

Digital Innovation: Seizing Policy Opportunities



Highlights of the 2017-18
OECD Digital and Open
Innovation project

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Digital and Open Innovation project

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1. About the project

How does innovation change in the digital age? What policy changes are needed in consequence? This brochure presents highlights from the OECD Digital and Open Innovation project that addressed those questions. The project's objective was to help innovation policy makers identify priority areas for innovation policy action and reform, so as to promote innovation and inclusive growth in the new digital age.

The **OECD Digital and Open Innovation project (2017-18)** was conducted by the OECD Working Party on Innovation and Technology Policy (TIP). The project was a collaborative initiative effort steered by an OECD team with guidance from the project's steering group – composed of country delegates. Experts and delegates to the OECD Working Party on Innovation and Technology Policy (TIP) and the OECD Committee for Scientific and Technology Policy (CSTP) provided regular comments on the project's direction, engaged in several expert workshops and provided country case studies. Valuable comments and suggestions were also provided by participants at the IDE Seminar at the Massachusetts Institute of Technology, the "A New Take on Innovation in Canada" Symposium, the 15th Meeting of the European Network of the Economics of the Firm (ENEF) on Firm Automation in the Era of Artificial Intelligence and the SMARTER Conference on Smart Specialization and Territorial Development. The project also built on and contributed to the OECD-wide Going Digital project.

The project was led by Caroline Paunov. The principal authors of the report 'Digital Innovation: Seizing Policy Opportunities' were Dominique Guellec, Caroline Paunov and Sandra Planes-Satorra. The team supporting the project also included Martin Borowiecki, Greta Ravelli, Blandine Serve and Maria Fernanda Zamora



2. Digital Innovation: Seizing Policy Opportunities Report

The report '[Digital Innovation: Seizing Policy Opportunities](#)' discusses how the digital transformation – digital technologies, data and software, AI-based analytics and other advances – is **changing innovation processes and outcomes**. It highlights the general trends across the economy and factors behind sector-specific dynamics, including increasing use of data as a key input for innovation, the expanding possibilities for experimentation offered by virtual simulation, 3D printing and other digital technologies, and the growing focus on services innovation enabled by digital technologies.

In view of such changes, this report **evaluates how innovation policies should adapt to foster innovation and inclusive development in the digital age**, and identifies priority areas for policy action. It also explores novel innovation policy approaches implemented by countries to foster digital technology adoption and collaborative innovation.





Main findings and recommendations

Digital transformation affects innovation in all sectors, but in different ways

Most innovations today are new products, processes or business models at least partly enabled by digital technologies or embodied in data and software. Innovation processes themselves are changing in an era of digital transformation, with the use of AI-based analytics that allow for large-scale experiments in research and new virtual simulation and prototyping techniques for developing new products.

Digital transformation is having an impact on innovation in all sectors of the economy. Four pervasive trends characterise innovation in the digital age:

- **Data are a key input for innovation** – Data are increasingly used in innovation processes, to explore new areas of product and service development; gain insights into market trends, consumer demand and the behaviour of competitors; optimise development, production and distribution processes; and tailor the offering to specific demands and rapidly adjust to changes in demand.
- **Services are a central focus of innovation** – Digital technologies offer opportunities for innovation in services. They contribute to blurring the boundaries between manufacturing and services innovation, as manufacturers increasingly develop digitally enabled services to complement their products (the “servitisation” of manufacturing).
- **Innovation cycles are accelerating** – Digital innovations (such as virtual simulation and 3D printing) introduce new and rapid innovation cycles, by accelerating the processes of product design, prototyping and testing, as well as commercialisation. New technologies also enhance experimentation and versioning, by allowing the market launch of testing (beta) versions of products that are regularly updated to incorporate consumers’ feedback.
- **Innovation is becoming more collaborative** – Firms engage with other actors in the innovation ecosystem using a variety of tools, including data sharing; business incubation; strategic partnerships with firms, universities and public research centres; venture capital investment and acquisitions; and participation in new platforms for innovation (e.g. crowdsourcing and industry platforms). In-house collaborations across teams and departments are also increasingly encouraged.

“One of the best pieces of work analysing the systematic effects of digitalisation on innovation, and their policy implications”

- Christian Busch

Scientific Adviser, Innovation

Federal Department of Economic Affairs, Education and Research - State Secretariat for Education, Research and Innovation, Switzerland

However, **impacts differ across sectors** due to the different opportunities digital technologies provide to product and process innovation across those sectors. For instance, while robots have been widely deployed to automate processes in the automotive industry, automation is still at early stages in sectors such as agriculture and retail. The impacts of digital transformation differ across (and within) sectors in the following ways:

- **Digital technology opportunities for innovation** – The characteristics of industry products and processes largely influence the scope of opportunities, which may include the digitalisation of final products or processes, or the creation of new digitally enabled business models. The current and future potential for innovation (and industry disruption) offered by specific areas of technology development (e.g. artificial intelligence (AI), the Internet of things (IoT), virtual reality, 3D printing) and the scope of possible applications thus vary by sector.
- **Data needs and challenges for innovation** – Sectors also differ regarding the type of data they need for innovation. Barriers to data access differ, as for instance data needed for innovation are more sensitive in some sectors (such as patient data for healthcare innovations), or less widely accessible for technical and legal reasons. Data quality and the ease of integration of multiple databases may also differ across sectors. Some sectors may also be more attractive than others to digital talent, leading to differences in the capacities to exploit data.
- **Digital technology adoption and diffusion** – A range of factors drive differences in digital technology adoption rates across sectors, including capabilities to take up those technologies, pressures from market disruptors, and the level of maturity of sector-specific digital technology. The pace of digital technology diffusion is also influenced by the average firm size, the conditions for access to relevant infrastructure and the complexity of supply chains.

Digital innovation is changing market structures and dynamics

Digital technologies change how knowledge – the key ingredient for innovation – is produced and disseminated. Digital technologies have drastically lowered the costs of searching, sharing and analysing data. The “fluidity” of data (the fact that it is reusable, reproducible and scalable at no cost) means that once available, digitised knowledge (i.e. knowledge that is put in the form of digital data) can be shared instantaneously among any number of actors, no matter the geographic distance or other barriers.

Platforms play a central role in this context. Platforms – Internet-based structures that organise interaction among various sorts of actors – facilitate access to knowledge (patents or publication databases) and research infrastructures and the data they generate (e.g. high performance computer centres, R&D facilities), and allow for producers and consumers to meet more easily (including for niche products). They also have an efficiency-enhancing effect, in that they create standards that facilitate innovation and allow for network effects and data aggregation.

“A very strong report allowing the reader to grasp where change is happening in the complex digital context”

-*Roland Sommer*

Director General, Association Industry 4.0 Austria

Vice-Chair, BIAC Technology Committee

The fluidity of data and the emergence of digital platforms have two opposing impacts on market dynamics:

- **Market entry and competition** – As data are fluid and potentially available to all at a low marginal cost, the costs of market entry and expansion for new firms are lower. Digital platforms can also facilitate entrepreneurship, by lowering set-up costs for newcomers regardless of their location. Digitalisation can thus create a more level playing field for all in terms of access to inputs (if no other barriers are in place), creating a sort of equality of opportunities.
- **Market concentration** – The increasingly intangible composition of products makes it easier to expand production to the entire market at little or no marginal cost (“scale without mass”), and thus allows successful players to grow very quickly. Platforms generate important efficiency gains from combining large amounts of data and providing a combination of services, which may give a nearly monopolistic advantage to dominant platforms (“winner take all” dynamics). The scarcity of skills required to exploit data efficiently can also contribute to concentration of talent (and thus innovation) in a few innovation hotspots.

Countries are adopting innovative policy approaches for the digital age

Digitalisation features prominently in national science, technology and innovation (STI) policy agendas, as part of main STI strategies or as dedicated national digital strategies, Industry 4.0 strategies or artificial intelligence (AI) strategies. Governments are also experimenting with novel innovation policy approaches and instruments to facilitate successful digital transformation that is inclusive. Among a diversity of policy goals are promoting digital technology adoption and diffusion across the economy, and rendering collaborative innovation more effective.

Experimental **policy approaches to promote digital technology** diffusion include the creation of test beds and regulatory sandboxes to facilitate testing of new digital technology applications. Innovative initiatives are also implemented to facilitate innovators' access to state-of-the-art facilities and expertise (e.g. in the field of AI, supercomputing), and in so doing enhance early adoption of advanced digital technologies. Traditional instruments to encourage technology adoption by SMEs – such as awareness-raising campaigns, innovation vouchers, technical assistance and training – are being revisited to respond to new challenges of the digital age, and these endeavours themselves often involve use of digital tools.

New **policy approaches to nurture collaborative innovation** include the use of crowdsourcing and research challenges open to anyone willing to engage in finding solutions (e.g. InnoCentive), as well as the creation of living labs, to find innovative solutions to pressing challenges and encourage co-creation among various actors. Intermediary organisations, such as Catapult Centres in the United Kingdom, have become central players in innovation ecosystems, and provide services such as matching firms needing technology solutions with potential suppliers. New research and innovation centres, often public-private partnerships, have also been created to provide spaces for multi-disciplinary teams of public researchers and businesses to work together to address specific technology challenges. These often stand out for their innovative organisational structures. Examples include Data61 in Australia and Smart Industry Fieldlabs in the Netherlands. Traditional instruments such as cluster policies, the creation of networks and provision of financial support continue to be implemented but are used in new ways.

Policy recommendations



Data access

- Ensure data access for innovation, considering data diversity & privacy concerns
- Develop markets for data

- Collaborate with competition authorities in addressing market power in the digital age
- Create spaces for collaboration & co-creation
- Support digital technology adoption by SMEs
- Support generic digital technology development to respond to societal challenges



Competition, collaboration & inclusiveness

- Promote open science
- Support interdisciplinarity
- Provide training in digital skills
- Invest in digital research infrastructure



Public research education & training

- Promote anticipatory, responsive and agile policies
- Support service innovation
- Adapt IP system

Business innovation & entrepreneurship



Cross-cutting policy challenges

- Frame policies in view of global markets
- Adopt sectoral approach when necessary
- Engage with citizens
- Ensure government access to digital skills



Disrupting the innovation policy spectrum



Policy recommendations

The new innovation landscape calls for changes to the targets, mechanisms and instruments of innovation policies, and to the policy mix for innovation. Four areas of priority action are critical for addressing the pressing challenges of the digital age, and constitute novel policy areas or policy approaches in most countries. In fact all innovation policy domains would need to be revisited to better respond to new challenges – for example, in the areas of technology diffusion, collaborative innovation, and public research.

Priority areas of policy action

- **Develop data access policies to promote digital innovation.** It is important to ensure the broadest possible access to data and knowledge (incentivising sharing and reuse) to favour competition and innovation, while respecting constraints regarding data privacy, ethical considerations, economic costs and benefits (i.e. incentives to produce the data, competition) and intellectual property rights considerations. Policies should take into consideration the diversity of data types, as they significantly differ in terms of the challenges associated with their generation, access and exploitation. Appropriate conditions should also be set to allow for the emergence of markets for data.
- **Experiment with more anticipatory, responsive and agile policies.** The deployment and close monitoring of policy experiments small in scale can help assess their relevance and efficiency in a context of high uncertainty, based on which they could be easily scaled up or down or be abandoned. In a context of rapid change, it is also crucially important to streamline application procedures for innovation support instruments. Using digital tools to design innovation policy and monitor policy targets is another option to spur faster and more effective decision making. Similarly, emphasis on instruments that do not target a specific technology can increase flexibility. Mission-oriented programmes that set a goal but do not impose the means to reach it can help. Such programmes would provide the necessary autonomy and agility to choose the proper technological paths to achieve a stated policy objective.
- **Support multi-purpose digital technology development to respond to societal challenges and engage with citizens.** Policies need to ensure that multi-purpose digital technologies are developed to serve not only commercial purposes, but also social and environment purposes. Public research could support building more applications and help adoption across the economy where private business does not have the incentives to produce them. Those investments benefit from co-creation (i.e. collaboration in technology development), and from developing a shared vision around the economic, ethical, policy and legal implications of such technologies. More engagement and debate among institutions, the scientific community and the public is also needed, in order to ensure that the public is well informed about the opportunities (and risks) of new technologies and to appropriately address public concerns (e.g. strengthening privacy protection). A lack of engagement with society creates the risk of a significant future backlash, with negative impacts on the development and deployment of these technologies.

"The report rightly points to the need for policies that are more flexible and anticipatory, given the fast pace of technology change"

- David Legg

Vice chair of the OECD-TIP Working Party

Economics, Analysis, and Market Insight, Innovate UK

- **Set national policies in a context of global markets.** Digitalisation facilitates the circulation of knowledge, including across national borders; this reduces governments' ability to restrict the benefits of policies to their own countries. That raises a challenge for national policy makers: how can they ensure that their own citizens (and taxpayers) benefit from national policies, and that most of the benefits (e.g. income generated, productivity gains, job creations) do not leak abroad? At the same time, there are many benefits from global integration that need to be preserved. Along the same lines, there are questions about the sharing of benefits generated by exploitation of national data (e.g. from the public health system) with foreign multinationals. Co-operative solutions will be needed that allow a sharing among countries of the benefits arising from international flows of data and knowledge linked to national policies. The OECD activity on base erosion and profit shifting (BEPS) is a step in this direction (www.oecd.org/tax/beps/).

“An excellent report introducing novel innovation policy approaches for the digital age, particularly in the area of data access, as well as the need for anticipatory regulation and setting national policies in the context of global markets”

- Kai Husso

Vice chair of the OECD-TIP Working Party

Chief Planning Officer, Enterprise and Innovation Department, Ministry of Economic Affairs and Employment, Finland

Principles for innovation policy areas that need adjustment in the digital age

- **Facilitate digital technology diffusion to support inclusion in the digital age.** Demonstration facilities, test beds and regulatory sandboxes are innovative tools used to encourage digital technology experimentation and adoption. Traditional instruments to increase technology adoption, particularly among SMEs – such as awareness-raising campaigns, innovation vouchers, technical assistance and training – remain important and could exploit the opportunities offered by digital technologies themselves (e.g. the provision of remote technical assistance). Facilitating access to state-of-the-art facilities and expertise (e.g. in the field of AI) is important for early adoption of advanced technologies by a wider range of firms.
- **Support service innovation to fully benefit from the potential of digital technologies.** This requires revising existing support initiatives that de facto exclude services innovation from targeted activities, and design new programmes to address emerging needs. Initiatives may include supporting innovative projects aimed at developing new services using new digital technologies (e.g. the Smart and Digital Services initiative in Austria), or at helping manufacturing SMEs develop services related to their products (e.g. service design vouchers for manufacturing SMEs in the Netherlands).
- **Support collaboration for innovation.** Support the creation of networks or platforms to promote interactions and collaboration among different actors in innovation ecosystems (large firms, SMEs, start-ups, research institutions) (e.g. Smart Industry Fieldlabs in the Netherlands). Knowledge intermediaries, such as Fraunhofer Institutes in Germany or Catapult Centres in the United Kingdom, play a key role in transferring and adapting knowledge (e.g. advances in AI) to new applications or sectoral needs. New models for collaborative innovation, such as data-sharing initiatives, crowdsourcing and platforms for collaboration and co-creation, could also be explored.

- **Promote the digitalisation of public research.** Strengthening researchers' digital skills, for example by offering specific training and capacity-building activities for scientists, needs to become a priority to ensure that new digital tools can be integrated in research processes (e.g. machine-learning techniques). This should be accompanied by appropriate investments in digital tools and infrastructures for research (e.g. platforms for data sharing, supercomputing facilities for AI) and changes in incentives to further interdisciplinary research. Stimulating engagement in partnerships with other research institutions and with industry – and the creation of spaces for co-creation – will facilitate science-industry knowledge exchange.
- **Build digital skills, including in the field of data analytics.** Innovation authorities should collaborate with education and research authorities – to identify the new skills needed for digital transformation; to encourage university and vocational training programmes to fill critical talent shortages (e.g. data scientists), often requiring more interdisciplinary curricula; and to set up targeted training programmes for workers and awareness-raising activities for business managers (particularly in the case of SMEs) and civil servants. Specific programmes targeted at building the digital skills of disadvantaged groups would facilitate the participation of those groups in innovative activities and help address current inclusiveness challenges.

Policy areas requiring a sectoral approach

Three policy domains in particular require taking a sectoral approach when designing new initiatives, as challenges and needs faced by sectors in these areas vary significantly:

- **Data access policies** should take into consideration the diversity of data types needed for innovation in different sectors, given that access and other challenges associated with their generation, exploitation and ownership differ. For instance, precision agriculture draws mainly on sensor and satellite data, while retail exploits consumer purchasing and social media data to personalise services. In agriculture, challenges often relate to data sharing and integration, while in retail ensuring data privacy is a rising concern.
- **Digital technology adoption and diffusion policies** – such as awareness-raising schemes, training and education, demonstration and testing of new technologies, and intermediary institutions – should be tailored to the specific needs of the sector and/or type of actor (notably SMEs). Diffusion is more challenging in some sectors than in others, depending on the characteristics of production structures, level of access to intermediary institutions and infrastructures, and availability of digital capacities.
- **Policies supporting the development of sectoral applications of digital technologies** where market conditions have inhibited the development of private sector-led solutions, to ensure that such technologies provide benefits across the economy. The gap between future digital technology opportunities – including those offered by AI – and current applications differs, challenging adoption of digital technologies by firms operating in certain sectors where applications are non-existent. Public research could support the development of more applications and help adoption across the economy. Engaging with industry stakeholders and social partners to develop a shared vision for the future in key priority sectors is a useful step. Roadmaps, sectoral plans and foresight exercises are key to strengthening policy intelligence and helping align policy and industry actions in the long term, while fostering public-private collaborations.

"A key guide for innovation policy makers. Issues of skills, data access and territorial inclusiveness in the digital age are most relevant in our countries"

- Agni Spilioti

Vice chair of the OECD-TIP Working Party

Director, S&T Policy Planning Directorate, General Secretariat for Research and Technology, Ministry of Education, Research & Religious Affairs, Greece

Synthesis of the report



Chapter 1. Characterising innovation in the digital age

Most innovations today are at least partly enabled by digital technologies or embodied in data and software. Digital technologies are enabling **the creation of new digital or digitally enabled products and business models** (such as social media networks, online marketplaces, on-demand mobility services) as well as the enhancement of traditional ones, as exemplified by connected cars.

Digital technologies are also **enabling innovation in production and distribution processes**, allowing for instance to automate processes with robots, trace products along value chains, better manage stocks with the use of sensors and the Internet of Things (IoT), and predict the maintenance needs of equipment with big data analytics.

Many new opportunities are also arising for **accelerating and improving R&D processes**. These include the use of big data analytics and large-scale computerised experiments for research, and virtual simulation and 3D printing for developing, prototyping and testing new products.

Today, **the effects of digital technologies are felt in all sectors**, changing innovation practices and outcomes not only in “born digital” sectors, but also in traditional ones such as agriculture, transportation and retail – as indeed would be expected of general purpose technologies (GPTs). GPTs are defined as technologies that drive innovation across the economy and bring long-term social, economic and productivity benefits, as was the case with the steam engine, electricity, the automobile, the computer and the Internet in the past. What are the characteristics of innovation in the digital age?

This chapter explores how the **digital transformation is changing innovation processes and outcomes** across all sectors of the economy, and the effect of such changes on market dynamics.

The chapter finds that digital transformation changes innovation because digitalisation significantly reduces the cost of producing and disseminating the sort of knowledge and information – innovation’s key ingredients – that can be digitalised. Smart and connected products are very different from the tangible products that characterised the previous industrial era.

Four changes in innovation dynamics witnessed across all sectors are identified here. First, data are becoming a key input for innovation. Second, innovation activities increasingly focus on the development of services enabled by digital technologies. Third, innovation cycles are accelerating, with virtual simulation, 3D printing and other digital technologies providing opportunities for more experimentation and versioning in innovation. Fourth, innovation is becoming more collaborative, given the growing complexity and interdisciplinary needs of digital innovation.

These transformations in innovation processes and their outcomes in turn **affect business dynamics and market structure**, and consequently have implications for the distribution of performance and rewards among businesses, individuals and regions.

Synthesis of chapter 1



Market Concentration

- Expanding digital production at little cost (scale without mass) favours dominant players
- Scarcity of skills to exploit data leads to concentration in few hotspots



Market Entry & Competition

- Data access lowers cost of market entry
- Platforms can facilitate entrepreneurship

Chapter 2. Impacts of the digital transformation on innovation across sectors

Since industries significantly differ in their products and processes, their structures, and in how they engage in innovation, the impacts of digitalisation on their innovation are unlikely to be the same. For instance, end products in primary sectors such as food or mining remain largely unchanged, while the media, music and gaming industries have completely digitalised their offering over the past decades. Production and innovation processes have also been transformed by digital technologies, but in different ways: while robots have been widely deployed to automate processes in the automotive industry, automation is still in its early stages in sectors such as agriculture and retail. Understanding these differences matters for policy aimed at supporting innovation systems, as countries' industry composition differs markedly.

"The report explores the diversity and complexity of digital innovation-related issues in a very coherent way. It sets the stage for future work and deeper analyses"

- *Ana Nieto*

Vice chair of the of the OECD-TIP Working Party

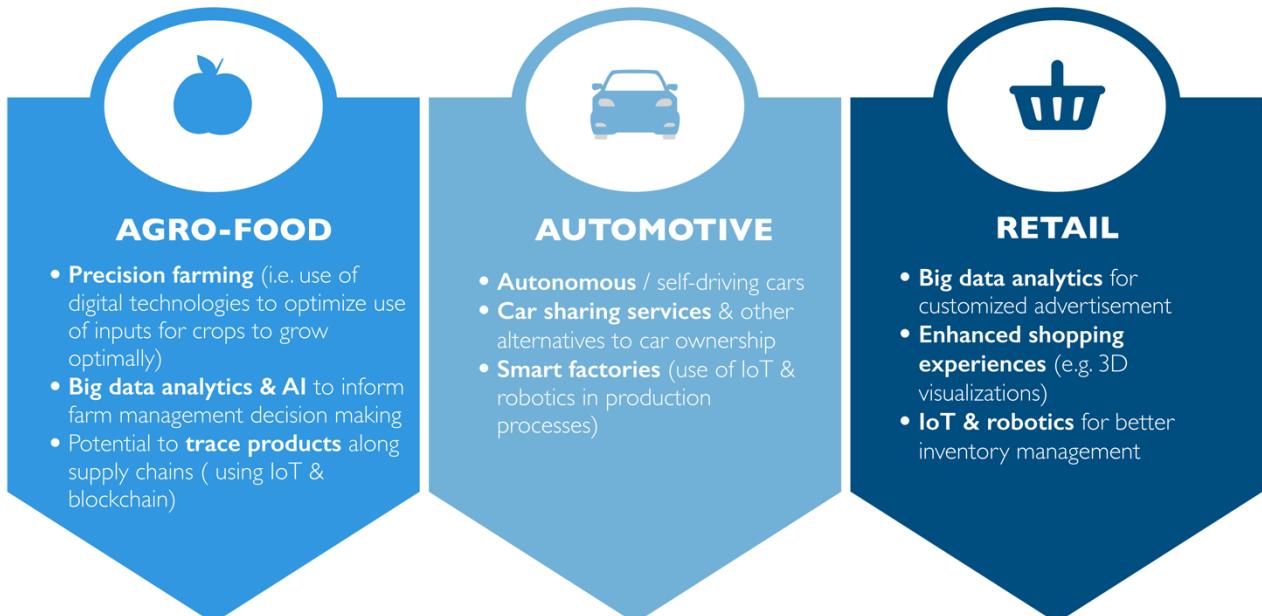
DG RTD TIP Delegate, Directorate-General for Research and Innovation, European Commission

This chapter describes how the digital transformation affects three distinct sectors – agri-food, automotive and transportation, and retail – to illustrate the nature of change in the primary, manufacturing and services sectors.

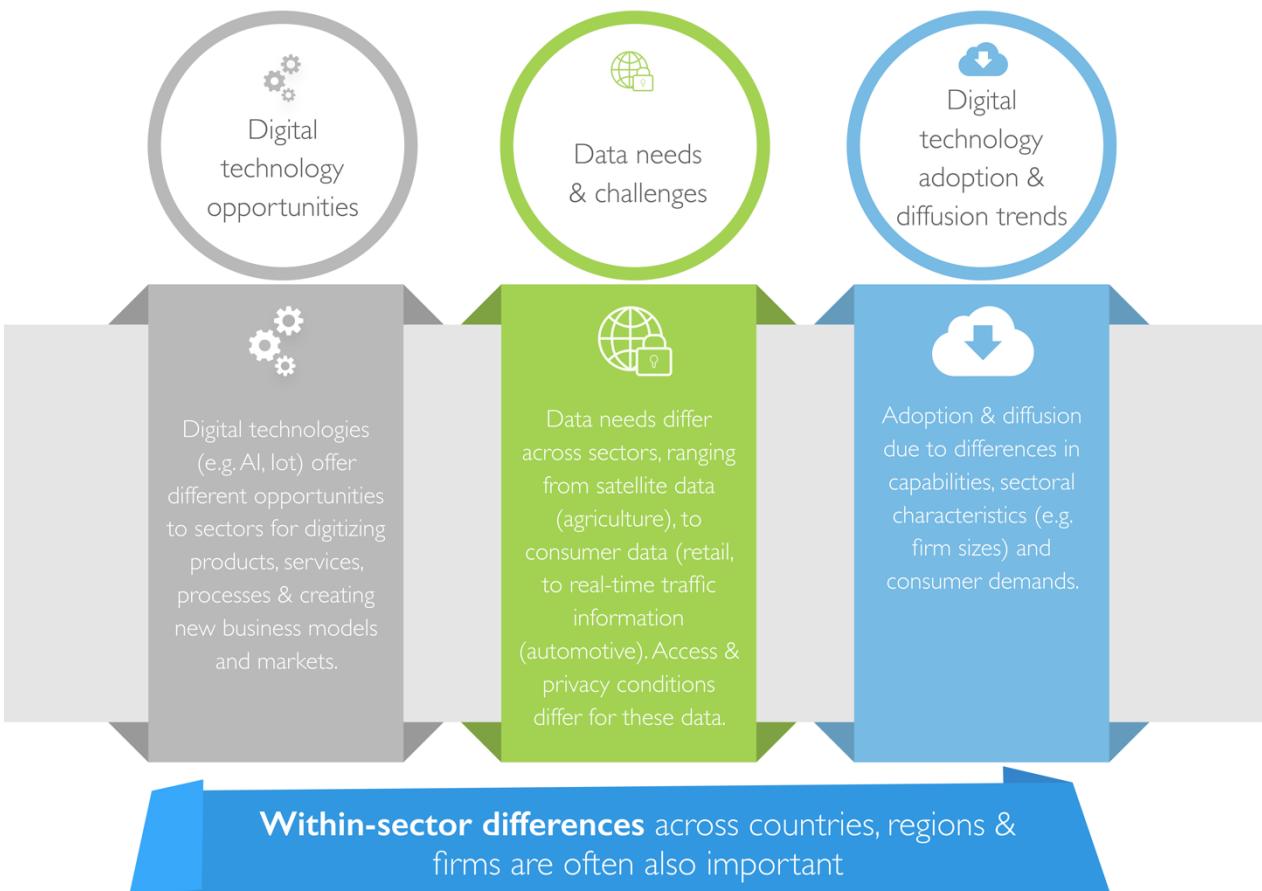
The chapter finds that three main dimensions shape the differences in impacts of digitalisation on innovation across sectors: 1) the **scope of opportunities for innovation** that digital technologies offer; 2) the **types of data needed for innovation** and the challenges faced with regard to their exploitation; and 3) the **conditions for digital technology adoption and diffusion**. The chapter also shows evidence of important within-sector heterogeneities.

Digital Innovation across Sectors

DIGITAL APPLICATIONS



DIFFERENCES ACROSS SECTORS



Chapter 3. How should innovation policies be adapted to the digital age?

With broad and deep transformations in innovation under way with digitalisation, are existing innovation policies still relevant and efficient? Do they appropriately address emerging challenges?

This chapter explores how policy support for innovation should change so as to be effective in promoting vibrant and inclusive innovation ecosystems in the digital age.

The chapter finds that effective development of innovation will require governments to adopt policy mixes that respond to the changing landscape. **The new policy mix should comprise five key objectives:**

- Ensure access to data for innovation
- Provide support and incentives to innovation and entrepreneurship
- Build a strong public research system and a skilled labour force
- Promote competitive, collaborative and inclusive innovation ecosystems
- Set national policies that take account of the global context and citizens' concerns

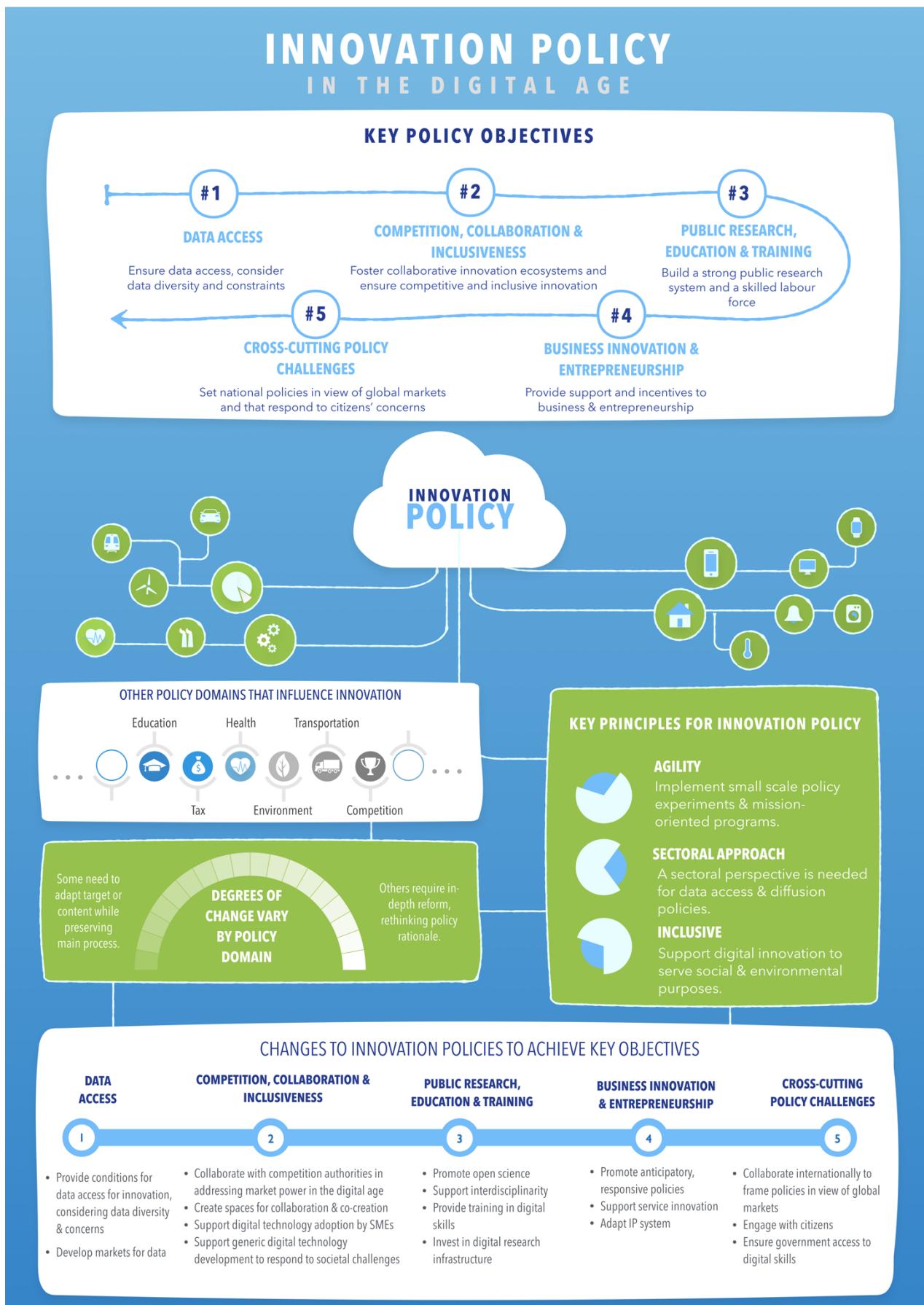
The **changes called for by the digital transformation affect the entire innovation policy spectrum**, but to varying degrees across policy domains. Some domains need to adapt their target or content to digital innovation while essentially preserving their established processes; this includes for instance policies supporting entrepreneurship, digital technology adoption by SMEs and the development of general purpose technologies. Other domains need to go through in-depth reform, sometimes including a rethinking of the policy rationale: that includes public research policy (moving towards open science) and policies supporting science-industry knowledge transfer, moving towards knowledge co-creation.

A sectoral approach is also needed with regard to some policy areas, in particular data access policies, adoption and diffusion, and support for digital technology application development. The challenges and needs faced by sectors in these areas vary significantly, as explored in Chapter 2.

Innovation is also influenced by many policies that do not target it explicitly or primarily, such as education, tax, health, environment, transportation and competition policies. This last is particularly critical for innovation, as only the right competitive environment will stimulate firms to innovate and pursue innovation-driven growth, as explored in Chapter 1.

The focus here is on innovation policies per se. Broader policy questions are addressed by the OECD-wide horizontal Going Digital project, which has developed an integrated policy framework for making the transformation work for growth and well-being.

Synthesis of chapter 3



Chapter 4. Policies to stimulate digital innovation's diffusion and collaboration

The digital transformation features prominently in national science, technology and innovation policy agendas, as part of main STI strategies or as dedicated national digital strategies, Industry 4.0 strategies or AI strategies. Moreover, many governments are experimenting with novel innovation policy approaches and instruments to facilitate a successful and inclusive digital transformation of their economy. Important priorities include promoting digital technology adoption and diffusion, and making collaborative innovation – defined as innovation among different actors, including large firms, start-ups, SMEs and public research organisations – more effective.

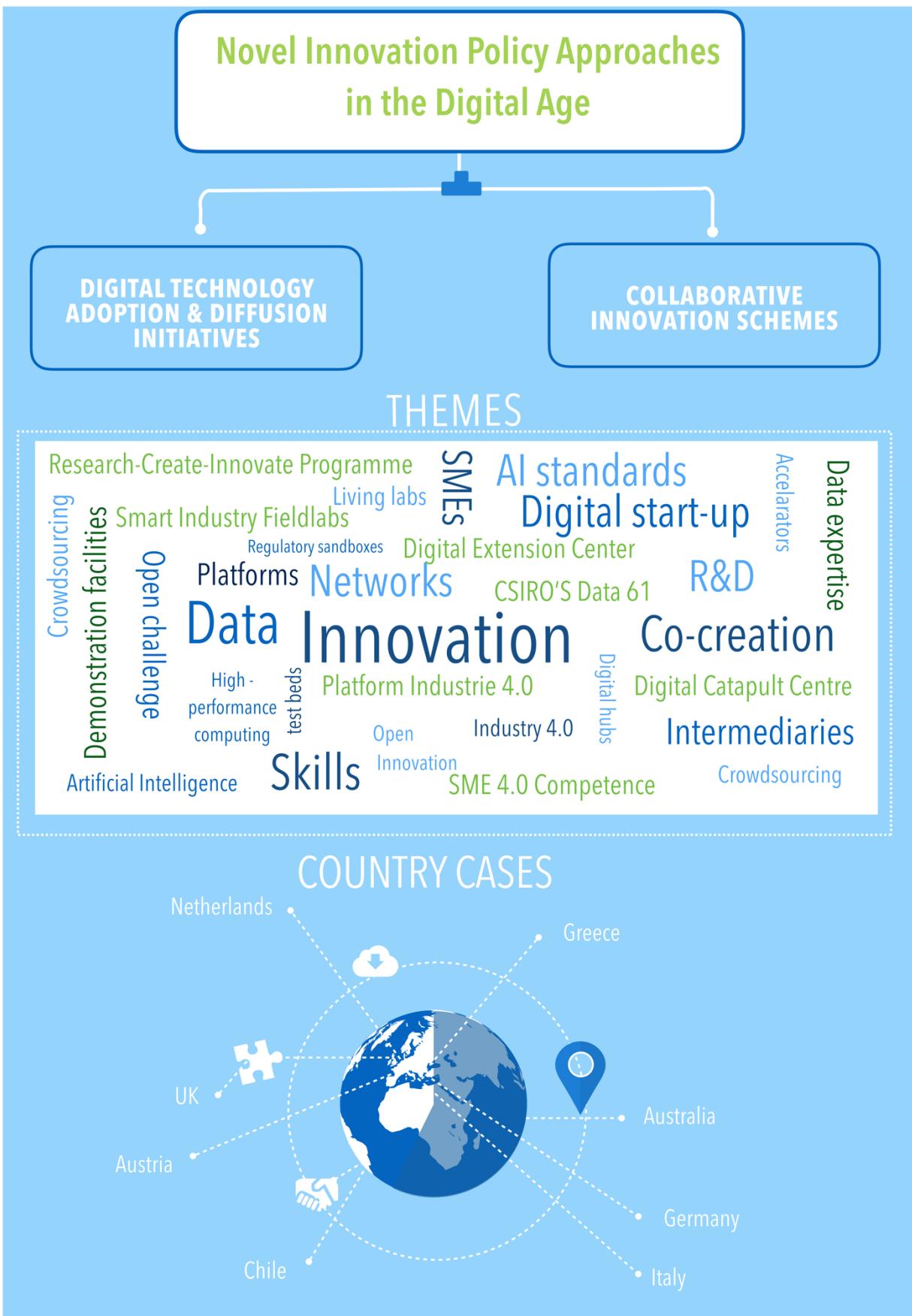
This chapter looks at some of the **innovative approaches undertaken in OECD countries**, with the focus on digital technology adoption and diffusion and efforts to promote the development of collaborative innovation.

The chapter shows that **many experimental policy approaches to promote diffusion centre on facilitating the testing of new digital technology applications**, for instance by creating test beds and regulatory sandboxes. Innovative initiatives are also implemented to enhance early adoption of advanced digital technologies by facilitating innovators' access to state-of-the-art facilities and expertise (e.g. in the fields of AI and supercomputing). Traditional instruments to foster technology adoption by SMEs – such as awareness-raising campaigns, innovation vouchers, technical assistance and training – have been revisited to respond to specific challenges of the digital age, and often make use of opportunities offered by digital tools themselves.

Innovative instruments are also used to spur collaborative innovation. Most experimental approaches include the use of crowdsourcing and open challenges, as well as the creation of living labs, to find novel solutions to pressing challenges and promote co-creation. Intermediary organisations, such as Catapult Centres in the United Kingdom, have become central players in innovation ecosystems, providing services such as matching firms needing technology solutions with potential suppliers. New research and innovation centres, often public-private partnerships, have also been created to provide spaces for multidisciplinary teams of public researchers and businesses to work together to address specific technology challenges. These often stand out for their innovative organisational structures. Examples include Data61 in Australia and Smart Industry Fieldlabs in the Netherlands. Traditional instruments such as cluster policies, the creation of networks, and provision of financial support continue to be implemented but are used in new ways.

This chapter builds on a number of country policy case studies contributed to the OECD TIP Working Party's Digital and Open Innovation project. It also incorporates information from country responses to the 2018 European Commission/OECD Science, Technology and Innovation Policy Survey and the 2017 OECD Digital Economy Outlook questionnaire.

Synthesis of chapter 4



3. Policy papers



Innovation policies in the Digital Age

This policy paper discusses how digitalisation is transforming innovation processes and outcomes, and explores the ways in which innovation policy needs to adapt in order to respond to new challenges. The paper also discusses the economy-wide effects of digital innovation in terms of business dynamics, market structures and distribution.

Guellec, D. and C. Paunov (2018), "Innovation policies in the digital age", *OECD Science, Technology and Industry Policy Papers*, No. 59, OECD Publishing, Paris, <https://doi.org/10.1787/eadd1094-en>.

The impacts of digital transformation on innovation across sectors (forthcoming)

This policy paper discusses similarities and differences in how digital transformation affects innovation processes and outcomes in different sectors. It focuses on three sectors: **agri-food, automotive/transportation and retail**.

Paunov, C. and S. Planes-Satorra (2019), "The impacts of digital transformation on innovation across sectors", *OECD Science, Technology and Industry Policy Papers*, OECD Publishing, Paris.

The digital innovation policy landscape in 2019 (forthcoming)

How are OECD countries supporting digital innovation and ensuring that benefits spread across the economy? This **paper explores the current landscape of strategies and initiatives implemented in OECD countries to support innovation in the digital age**. It identifies common trends and differences in national digital, smart industry and artificial intelligence (AI) strategies. The paper also discusses the range of policy instruments used across OECD to support :1) digital technology adoption and diffusion, including demonstration facilities for SMEs; 2) collaborative innovation (including via the creation of digital innovation clusters and knowledge intermediaries); 3) research and innovation in key digital technologies, particularly AI (e.g. by establishing testbeds and regulatory sandboxes); and 4) digital entrepreneurship (e.g. through early-stage business acceleration support).

Planes-Satorra, S. and C. Paunov (2019), "The digital innovation landscape in 2019", *OECD Science, Technology and Industry Policy Papers*, OECD Publishing, Paris.

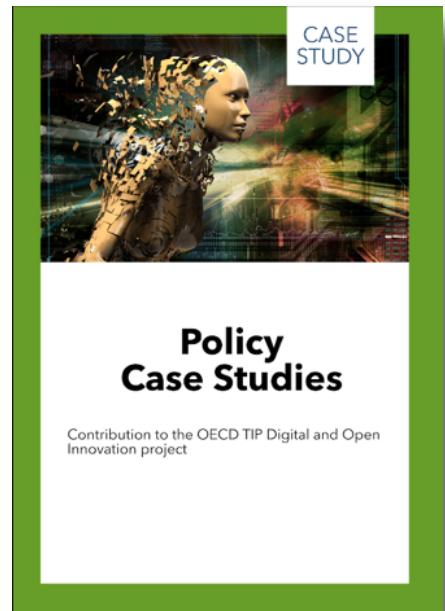
4. Country case studies

The "Digital Innovation: Seizing Policy Opportunities" report also builds on a number of country case study contributions to the TIP Working Party's Digital and Open Innovation project. This includes **eight policy case studies** – each focusing on a new innovation policy initiative for the digital transformation – and **three sectoral case studies** – exploring the impacts of digital transformation on specific sectors or firms.

Find all the case studies at: <https://oe.cd/2xP>

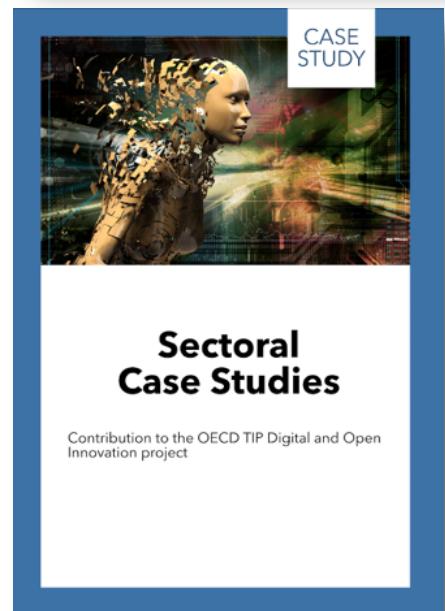
Policy case studies

- **CSIRO's Data 61 – Australia** (Peter Leih, Kate Powl, Cheryl George, Adrian Turner, Sandy Plunkett and Data61 team)
- **Plattform Industrie 4.0 – Austria** (Rafael Boog, Jasmina Schnobrich, Roland Sommer and Paul Trompisch)
- **Digital Extension Centre – Chile** (María José Bravo and Alejandra Núñez)
- **SME 4.0 Competence Centres – Germany** (Ministry of Economic Affairs and Energy)
- **Research-Create-Innovate programme – Greece** (Vasileios Gongolidis)
- **Industry Platform 4FVG – Italy** (Stefano Salvador)
- **Smart Industries Fieldlabs – the Netherlands** (Claire Stolwijk and Matthijs Punter)
- **Digital Catapult Centre – UK** (Brian MacAulay and Digital Catapult team)



Sectoral case studies

- **Digital start-ups and clusters – Austria** (Karina Wagner and Gerlinde Pöchhacker-Tröscher)
- **Digital agriculture and the Agridigit project – Italy** (Marcello Donatelli and Michele Pisante)
- **The digitalisation of automotive supply chain:** an empirical analysis with evidence from Germany and China (Johannes Kern and Pascal Wolff)



5. Project events

Four workshops have been organised in the context of this project, gathering experts, policy makers and practitioners from across OECD countries and beyond to discuss about different aspects of innovation in the digital age, as well as their policy implications:



Innovation and the digital economy: What role for innovation policies?

Paris, June 2017

www.innovationpolicyplatform.org/digitalworkshop2017

[Summary of discussions](#)



The impacts of digital transformation on innovation across sectors

London, September 2017

www.innovationpolicyplatform.org/Londonworkshop2017

[Summary of discussions](#)





Digital health innovations

The Hague and Eindhoven, April 2018

www.innovationpolicyplatform.org/digitalhealth

[Summary of discussions](#)






How to leverage the digital transformation's potential for innovation and research?

Paris, June 2018

www.innovationpolicyplatform.org/digitalinnovation

[Summary of discussions](#)






Digital Innovation and University-Industry Collaboration: New Policy Perspectives

Launch of the OECD report 'Digital Innovation: Seizing Policy Opportunities'

London, 10 April 2019

Event jointly organised by Digital Catapult, Innovate UK and the OECD.

Agenda

Panel 1. Where should innovation policy go from here?

Panel 2. How to implement the policy recommendations in practice: policy experiments

Panel 3. AI and data management for innovation: how to handle the challenges ahead?

Evening reception to explore policy experiments and new technologies

Find the full agenda and all information about the event at:

<https://oe.cd/2xs>



For more information visit: <https://oe.cd/2xw>