providing adequate protection, through better transferability of skills, portability of benefits, and effective employment services.</td>
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<tr>
<td>• Ensure people have the mix of skills needed to succeed in technology-rich work environments, notably sound cognitive skills, ICT skills, complementary skills, specialist skills and the ability to cope with change and keep learning, including when out of work.</td>
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<td>• Get ready for a massive training challenge and review education systems. Improve the accessibility, quality and equity of education for young people and of training for adults throughout their working life, including through incentives for training of those most in need and through better use of digital technologies for learning.</td>
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<td>• Address barriers to adult learning, e.g. through policies supporting informed learning choices, promoting adult learning and using distance learning, and strengthening financing of life-long learning as well as systems of skills validation.</td>
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<td>• Address concerns around emerging forms of work and ensure good outcomes for all workers by applying and, where needed, reviewing and extending labour market regulation, and strengthening workers’ voices. Reduce the risk of arbitrage between different forms of employment and work by ensuring neutrality of regulation, tax systems and benefit schemes.</td>
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<tr>
<td>• Improve social protection to ensure nobody is left behind. Strengthen active labour market programmes to support displaced workers and design effective income support schemes to provide income security without undermining work incentives.</td>
</tr>
<tr>
<td>• Co-ordinate among education and training institutions, employers, and social partners to make education and training more responsive to changing needs and to better target those who need learning opportunities the most.</td>
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Promoting social prosperity and inclusion

Societies are going digital too, as digital technologies and data empower people by increasing access to information and enabling new ways of engagement. On average, 12% of people post civic or political opinions online, ranging from 4% to 24% across the OECD. However, digital divides persist along a range of dimensions. For example, 32% of 55-65 year-olds have no computer experience or have failed core ICT tests, compared with 5% of 16-24 year-olds, and the share of young students who perform well in foundational skills for life in a digital society, like science, numeracy and literacy, varies considerably across countries. Moreover, less than half of young women compared to young men are able to program (Figure 7).

Societal impacts of digital technologies are complex and involve both opportunities and risks. On the one hand, over half of people in the OECD use social networking to increase personal connections, and flexible working arrangements can help reconcile working and family schedules. On the other hand, about 9% of 15 year-olds say they have been cyberbullied, and workers who frequently use a computer are more likely to experience worries about work at home than those who do not.

Figure 7. More young men than women can program

Share of 16-24 year-olds who can program, by gender, as a percentage of all Internet users, 2017

Promoting social prosperity: What matters most for policy?

- Reduce digital divides and include everyone in a digital society, notably women, the elderly and low-income individuals, including through social policies that support mobility and redistribution.
- Promote foundational skills for all, including by offering incentives for and easing access to adult learning and improving the recognition of skills acquired after initial education.
- Harness the potential of digital technologies and data to address collective challenges, for example environmental protection and health care, by promoting energy efficiency and reducing health care costs with mobile health technologies.
- Boost civic engagement through digital government strategies and involve all stakeholders, including the technical community, the business community, trade unions and civil society, to help understand and address societal issues, including risks like cyberbullying and disinformation.
Strengthening trust in the digital age

Trust fundamentally underpins digital transformation and needs to be strengthened. Almost 30% of Internet users do not provide personal information to social networks because of security or privacy concerns. Payment security and privacy concerns persist for almost 25% of Internet users, with more than half reporting such concerns in Portugal, Finland, Switzerland and Turkey (Figure 8). Transparency on the purposes and uses of personal data collections and enhancing users’ access and control over their data are particularly relevant to trust in the digital age. Consumer protection concerns about receiving goods, returning goods, complaint or redress remain a barrier to buying online for 16% of EU citizens. Moreover, only 17% of peer platform (e.g. home-sharing) users read the terms and conditions in full, suggesting that more effective measures are needed to protect consumers online.

Figure 8. Payment security and privacy concerns remain prevalent in many countries

*Individuals who did not buy online for payment security or privacy concerns, as a percentage of Internet users who ordered goods or services over the Internet more than a year ago or who never did, 2017*

*Note:* See Statlink for figure notes.

*Source:* See StatLink [https://doi.org/10.1787/888933914917].

Strengthening trust: What matters most for policy?

- Use risk management as a framework to develop policies to increase trust, including to assess and manage risks related to digital technologies, data and cross-border flows. Ensure that digital security risk is a strategic priority for individuals, firms – small and medium-sized enterprises in particular – and governments, not only a technical question, and that everyone takes responsibility for managing digital risk.

- Develop and implement a national privacy strategy with a whole-of-society perspective supported at the highest level of government. Encourage interoperability of privacy frameworks across jurisdictions to enable the free flow of personal data, increase transparency on the purpose and use of personal data collections, and enhance users’ access and control over their data, including through “privacy by design”.

- Support digital consumers who face challenges related to online information disclosure, misleading and unfair commercial practices, confirmation and payment, fraud and identity theft, product safety, and dispute resolution and redress, including in the context of connected devices where the offline and online worlds converge.
Fostering market openness in digital business environments

Digital technologies and data transform how firms compete, trade and invest, leading to greater competition in many markets, but also tilting others towards greater concentration, market power and dominance. Cross-border acquisitions of digital-intensive firms grew 20 percentage points more than those in other sectors over 2007-15. Firms in highly digital-intensive sectors also enjoyed a 55% higher mark-up – the wedge between the price a firm charges for its output and the cost the firm incurs to produce one extra unit of output – than other firms. In terms of trade, e-commerce is expanding across borders, with 45% of EU firms having undertaken cross-border e-commerce sales in 2016. Digitally deliverable services already account for about a quarter of total services trade across the OECD. Much remaining potential hinges on reducing trade restrictions on digitally deliverable services, notably measures that affect infrastructure and connectivity (Figure 9). Finally, ensuring that tax systems are ready to meet the changes brought about by business models enabled by digital transformation is a critical challenge.

Figure 9. Measures restricting trade in services that enable digital delivery are primarily related to infrastructure and connectivity

OECD Digital Services Trade Restrictiveness Index, 2018

Note: See Statlink for figure notes.

Source: StatLink https://doi.org/10.1787/888933915487.

Fostering market openness: What matters most for policy?

- Monitor changing competitive dynamics, especially trends in market concentration and dominance in digital-intensive sectors, and ensure that competition authorities use flexible tools and co-operate across borders to address transnational competition issues.
- Lower trade barriers, particularly for digitally deliverable services, e.g. inefficient regulations on interconnection, and ensure holistic market openness policies through multi-stakeholder dialogue to ensure interoperability across regulatory regimes, including for cross-border data flows and related privacy and security considerations.
- Reduce barriers to international investment, including in communications infrastructures, digital technologies and knowledge-based capital (e.g. business models, software, data), and promote open financial markets.
- Ensure that tax systems are fit-for-purpose in the digital age through continued international co-operation towards a consensus-based, global solution.
Developing a digital transformation strategy

To be successful, policies in all seven dimensions – access, use, innovation, jobs, social prosperity, trust, market openness – need to be closely co-ordinated. Many countries have a digital economy strategy or an equivalent policy in place, but only a few of these promote a whole-of-government approach. Governments need a comprehensive digital transformation strategy (DTS), building on the Going Digital Integrated Policy Framework, and a governance approach that supports effective co-ordination across policy areas and among all stakeholders. Key elements of a DTS are a strategic vision for the country’s digital transformation, clear priorities and objectives, measurable targets, sufficient budget, and thorough monitoring and evaluation. The OECD Going Digital Toolkit, designed to support governments in developing and successfully implementing a DTS, provides key resources including indicators and policy guidance (Figure 10).

**Figure 10. Develop a strategy using the OECD Going Digital Toolkit**


**Key steps in developing and implementing a DTS**

- Establish a governance approach with clear responsibilities for strategic co-ordination (e.g. the head of government or a lead minister) and operational co-ordination (e.g. chief digital officers).
- Articulate a strategic vision that provides direction on priorities and objectives of a DTS and ensure coherence with related domestic and international strategies and/or policies.
- Assess key digital trends, including through international benchmarking, and evaluate existing policies to identify opportunities and challenges to be addressed by a DTS.
- Develop a comprehensive and coherent DTS engaging all relevant actors, including different parts and levels of government, non-governmental stakeholders and international partners.
- Issue an action plan that specifies concrete policy measures, responsibilities, budget, time frame, and measurable targets, and address challenges early to ensure successful implementation of the DTS.
Further reading


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