Chapter 5.

Seizing the opportunities from digitalisation

This chapter focuses on two areas that have acquired a prominent role in the current policy debate about digitalisation: innovation and jobs.

The first section reviews recent innovation performance in Sweden, examines the main policy initiatives in support of research on and diffusion of information and communication technologies (ICTs), and formulates recommendations to foster digital innovation.

The second section examines recent trends in the labour market in Sweden and discusses policies to promote job quality and accompany workers along the digital transformation.

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

The digital transformation cuts across all economic and societal activities, raising opportunities and challenges and calling for adequate policy responses. This chapter focuses on two areas that have acquired a prominent role in the current policy debate about digitalisation: innovation and jobs.

The first section reviews recent innovation performance in Sweden, examines the main policy initiatives in support of research on and diffusion of information and communication technologies (ICTs), and formulates recommendations to foster digital innovation.

The second section examines recent trends in the labour market in Sweden and discusses policies to promote job quality and accompany workers along the digital transformation.

Swedish innovation policies for the digital transformation

Sweden is an international hub of scientific excellence and technological leadership. It is among the global science leaders, both for the number and the quality of its scientific publications. The number of international patents per capita is higher than in most OECD countries (OECD, 2017b). In 2012-15, 43% of all Swedish patents were related to ICT, the fourth largest share worldwide after the People's Republic of China (hereafter "China"), Korea and Finland (Figure 5.1).

Figure 5.1. **ICT-related patents**

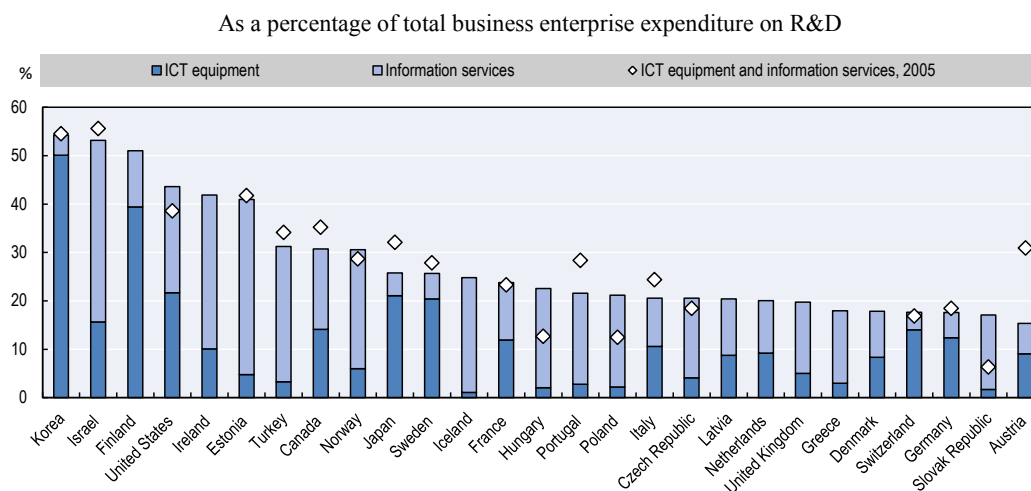As a percentage of total IP5 patent families owned by economies
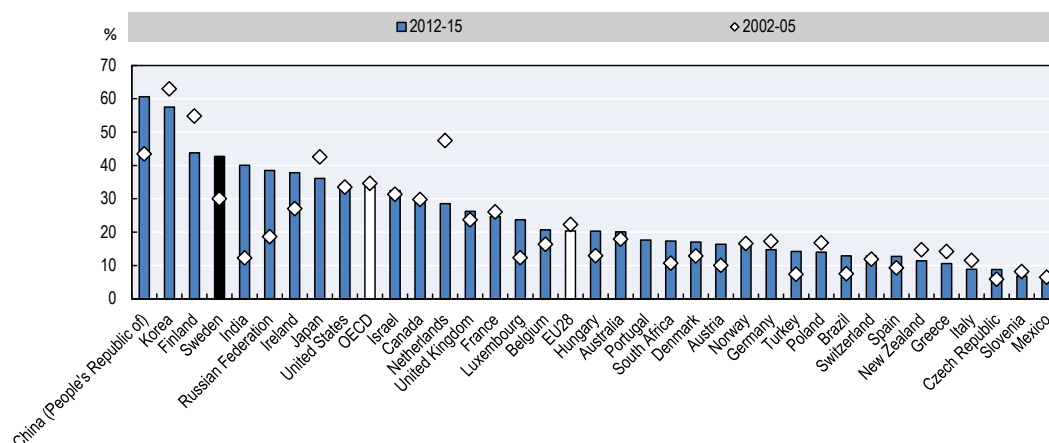
Source: OECD (2017b), *OECD Science, Technology and Industry Scoreboard 2017: The Digital Transformation*, http://dx.doi.org/10.1787/9789264268821-en.

Sweden also used to have the highest expenditures on research and development (R&D) relative to gross domestic product (GDP) in the world. Since 2000, however, R&D intensity has started to decline, down to 3.3% in 2015 (see Chapter 1). While Sweden still stands at a high level, its research performance is losing ground compared to world innovation leaders (e.g. Israel, Denmark, Korea and Switzerland) and to some emerging economies (e.g. Chinese Taipei and China). One main reason for the relative decline of R&D is that a number of large and international companies increasingly locate research activities in other countries.

In 2013, Sweden had the fifth largest share of R&D expenditures in ICT equipment (20%) among OECD countries, but this was much smaller than the same share in Korea

(50%) and Finland (39%). The share of R&D expenditures in information services (5.3%) was among the lowest in the OECD (Figure 5.2). The telecommunication industry is being particularly hit by these changes in the global R&D landscape, as Swedish firms are finding themselves in direct competition with enterprises from emerging economies, notably China (OECD, 2016d).

Figure 5.2. **R&D expenditure by ICT equipment and information services industries, 2015**

As a percentage of total business enterprise expenditure on R&D

Note: ICT = information and communication technology.

Source: OECD (2017b), *OECD Science, Technology and Industry Scoreboard 2017: The Digital Transformation*, http://dx.doi.org/10.1787/9789264268821-en.

The government's objective is for Sweden to be a world-leading research and innovation country, where high-quality research, education and innovation result in higher welfare and competitiveness and help to meet social challenges.

The Research and Innovation Bill 2017

In 2017, the Research and Innovation Bill "Collaborating for knowledge – for society's challenges and strengthened competitiveness" (Government Offices of Sweden, 2016) sets the orientations for research and innovation policy with a ten-year perspective, focusing in particular on measures in 2017-20. Important cornerstones of the bill include increased basic appropriations to higher education institutions, initiatives in research linked to global societal challenges and increased resources to strengthen Sweden's innovative capacity. The bill provides an increase in the appropriations for research and innovation of over SEK 3 billion (USD 355 million) until 2020.

To achieve these objectives, the bill develops a strategy built around three main policy actions:

1. increase the international attractiveness of Sweden for investment in R&D

2. promote a more efficient and long-term use of resources to enhance the quality of research across the whole country

3. promote a closer collaboration among universities, businesses and society.

Cutting across these three actions, the bill points out the need for a closer and more systematic evaluation of the variety of projects and initiatives supported by Swedish innovation policies.

Digitalisation has a key role in the Research and Innovation Bill 2017 in two respects. First, ICTs are an important technological field of their own; second, digital technologies are an enabler of innovation in other technological fields and a fundamental infrastructure for research activities.

Innovation policies in the ICT field

The ICT sector is one of Sweden's most important industries. In 2015, exports amounted to nearly SEK 140 billion, representing nearly 12% of total exports. There are more than 46 000 companies in the ICT industry, with nearly 200 000 employees. The area is developing rapidly and the competition is fierce.

Government-funded R&D is already substantial and has been increasing. The Swedish Research Council and Swedish Innovation Agency (Vinnova) allocate nearly SEK 900 million annually for research and research infrastructure related to ICT. The field of computer science and electrical and electronic technology alone accounts for nearly 20% of the Research Council's contribution to science and technology (Government Offices of Sweden, 2016). Swedish researchers in computer science can point to their high production of scientific articles that are cited among the leading researchers in the world (OECD, 2017a).

Fifth generation mobile networks (5G) are under development and higher speeds, greater capacity and better connectivity are opening up further opportunities to use mobile technologies in production and consumption. The 2008 Research and Innovation Bill allocated funds for research on information technology (IT) and mobile communication systems to two centres: one at the Royal Institute of Technology, in co-operation with Stockholm University, and the other at the Linköping University, in collaboration with Lund University, the Blekinge Institute of Technology and the University of Halmstad. To support research on the 5G mobile technologies, the 2017 bill has allocated an additional SEK 150 million (USD 18 million) to the centre at the Royal Institute of Technology.

Additional funds have also been allocated for research on machine learning to the Knowledge Cluster in Stockholm, one of the three most prominent centres in the world, and to the Linköping University.

ICT as a fundamental infrastructure for research activities

The digital revolution has profoundly changed the way research is undertaken, universities are organised, interactions between industry and the research community take place. Increased digitisation creates new research opportunities far beyond the ICT technology field.

Modern research generates a massive and rapidly increasing volume of data (so-called big data). The trend towards more data-driven and computation-intensive research has dramatically increased the need for efficient digital infrastructure to process, analyse, store and make data available. In Sweden, this need is particularly strong for major national research infrastructures, such as the Synchrotron Max IV, the National Centre for Life-Science Research and the European Spallation Source.

The 2017 bill provides for an increase in grants to the Research Council in order to support data-driven research. The increase amounted to SEK 20 million (USD 2.4 million) in 2018 and an additional SEK 20 million in 2019.

The allocation to the Swedish University Computer Network (Sunet), a research infrastructure offering affiliated universities and some cultural institutions Internet connections nationally and internationally and related IT services, was also increased through a reallocation of funds from the Research Council.

The bill also takes a strong stance to promote open access to research data. Its goal is that all scientific publications from publicly funded research should be openly accessible immediately after their publication. Likewise, research data used in scientific publications should become openly available. Open access to research outputs is expected to promote high-quality research.

Further to the European Commission's recommendation on access to and preservation of scientific information (European Commission, 2012), the government asked the Research Council to issue national guidelines for open access to research. In addition, the 2017 bill has given the Research Council responsibility for the national co-ordination of the work on open access to research data. To this purpose, the budget of the National Library of Sweden (Kungliga biblioteket) has been increased through a reallocation of funds from the Research Council. This includes further development of the *SwePub*, a national database of the scientific publications available at Swedish universities.

Innovation partnerships programmes

In 2015, the government established the National Innovation Council with the mandate to promote Sweden as a country of innovation and to strengthen its international competitiveness. The council has an advisory role and provides new perspectives on issues of importance in innovation policy, in the short and long run. It is chaired by the prime minister and consists of five ministers and ten external members with backgrounds including in industry and research.

The Innovation Council has identified three areas that are crucial to tackling the great societal challenges of our time: digitalisation, life sciences, and environment and climate. Based on these priority areas, the council has established five innovation partnership programmes (IPPs). The IPPs are meant to encourage and build on many initiatives for research and innovation undertaken in collaboration among industry, academia and the public sector. The five IPPs are: i) next-generation travel and transport; ii) smart cities; iii) circular and bio-based economy; iv) life science; and v) connected industry and new materials. Digitalisation cuts across all five programmes.

The IPPs were launched on 1 June 2016. Each one relies on a partnership group that identifies challenges and opportunities and sets priorities for action. Several groups have been established and a number of concrete partnership projects have been developed.

The IPPs aim to foster synergies among a number of innovation programmes already in place, notably the 17 strategic innovation programmes (SIPs) jointly financed by Vinnova, the Energy Agency and the Research Council (Formas).

The SIPs were the result of an intensive consultation process over 2012-16 among the stakeholders active in a certain innovation area. Their goal is to foster co-operation in areas of strategic importance to Sweden in order to find sustainable solutions to global social challenges and to increase Sweden's competitiveness in the international arena. Businesses, academia and organisations join forces under the umbrella of these programmes to develop the sustainable products and services of the future.

With about SEK 2.11 billion (USD 250 million), "Connected industry and new materials" was the IPP with the largest amount of grants financed by Vinnova in 2017 (Figure 5.3). The other IPPs received between SEK 819 million (life sciences; USD 97 million) and SEK 543 million (circular and bio-based economy; USD 64 million).

Figure 5.3. **Vinnova grants under the innovation partnership programmes, 2017**
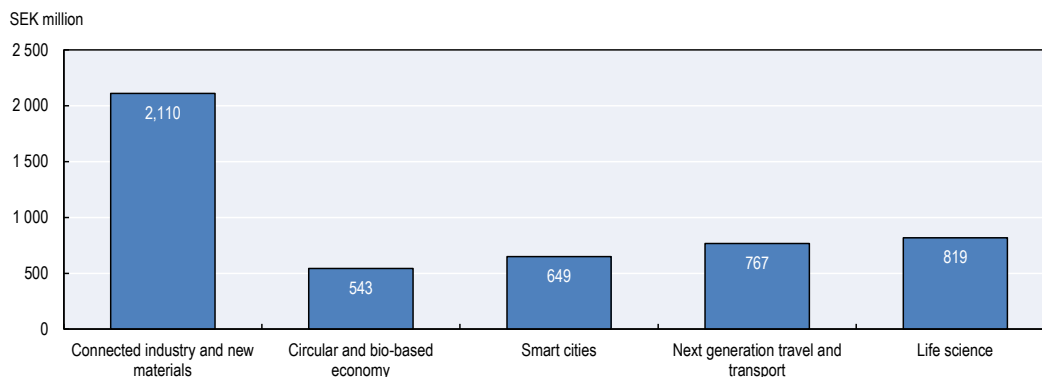
Source: Vinnova (2017), *Annual Report 2017*, https://www.vinnova.se/publikationer/arsredovisning-2017.

A number of programmes under the IPP "Connected industry and new materials" are aimed to support digital innovation.

Process Industrial IT and Automation (PiiA) aims to help grow Swedish process industry by supporting the development of advanced IT and automation solutions. The programme facilitates co-operation between process industry businesses, their suppliers and research partners. The PiiA's goal is that, by 2022, Sweden will be recognised as the world leader for the development and use of innovative and competitive solutions in process industrial IT and automation. The programme consists of four work streams:

1. projects: research, innovation and development projects supporting the digitalisation of the process industry

2. analysis: trends and intelligence within IT and automation

3. innovation: competence and innovation support

4. research: industrial postdoctoral programme to secure that the future competence contributes to the development and use of automation and digitisation in industry.

Smarter Electronics Systems aim to foster cross-border co-operation to develop micro and nano-electronics, photonics, micromechanics, power electronics, and built-in systems in Sweden. Smart electronic systems are increasingly used in technologies to address global challenges, such as renewable energy development, energy production efficiency, energy saving, a long-term sustainable environment and ageing. The programme is carried out in broad collaboration between industry representatives, research institutes and universities.

Produktion2030 aims to make Sweden one of the world's leading countries for sustainable production. The programme focuses on how Swedish industry can strengthen its global competitiveness and create new and attractive jobs. Produktion2030 builds on close co-operation between the Association of Swedish Engineering Industries, the Swedish Production Academy and the Swedish research institutes. Produktion2030 is based on five instruments:

1. projects include research and innovation as well as test and demonstration projects

2. small and medium-sized enterprises (SMEs): it promotes the dissemination of new knowledge and technology to SMEs, through collaboration with local and regional industry clusters and networks

3. education: a national PhD programme Produktion2030 and a portfolio of courses at the master level, with a focus on industrial digitalisation

4. mobility provides financial support for exchange programmes and study visits

5. internationalisation and analysis: contributes to the EU research programmes relevant for the industry and carries out industry analyses through international networks.

The IPP "Next generation travel and transport" consists of four areas where digital innovation plays a key role. In particular, two of these areas focus on the development and use of digital technologies to improve transport and mobility.

The **Strategic vehicle research and innovation programme (FFI)** provides around SEK 1 billion (USD 118 million) per year for R&D activities. Public funds account for about a half of this amount. The programme is a partnership among Volvo, Scania, the Swedish automobile suppliers' association FKG, the Swedish automobile trade association BIL, Vinnova, the Swedish Energy Agency and the Swedish Transport Administration.

The FFI's overarching objectives are to reduce the environmental impact of road transport, reduce the number of people injured and killed in traffic accidents, and strengthen the international competitiveness of the automobile sector.

The programme consists of five permanent sub-programmes and a few strategic initiatives, providing an opportunity to explore a specific area using special funds for a limited time period. Seventy-five per cent of the FFI's budget is allocated to the five sub-programmes and the remainder is earmarked for strategic initiatives.

The five FFI sub-programmes are energy and the environment; road safety and automated vehicles; electronics, software and communication; sustainable production; and efficient and connected transport systems. Current strategic initiatives include: Bicycles and Other Vehicles in a Safe and Smart Cooperation for a Sustainable Future, Automotive Security and Privacy, and Complex Regulation and Machine Learning.

Within the IPP "Next generation travel and transport", **Drive Sweden** hosts a number of projects addressing the challenges related to road safety, infrastructure and legislation. The programme's goal is to develop solutions for "combined mobility as a service", i.e. the ability to purchase a journey from point to point using a variety of means of transport, e.g. autonomous vehicles, public transport, car pools and rental bikes. The programme also includes several projects related to the use of automated vehicles for logistic services and people transportation (Box 5.1).

The SIP MedTech4Health under the IPP "Life science" runs the **Analytic Imaging Diagnostics Arena (AIDA)** programme. AIDA is a national arena for research and innovation around artificial intelligence (AI) for medical imaging diagnostics. Through AIDA, academics, healthcare professionals and industry work together to translate technical advances in AI into clinically useful tools for the benefit of patients.

Medtech4Health enables groups and individuals to become involved with AIDA by applying for technical projects (groups) or clinical fellowships (individuals). Successful applicants can access AIDA's technical infrastructure and human expertise, as well as

benefit from a broad exchange with other innovators in the field. Their expenses may be funded by up to 50%. Medtech4Health has SEK 11 million (USD 1.3 million) allocated for AIDA over the period 2017-20. In early 2018, AIDA had nine ongoing projects and four clinical fellowships.

Box 5.1. The "Drive Me" project in Gothenburg

The Gothenburg City Planning Authority is the first in the world to examine the interaction between autonomous vehicles and sustainable, long-term urban planning. The city is exploring the effects and benefits of technology, including the future need for parking facilities, enhanced road safety, accessibility, and implications to the use of public space.

The project is part of two Swedish IPPs, Smart Cities and Next Generation Travel and Transport, and is funded in part by Vinnova within the framework of the public-private partnership Drive Sweden. It will continue through to the end of 2018.

Drive Me is the world's first large-scale pilot project in autonomous driving where 100 self-driving cars are being driven on public roads in Gothenburg.

The ground-breaking project is a joint initiative involving the car maker Volvo, the developer of active safety systems Autoliv, the Chalmers University of Technology, the Lindholmen Science Park for transport-related R&D, and the Swedish Transport Administration. The testbed has required a temporary exception to transport regulation voted by the Swedish parliament following a two-year investigation.

The DriveMe project focuses on a number of areas, including:

- how autonomous vehicles can generate social and economic benefits by improving traffic flows, environment and safety

- infrastructure specifications for autonomous driving

- which traffic situations are appropriate for self-driving vehicles

- the customer's confidence in self-driving vehicles

- how other drivers can be integrated with a self-driving car.

The project started in 2014 with customer surveys, technical advances and the development of user interfaces and cloud-based services. The first pilot cars were launched on the streets of Gothenburg in 2017 and involve local drivers integrating autonomous driving technology into their daily lives.

Source: Test Site Sweden (n.d.), "DriveMe", https://www.testsitesweden.com/en/projects-1/driveme.

Innovation Engines is another programme that is part of Medtech4Health's providing cutting-edge trials for the systematic testing and implementation of new technologies and new work practices (e.g. wireless measurement in hospitals, remote consultations, etc.). To support the Innovation Engines, Medtech4Health has budgeted SEK 10 million (USD 1.18 million) in 2017 and 2018 as well as a further SEK 6 million (USD 0.71 million) each year for 2019 and 2020.

Internet of Things (IoT) Sweden is a SIP under the IPP "Smart cities". The objective of the programme is to promote innovation and adoption of IoT as a tool to address societal challenges, in co-operation with public organisations, businesses and scientists.

The programme works mainly with three different types of activities: seminars and meetings, where IoT opportunities and challenges are identified and discussed; calls for innovation projects, IoT Sweden supports Vinnova in formulating and designing calls for innovation projects in the field of IoT; strategic innovation projects, through analyses and monitoring of the IoT area, IoT Sweden recommends Vinnova to finance a small number of key projects.

Smart Industry: A strategy for new industrialisation in Sweden

In 2016 the Swedish government launched a new industrialisation strategy "Smart Industry" (Ministry of Enterprise and Innovation, 2016). The strategy's vision is that Sweden will be a world leader in the innovative and sustainable industrial production of goods and services. Its goal is that the industrial sector throughout Sweden will increase its competitiveness and participation, primarily in the high-quality segments of global value chains. The strategy set objectives on four focus areas:

1. Industry 4.0: companies in the Swedish industrial sector should be the leaders in the digital transformation and in exploiting the potential of digitalisation.

2. Sustainable production: increased resource efficiency and more sustainable production should contribute to value creation, job creation and competitiveness in the industrial sector.

3. Industrial skills boost: the skill development system in Sweden should meet the skills demand by the industrial sector and promote its long-term development.

4. Testbed Sweden: Sweden should lead research in fields that contribute to strengthening the industrial production of goods and services.

The strategy is supported by an action plan, which is regularly monitored and updated. To support the strategy's implementation, the government has set up an Advisory Board for New Industrialisation, consisting of four members with a wide range of experience and good insight into the conditions and needs of the industrial sector. The Advisory Board monitor the strategy's implementation and regularly submits recommendations for future work.

The strategy is being monitored based on a small set of indicators (employment in different segments of the value chain, productivity, gross investments and R&D investments), which together provide a measure of the capability of the industrial sectors to adapt and innovate according to the strategy's objectives. When appropriate, these indicators are complemented by additional ones to monitor and assess specific areas of the strategy and the action plan.

Some of the projects under the Smart Industry are also part of the IPPs, e.g. Produktion2030, PiiA and IoT Sweden. Other projects of particular interest are related to the development and use of 5G technologies.

PIMM DMA (Pilot for Industrial Mobile communication in Mining, Digitalised Mining Arena) focused on developing a "state-of-the-art" mobile network in a mine and testing a number of applications enabled by mobile communication. The project has shown that cellular-based communication has very good properties, enabling robustness, time performance and low latency for demanding applications. PIMM DMA is expected to lead to the development of new products and services enabling industrial automation, in general, and mining automation, in particular.

Over 2015-17, the **5G-Enabled Manufacturing (5GEM)** project created a pilot production system for world-class industrial manufacturing based on wireless and mobile 5G communication. Fifth generation wireless communication technologies offer new means for Swedish industry to achieve higher productivity, flexibility and competitiveness. The project developed demonstrators for manufacturing system design, deployment, operation and maintenance, which are the key life-cycle phases for competitive and sustainable manufacturing.

As part of the Smart Industry Strategy, Vinnova is investing SEK 10 million (USD 1.18 million) in 2018 on 13 projects to disseminate knowledge on AI, human collaborations with robots and digital security.[1]

New approaches to innovation

In recent years, a number of new approaches to test technological and organisational innovations have emerged in many countries. Current practices include testbeds, sandboxes and policy labs. While there does not seem to be an agreed definition for each of these terms, which are often used interchangeably, the common idea is to set up a separated environment where innovations can be tested in isolation, with the aim to diffuse successful innovations to a larger number of situations and institutions. In a loose sense, testbeds tend to focus more on the technical features of an innovation (i.e. they are similar to a "large-scale" laboratory test); sandboxes look at the interactions among a number of agents implementing or adopting the innovation (e.g. a selection of firms); whereas policy labs focus on the implications of specific innovations on the economy and society and how policies can best address them.

Testbed Sweden

Digitalisation opens new opportunities for simulations, tests and demonstrations in several areas. It also broadens the scope for the collection and analysis of the data generated by these experiments. Test and demonstration environments, referred to as testbeds, are becoming increasingly important for businesses and the public sector as goods and services are developed at a more rapid pace and become increasingly complex.

In January 2016 the Swedish government launched **Testbed Sweden** to encourage new ideas and solutions to be tested in Sweden. The goal of the programme is to create a research and innovation environment more attractive for foreign investors. This requires strengthening co-operation between businesses, regulatory agencies and the public sector. Testbed Sweden includes several different types of tests, mainly implemented through strategic innovation areas, test and demonstration environments, institutions, challenge-driven innovation and collaboration programmes.

Vinnova has been given responsibility for a national co-ordinating mechanism to strengthen test and demonstration activities in Sweden; provide and disseminate information on the hundreds of testbeds available in Sweden; and contribute to make them attractive internationally. A number of testbeds projects are undertaken in the field of digitalisation (Box 5.2).

Box 5.2. **Digitalisation testbeds in Sweden**

Vinnova is working to strengthen the prospects for testbeds in Sweden. Several testbed projects are undertaken in the field of digitalisation.

3D additive manufacturing

Research in new materials and applications of 3D bio-printing in fields including cancer research. Projects are carried out in collaboration with medical and clinical research teams and industry, in a laboratory and simulated environment.

CRATE

CRATE is an exercise and training facility for the protection of IT systems under realistic conditions. CRATE is also used for research projects and for tests and experiments, in a laboratory, simulated and real environment.

EMC: Testbed for interference resistance of electronics and wireless communication technology

The testbed is used for research, tests, evaluation, and demonstration of electronic disruption resilience and new communications technology. Projects are carried out in a laboratory and simulated environment.

Gamecubator

The testbed's purpose is to provide a creative environment to promote growth in the area of game development and gamification for new and existing companies by means of coaching, infrastructure and tools. Projects are carried out in a real environment.

PrEsEnT

Lapplands Gymnasium – one of Sweden's largest upper secondary school – builds and runs a testbed environment to develop the future of distance teaching via partnerships and smart, inclusive and transparent innovation systems and living labs. Projects are undertaken in a simulated and real environment.

Active Learning

This testbed's purpose is to support teachers to develop more effective teaching approaches using digital tools and content. The project tests, develops, and introduces working methods and tools for active learning, in a simulated and real environment.

"Maker" school

The purpose of this project is to contribute to the development of new subject matter specific methodology based on the creative use of emerging technologies. The project is run in a real environment.

Visualisation Screens (Visualiseringsbordet)

The testbed's purpose is to explore and demonstrate opportunities to visualise and interact with 3D datasets based on large multi-touch screens. Primary areas of use are learning, communication and experiences, and decision making. The project is run in a simulated and real environment.

Source: Vinnova (2018), "Testbeds in Sweden", https://www.vinnova.se/en/m/testbed-sweden/testbeds-in-sweden.

Regulatory sandboxes

Digitalisation is creating opportunities for new business models and reshaping the way firms compete with one another and interact with consumers. Most regulations were established before the development of digitalisation and may not be fit to this new environment. In some cases, regulation may become ineffective and not achieve the goals it was designed for; in others, regulations hamper innovation by preventing the diffusion of new business models or the emergence of new goods and services.

The regulatory sandbox allows businesses to test innovative products, services, business models and delivery mechanisms in the real market, with real consumers. The sandbox seeks to provide firms with the ability to test products and services in a controlled environment, reduced time-to-market at potentially lower cost, support in identifying appropriate consumer protection safeguards to build into new products and services, and better access to finance.

In March 2017, Finansinspektionen (FI), Sweden's Financial Supervisory Authority, received an assignment from the government to map innovations in the financial sector; and review the questions and needs of market participants in relation to the authority's core activities: supervision, authorisation and regulations. The FI is tasked with safeguarding the stability of the financial sector and sound consumer protection but has not been given an explicit assignment to promote innovation.

Innovative activities are initiated either by financial companies or non-financial firms, often start-ups. Companies are experiencing a considerable need for information about rules, processes and principles in order to be able to realise their innovations.

In order to meet this need, the FI has established an Innovation Centre providing information and maintaining a dialogue with companies that conduct innovation-based business (FI, 2017). The objective of the centre is to serve as a single point of contact for companies that are unsure of the rules, processes and principles that apply in the financial sector to their innovations.

At the same time, the Innovation Centre helps the FI to monitor the development of the financial sector since it makes the authority a natural "partner" for businesses when it is unclear how regulations and the FI's processes apply to an innovation. This also helps the FI to develop a more transparent authorisation process, thus contributing to better supervision and stronger consumer protection.

Typically, a regulatory sandbox provides authorisation only for a small set of firms. In Sweden, this mechanism is regarded as problematic for two reasons. First, the selection process can be considered to benefit some companies at the cost of others; second, it may raise conflicts of interest if companies perceive the authority to be standing behind or taking responsibility for certain innovations.

The Innovation Centre, therefore, makes it possible to achieve the main functions of a regulatory sandbox, i.e. a closer and more transparent dialogue between firms and the authority, while avoiding the drawbacks of selecting firms.

Policy labs

Policy labs are dedicated teams, structures or entities focused on designing public policy through innovative methods that involve all stakeholders in the design process (Fuller and Lochard, 2016). Many countries have established policy labs as a tool to enhance co-operation among administrations, authorities and government ministries as well as businesses and citizens.

In Sweden, a number of labs have been founded, such as Co-lab Sweden (working on the inclusion of child and youth immigrants), Experio Lab (addressing challenges to the healthcare system), Trafiklab (a community of developers that aims to disseminate public transport data to various social actors), OpenLab (for social innovation in Stockholm) and Mötesplats Social Innovation (with a focus on social development in Skåne).

Trafiklab is a community where developers can share data and application programming interfaces (APIs) for public transport in Sweden and easily get the information needed to develop new services. Examples of APIs developed through Trafiklab include STHLM Traveling, an application providing travel plans, real-time traffic information and the possibility to buy e-tickets, used by 50 000 people every day and translated into 15 languages. Skutsgruppen is an application offering travellers seats in private buses, boats, cars, bikes, air balloons and public transport throughout Sweden, through co-operation between public transport and the car rental companies. The App Resident makes it easier to travel in public transport, especially for people with cognitive impairment such as attention deficit hyperactivity disorder and autism. The service Keoscreens provides bus travellers in the city centre of Stockholm real-time traffic information directly on screens of the buses.

A policy lab is also active as part of the Drive Sweden programme. The lab aims to help Swedish authorities increase knowledge, stimulate new processes and ultimately create new services, adjust regulations to enable more tests of new mobility technologies and services in real environments in Sweden. The lab focuses on the development of rules for trial and implementation and looks at regulatory issues and policy processes.

The Swedish Tax Agency has also set up a policy lab in order to achieve higher compliance with existing tax rules in the area of the sharing economy. Through the policy lab, the Swedish Tax Agency aims to gain insight about difficulties and incentives for end users to comply with existing taxation rules and develop proposals for changes in the current regulations.

Policy labs are very interesting experiments, but they face high uncertainty due to budget cuts and changes in elected officials. Although policy labs are often intended to spread innovative practices to the public administration and government, in practice such initiatives often remain limited to the community that launched them. Effects on policies seem to be the greatest when a policy lab is initiated by those who will be the potential users of its outputs.

Recommendations on innovation policies for digitalisation in Sweden

Set clearer priorities for digital innovation

Sweden is an international hub of scientific excellence and technological leadership. This vibrant innovation environment also applies to digital technologies. There is a large number of initiatives, publicly funded and in co-operation with business, to foster research in ICT technologies and promote the adoption and development of advanced digital tools for businesses.

While this high dynamism, combined with a bottom-up approach, are very valuable for research and innovation, it would be useful for the government, through its innovation and research agencies, to provide stronger guidance about innovation priorities in the field of digitalisation.

This recommendation is also supported by the assessment of the publication *OECD Reviews of Innovation Policy: Sweden 2016* (OECD, 2016d: 17): "A lack of adequate governance, leadership and strategic vision is at the heart of many of the difficulties

encountered in successfully implementing the policy initiatives examined …. Research and innovation policy, governance and co-ordination mechanisms should be transformed to effectively link public research and innovation and address societal challenges".

The establishment of the Innovation Council and the IPPs are a useful step towards setting strategic priorities, streamlining activities and fostering synergies of innovation programmes. There is, however, room for further improvement in this direction.

Scale up the size of programmes for digital innovation

Public funds to research activities related to digitalisation seem to be scattered among a plethora of programmes. The objective and scope of some programmes appear fairly close and, while different approaches to address the same challenges may be an asset for research, too much fragmentation may result in missing economies of scale in research and testing.

Reaching a critical mass is particularly important for innovations related to digitalisation, as challenges and solutions are common to many sectors and industries. By interfacing and co-ordinating the efforts of different industrial sectors, progress in specific technological areas can be attained faster.

As digital solutions often require large investments, it is less costly to develop common test environments that can be shared for different technologies. In addition, the diffusion of successful innovations generated by testbeds may be limited if their scope is too narrow and their replicability on a bigger scale or for a larger community of users unclear (Growth Analysis, 2017).

The publication *OECD Reviews of Innovation Policy: Sweden 2016* made a similar assessment: "Overall, there is insufficient specialisation and concentration of research resources in priority areas. Wise strategic choices coupled with larger centres to exploit the benefits of scale, as well as emphasis on the global positioning of Swedish universities, could help improve their performance" (OECD, 2016d: 16).

Figure 5.4. **Vinnova's funded projects for co-operation in innovation, 2017**
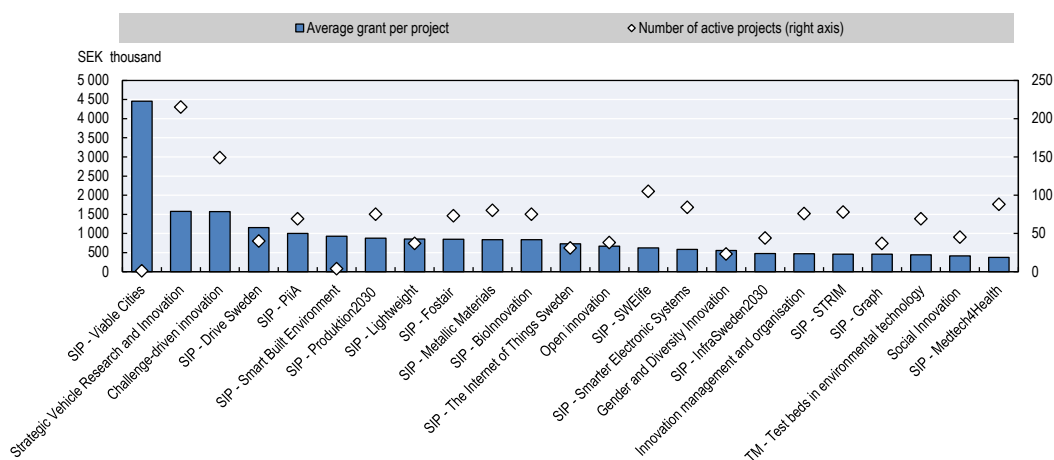
Source: Vinnova (2017), *Annual Report 2017*, https://www.vinnova.se/publikationer/arsredovisning-2017.

As available resources are limited, it is critical to focus on areas of high importance to Sweden and where Swedish firms can gain or sustain a leading position (Vinnova, 2016). Too many projects may result in too little funding for at least some of the projects. For

instance, there were over 1 500 projects financed or co-financed by Vinnova in 2017 as part of its strategy to promote co-operation in innovation. However, the average grant for these projects was SEK 881 000 (USD 104 000) (Figure 5.4).

Improve the assessment of innovation policies

The Research and Innovation Bill 2017 points out the need for a closer and more systematic evaluation of the variety of projects and initiatives supported by Swedish innovation policies. Indeed, the OECD's 2016 Review also observed that "there is little evidence" (p. 15) that some of the policies to improve innovation performances in Sweden, e.g. increase in block funding to universities and the establishment of strategic research areas, have produced the expected effects.

A recent review undertaken by the Swedish Agency for Growth Policy Analysis (Deiaco and Tingvall, 2017) concludes that evaluation studies of the effects of innovation policies provide a mixed picture. Different evaluations of the same programme may reach opposite conclusions, with self-assessment based studies resulting in a positive evaluation more often than quantitative studies.

While the assessment of innovation policies is a complex task, it is essential that the large number of programmes active in Sweden are systematically analysed. Support schemes to innovation may lead to unwanted outcomes, such as rent-seeking, picking winners, distortion of competition, excessive administrative costs, bias in investments and tax wedges, only to mention the most common problems.

Strengthening policy labs and regulation sandboxes

Digitalisation is opening up great opportunities for the economy and society, but seizing these opportunities requires innovative ways to design and implement policies and regulations. The complex challenges raised by digitalisation require an ability to work across policy areas and administrative boundaries; involve users, citizens and businesses; and experiment and explore in a more agile, co-creative and open environment.

Furthermore, timely adoption of new digital technologies benefits from a systematic and formal approach, where priorities are set and activities co-ordinated across departments and agencies. The rapid technology evolution, the speed of the digital transformation and its cross-sectorial nature are all factors that policy makers need to consider.

Several policy labs have been established in Sweden in recent years, as in a number of many other countries. While these initiatives are interesting and potentially useful, their effects seem limited by a number of factors, including insufficient political commitment in the long run. The government should take a clear stance in favour of policy labs and include them among its policy tools, particularly in relation to digitalisation.

Regulatory sandboxes provide another useful instrument to ensure co-operation between all stakeholders in the development of new regulations better suited to the digital economy. The successful example of the Innovation Centre launched by the FI, Sweden's Financial Supervisory Authority, points to the opportunity to broaden the traditional mandate of regulatory agencies (supervision, authorisation and regulations) to include support to innovation.

Through regulatory sandboxes, agencies would be able to engage in a closer dialogue with companies that intend to develop new business models based on innovation. This requires a profound change in the culture and the practice of regulatory agencies, but also a clearer mandate by the Swedish government that issues instructions to those agencies.

Labour markets and jobs in the digital economy

The digital transformation is creating job opportunities in new markets and increasing employment in some existing occupations. At the same time, digital technologies enable the production of more goods and services with less labour, thus exposing some workers to the risk of unemployment or lower wages. In addition, digital platforms enable changes in the organisation of work, with implications for the capability of existing policies and programmes to ensure labour market inclusion, job quality and skills development.

To reap the benefits of the adoption of digital technologies, governments, businesses, trade unions and academia will need to address new economic and labour market challenges. This section will focus on policies to accompany workers along the transition to the new jobs enabled by the digital transformation and to help ensure job quality in the digital economy.

Digitalisation and jobs

There is growing concern that digital technologies have contributed to job losses, wage stagnation and rising wage inequality in many OECD countries over the last two decades. Spectacular progress in robotics and AI raises worries that job displacement may continue at an even faster rate in the near future.

Economic history shows that major technological innovations have always been accompanied by extensive transformations in the labour market. Jobs brought about by new technologies are different from the old jobs: they are created in different sectors and different occupations, they involve different tasks and require different skills.

Figure 5.5. **Employment changes by industry in OECD countries, 1995-2015**

Percentage changes
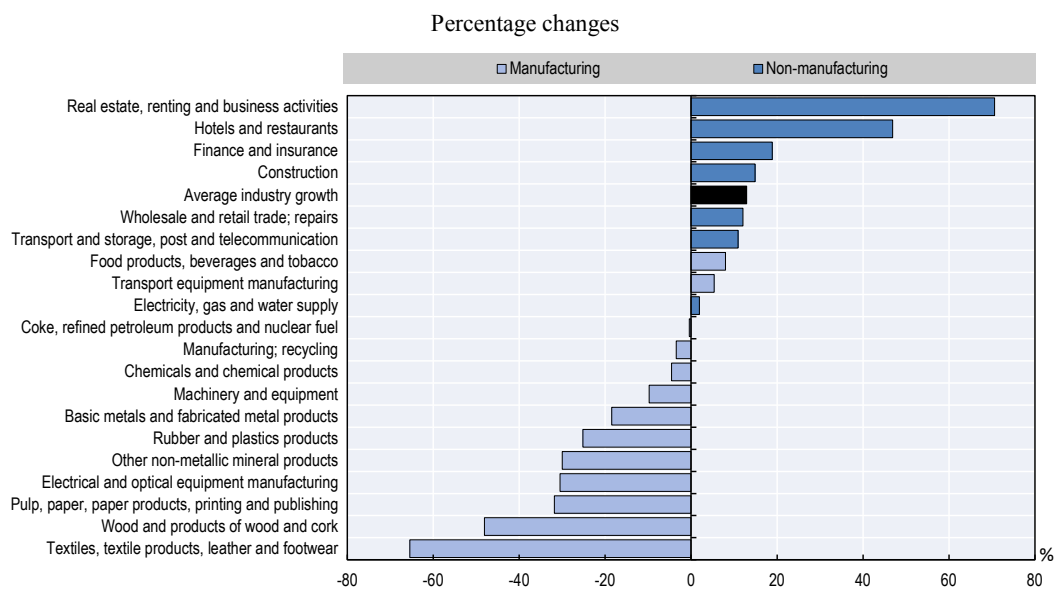
Note: The countries included in this graphic are: Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, the Netherlands, Norway, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, the United Kingdom and the United States.

Source: OECD (2017a), *OECD Employment Outlook 2017*, http://dx.doi.org/10.1787/empl_outlook-2017-en.

In today's digital transformation, employment is decreasing in sectors with more scope for automation and slower growth in demand, such as manufacturing, retail and

finance (Figure 5.5). The decrease in employment is more pronounced in routine occupations, both for low- and high-skilled jobs, leading to employment polarisation and the decline in the share of middle-income jobs (OECD, 2016a; 2017a).

In this context, effective labour market policies and institutions are essential to accompany displaced workers along the transition to new jobs and reduce the social costs of this process (OECD, 2016c).

The OECD recently carried out an in-depth review of labour market policies in Sweden (OECD, 2015). Compared to most OECD countries, the Swedish labour market has performed pretty well in recent years. Almost 90% of the displaced workers in Sweden find a new job within a year (Figure 5.6). On average, their wages are lower than they were in their previous job, but the income loss is smaller than in other comparable OECD countries.

The resilience of Swedish employment during the global financial crisis suggests that its labour market policies and institutions are well-equipped to deal with the digital transformation. Sweden's capability to facilitate a smooth transition for workers affected by economic restructuring is mainly the result of two specific features of its labour market institutions: the strong dialogue between the social partners and the active role of the job security councils (JSCs).

Figure 5.6. **Re-employment rates of displaced workers**

Selected OECD countries

Source: OECD (2015), *Back to Work: Sweden: Improving the Re-employment Prospects of Displaced Workers*, http://dx.doi.org/10.1787/9789264246812-en.

Social partners play a key role in the regulation of the labour market in Sweden through collective agreements (Box 5.3). They also provide comprehensive support for displaced workers in the transition from job to job through the JSCs. These are non-profit foundations, offering advice and consultation to employers as well as transition services and guidance to workers (Box 5.4).

The key feature of the JSCs is that they provide their services before dismissal takes place or at very early stages of the process. Compared to most OECD countries, the notice period in Sweden is longer – up to 12 months for 55-year-olds and above, white-collar workers with at least a 10-year job tenure, which gives the JSCs time to help dismissed workers find a new job.

Box 5.3. **Social partners in Sweden**

There are three main trade union confederations in Sweden:

1. LO (Trade Union Confederation) – the biggest trade union confederation that covers mainly blue-collar workers.

2. TCO (the Swedish Confederation of Professional Employees) – covers professionals and most white-collar workers.

3. Saco (the Swedish Confederation of Professional Associations) – brings together unions organising civil servants and professional employees.

Collective agreements are made through two main negotiation councils, namely the Federation of Salaried Employees in Industry and Services (PTK) and the Public Employees' Negotiation Council (OFR). These councils play an important role in collective bargaining at branch/sector level.

The PTK negotiates with the Confederation of Swedish Enterprise on pensions and unemployment insurance, comprising 27 national unions from the TCO and Saco and representing 700 000 employees. On the other hand, 14 national unions in the public sector have joined together in the OFR, which is a collaborative body, a forum for dialogue and co-operation where the unions consult and co-operate with each other on common bargaining issues. The unions represent some 560 000 central and local government employees. The OFR is formed by unions from both Saco and the TCO.

Figure 5.7. Social partners in Sweden
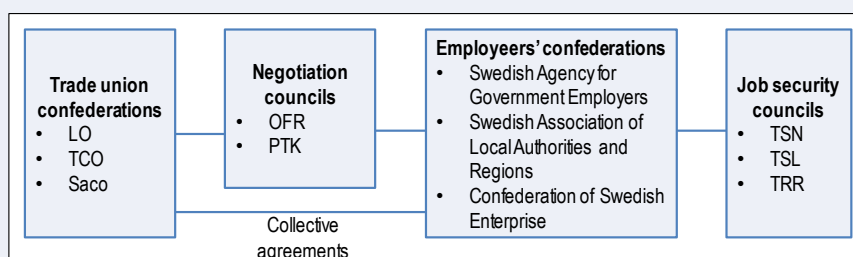
There are approximately ten more JSCs in Sweden. The TSN, the TSL and the TRR are the main ones.

Source: OECD (2015), *Back to Work: Sweden: Improving the Re-employment Prospects of Displaced Workers*, http://dx.doi.org/10.1787/9789264246812-en.

On the government side, the Ministry of Employment has the main responsibility for labour market policy related to displaced workers, acting through the PES. Unlike the JSCs, services provided by the PES come after a dismissal takes place and programmes are not typically tailored to the professional profile of displaced workers. Furthermore, PES services are limited to priority groups, e.g. long-term unemployed, disabled and immigrant workers, while all other groups can benefit from intensive support only after 300 days of unemployment, via the Job and Development Programme.

While the JSCs are very successful, workers with temporary and fixed-term contracts, mainly youth and other vulnerable groups, benefit less from their services, despite the fact that they are more likely to be dismissed. In addition, many of those who qualify for the JSCs support receive only partial services, especially blue-collar workers. Expanding the JSCs' services to all displaced workers remain a major challenge for labour market institutions in Sweden (OECD, 2015).

Box 5.4. **Job security councils in Sweden**

In Sweden, the labour market is characterised by a high percentage of unionisation and collective bargaining coverage and a unique degree of co-operation between social partners. This is exemplified through the JSCs, a structural mechanism developed by trade unions and employers in the 1970s that operate independently from the government and Public Employment Services (PES). The JSCs are financed by employer contributions based on collective agreements between social partners in specific industries and sectors, with reference to employment protection legislation (EPL).

More than ten JSCs cover almost 80% of the Swedish labour force, including white-collar workers, blue-collar workers and public employees. The JSCs provide transitional services to displaced workers based on their individual circumstances and requirements. They also provide tailored advice and counselling services to both employers and trade union representatives during the earliest stages of restructuring, with the aim of managing voluntary and compulsory redundancies. Crucially, the JSCs provide tailored advice to both employers and trade unions at the very early stages of the unemployment process, often even before workers are officially unemployed. As a result, the majority of re-employment offers to displaced workers are made before the end of the formal redundancy transition period. In 2016, the council responsible for white-collar private sector employees (Trygghetsrådet) was successful in finding new employment opportunities for 88% of laid-off workers.

The JSCs in Sweden are remarkable in their capacity to provide rapid response services in the case of mass layoffs of entire workplaces, but also in terms of extending early intervention measures to individual and small-scale layoffs. This helps workers from all backgrounds and competences transition to new work, regardless of the nature of the previous employment. The JSCs further highlight the role of constructive engagement among all concerned parties, including the individual, trade unions and former employer, while also accommodating the specific needs of displaced workers.

Source: OECD (2015), *Back to Work: Sweden: Improving the Re-employment Prospects of Displaced Workers*, http://dx.doi.org/10.1787/9789264246812-en; TUAC (2018), "The Swedish job security councils: A case study on social partners' led transitions".

Not only the coverage but also the quality and range of services provided vary among the JSCs. For instance, the Early Risk Service, i.e. a set of special anticipatory measures focusing on career planning for all workers who could potentially be affected by displacements, is currently offered by all the JSCs to provide all displaced workers with the same opportunities. Assessing the outcomes of JSC services and promoting the uptake of the most successful ones is another challenge for the social partners system in Sweden.

The current separation between job-search counselling and training – the first being provided by the JSC during the notice period and the second under the PES after dismissal – are likely to weaken the effectiveness of job-transition services. There is room to improve the co-ordination between the JSCs and the PES at an early stage, which currently takes place only for large-scale redundancies, and to increase resources for the training of blue-collar workers.

Finally, the target groups of the PES should be enlarged from disadvantaged groups to all short-term unemployed, particularly blue-collar workers, who have higher employability and could benefit the most from the PES' services (OECD, 2015).

New forms of work in the digital economy

Over the last few years, Internet platforms have emerged as major actors in the digital economy, providing digital marketplaces for information, goods and services. Among them, Internet job platforms are providing new ways to match demand and supply for labour services.

Some job platforms provide a marketplace for low-skill physical tasks, mostly carried out by young people on an occasional basis. Others enable digital services on line, matching demand and supply across different countries and over a wider range of tasks, from low-skill tasks like data entry or administrative support to high-skill ones like programming, legal advice or business consulting (Figure 5.8).

Figure 5.8. **Tasks on platform-mediated jobs**
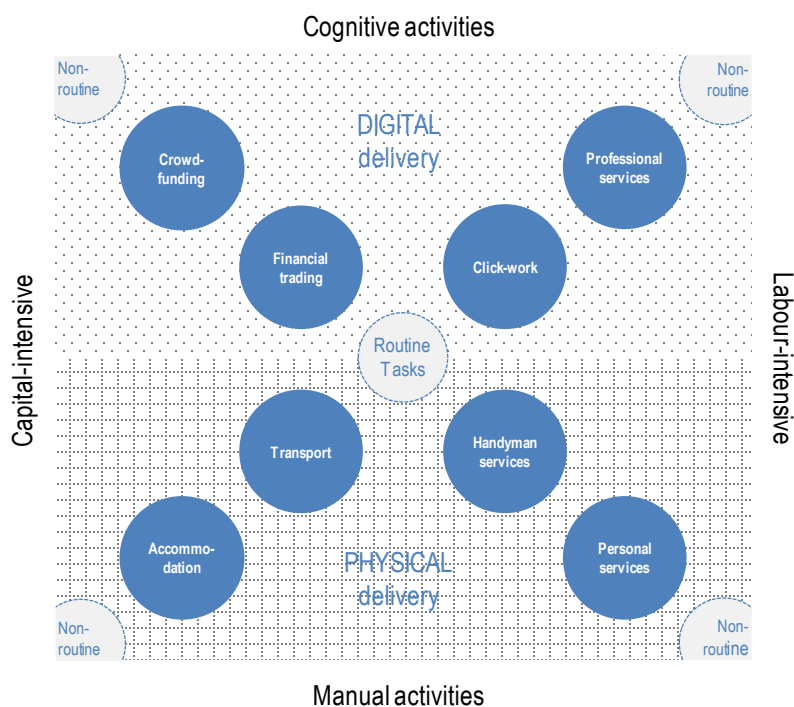
Source: OECD (2016b), "New forms of work in the digital economy", http://dx.doi.org/10.1787/5jlwnklt820x-en.

Internet job platforms have the potential to dramatically change traditional work arrangements and labour market relationships. Some full-time, long-term jobs are being turned into an uneven flow of "on-demand" tasks for a large global pool of "virtual workers". While these changes create opportunities for workers, jobseekers and firms, they also raise major challenges for job quality, taxation and social security.

Platforms have contributed to job creation in a time of economic crisis and may create further job opportunities in lagging regions while mitigating skills shortages in dynamic areas. In addition, the platform economy has reduced transaction costs and enables employers to avoid many regulations and taxes associated with standard employment contracts, which has led many SMEs to use them. The platform economy could also lead to more inclusive labour markets as it removes many barriers to employment faced by certain under-represented groups in the labour market.

The main advantages for platform employers are the access to a larger pool of skills and experience, faster execution of the tasks contracted out and lower costs for hiring, administration and facilities. The risk of losing in-house competences as well as poor control over the process and the quality of the service provided are reported as the main drawbacks.

According to workers, among the main reasons for working via an online platform is the ability to manage working time independently, to choose the place of work and to achieve a better work-life balance (OECD, 2016b). These benefits tend to be higher for certain groups, notably single parents, students and seniors.

The benefits from higher flexibly, however, do not come without costs. Platform-based workers may have to perform many tasks in parallel, working longer hours and under higher stress. Other negative aspects include the information asymmetry between employers and workers, the lack of a reliable dispute resolution system, the possibility of privacy violation, and the lack of support from colleagues and managers. Work satisfaction also tends to be low as tasks are often low-skilled and trivial (Eurofound, 2015).

Under the existing labour market programmes and regulations, platform-based workers are likely to face some of the same problems as those in non-standard work, such as temporary, part-time or short-term jobs. Non-standard workers tend to experience lower wages than standard workers as well as greater job insecurity and earning losses between contracts (OECD, 2014).

The self-employed are more likely to have fewer work-related benefits, in particular for unemployment, work injury, sickness, maternity and retirement. Non-regular workers are also less likely to receive employer-sponsored training in most OECD countries but have a higher probability of becoming unemployed or leaving the labour force (OECD, 2014).

EPL is also lower for non-standard workers. In Sweden, EPL includes heavy notification procedures in case of dismissal, stringent regulation of the order of layoffs in case of redundancy, a relatively broad definition of unfair dismissals and sizeable compensation following such dismissals. However, many of these provisions apply to permanent work contracts only. The gap in EPL between permanent and temporary workers in Sweden is among the highest in the OECD (Figure 5.9).

Figure 5.9. **Gap in the strictness of employment protection legislation between permanent and temporary contracts in OECD countries, 2013**
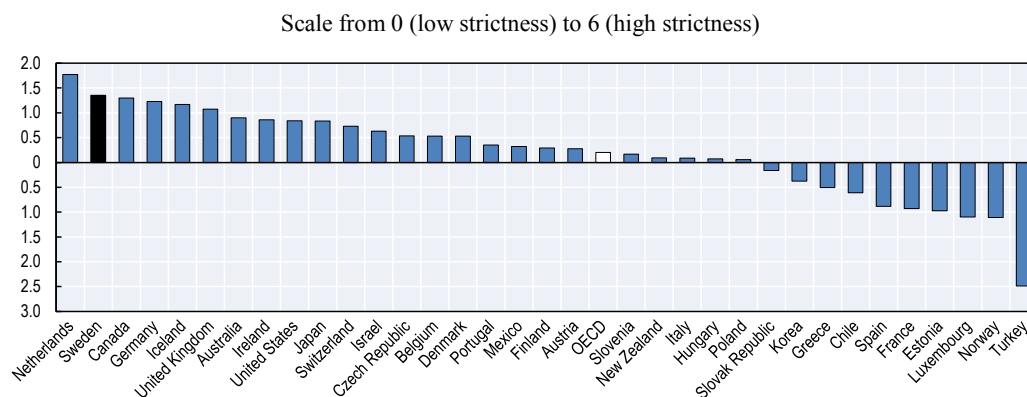
Scale from 0 (low strictness) to 6 (high strictness)

Source: OECD (2015), *Back to Work: Sweden: Improving the Re-employment Prospects of Displaced Workers*, http://dx.doi.org/10.1787/9789264246812-en.

To meet these challenges, governments, employers' organisations and trade unions should improve their capability to detect emerging labour market trends and explore ways of developing existing labour market programmes and safety nets, where eligibility is tied to standard employment models, so as to ensure inclusive growth and job quality.

Box 5.5. A "social partners' platform": A proposal by Unionen

Unionen, Sweden's largest trade union on the private labour market, is developing a novel approach to self-regulating the emerging platform-based labour market, based on the Nordic social partner model.

Existing regulation is designed with "analogue firms" in mind. To increase compliance and lower regulatory transaction costs for platform firms, it is crucial that the relevant regulation and the associated regulatory supervision be more adapted to the digital environment and the algorithms driving these firms. To achieve this, new, highly digital standards of regulation will need to be created.

Unionen proposes creating a platform institution tasked to create digital standards and guidelines for firms wishing to abide by the rules and norms established by society. By centralising this function, rather than relying on a plethora of government agencies to create such standards, relevant expertise can be concentrated, creating the best possible conditions for creating top standards and ease of use. The institution will be owned by the stakeholders, i.e. it will be shared between relevant trade unions and platform firms that have signed collective agreements. Centralised standard creation will also mean that standards are created "closer to the market" than would otherwise be the case.

Further efficiency gains can come from concentrating required expertise in a single institution, in turn continually improving existing standards and the process of creating novel ones. The created standards will be the result of negotiations between platform firms, trade unions and the relevant government agencies. The institution itself may thus be seen as a social compact tasked with adapting existing institutions to a changing labour market.

This will ultimately require the consent of legislators, as individual government agencies would normally be tasked with creating such standards. Given that platform-based firms may arise in a plethora of markets, an uncoordinated regulatory response might produce mixed results. There is also a risk of the developed standards not sufficiently balancing the sometimes shared and fragmented interests of platform firms and labour.

Apart from adapting existing regulation, there are already examples of novel practices possibly requiring regulatory supervision. One such example lies in the design and function of rating and reputation systems, an integral function of many platforms today. By creating trust between parties, and by giving an indication of expected quality, ratings determine the individual provider's, and sometimes the client's, ability to sell and purchase goods and services on platform markets. Ratings are thus also pertinent to wage formation. Ratings and reputations produced on platforms are usually not portable to other platforms, creating lock-in effects. Creating some degree of transferability between platforms may increase labour mobility and stimulate platform competition.

Source: Söderqvist, F. (2017), "A Nordic approach to regulating intermediary online labour platforms", https://doi.org/10.1177/1024258917711375.

The strong "social partners" model in Sweden may provide the space where platforms and trade unions can address these issues. There would be potential gains for all parties.

Platform firms would face lower transaction costs to comply with existing regulations and contribute to shaping regulations that are well-suited to their business model. Trade unions would contribute to setting up effective mechanisms to extend safety nets to platform workers not covered by current labour laws and agreements. Through this process, the government and its regulatory agencies would gain a better understanding of the features specific to a digital environment and be able to assess the effectiveness of existing rules and, when appropriate, design new rules fit to this environment.

In most countries, policy discussions on online platforms have mostly focused on specific sectors so far. Cross-cutting policy issues, such as the ones relating to work, consumer protection, taxation, competition, or privacy and security, should be addressed more systematically. A few countries have started to develop a more comprehensive approach though. The US Federal Trade Commission held a hearing and public consultation earlier in 2016 while the UK government has issued recommendations in response to an independent review of the sharing economy (Department for Business, Innovation & Skills, 2015). In Sweden, Unionen, the largest trade union on the private labour market, has proposed a platform institution tasked to create digital standards and guidelines for firms wishing to abide by the rules and norms established by society (Box 5.5).

A regulatory sandbox on platform-mediated jobs could also help to address some of the issues related to compliance with the current labour market regulations and the opportunity to develop new ones. The Innovation Centre established by the FI, Sweden's Financial Supervisory Authority, would provide a useful model for such a sandbox (see subsection "Regulatory Sandboxes" above).

An Innovation Centre for the labour market could also be established, with the task of providing tailored information and developing a dialogue with job platforms about regulatory obligations and issues. To this purpose, the Ministry of Labour may consider issuing instruction for the National Mediation Office (Medlingsinstitutet) to map innovations in the labour markets and review issues that platforms and trade unions may raise in relation to the agency's core activities: labour disputes, wage formation, and statistics on wages and salaries.

Policy recommendations

Effective labour market policies and institutions are essential to accompany workers during the digital transformation. The Swedish model, based on the strong dialogue between the social partners and the active role of JSCs, seems well-equipped to facilitate a smooth transition for workers affected this transformation. However, there is room to improve the coverage and the quality of the JSCs' and of the PES' services.

Social partners may want to:

- extend the provision of the JSCs' services to all displaced workers, including blue-collar, youth and other vulnerable groups

- promote successful job-transition services, e.g. the Early Risk Service across all JSCs

- improve the co-ordination between the JSCs and the PES at an early stage of the dismissal procedure, in co-ordination with the government

- enlarge the coverage of the PES' services to all short-term unemployed.

In an increasingly integrated global economy, digital technologies are enabling firms to segment work in new ways and to increase the use of temporary labour. Platform-based workers are likely to face some of the same problems as those in non-standard work, such

as temporary, part-time or short-term jobs, i.e. lower wages, greater job insecurity and fewer work-related benefits. In Sweden, EPL is well developed but the gap in EPL between permanent and temporary workers is among the highest in the OECD.

As mentioned above, to meet these challenges, governments and social partners should improve their ability to detect emerging labour market trends and explore ways of developing existing labour market programmes and safety nets, in which eligibility is tied to standard employment models, so as to ensure inclusive growth and job quality in the new work organisation enabled by the digital economy:

- Social partners may want to take initiatives to promote the establishment of a negotiation council where job platforms and trade unions may negotiate collective agreements fit to the new forms of work enabled by digitalisation.

- The government may want promote a regulatory sandbox on the labour market, based on the model of the Innovation Centre established by the FI. To this purpose, the Ministry of Labour may consider issuing instructions for the National Mediation Office to map innovations in the labour markets and review issues that platforms and trade unions may have in relation to the agency's core activities.

Note

1.   https://www.vinnova.se/en/m/digitalisering-av-industrin.

References

Deiaco E. and P. Tingvall (2017), "Swedish innovation policies: Design, selection and evaluation", paper presented at the 130th Meeting of the OECD Committee on Industry, Innovation and Entrepreneurship, Paris, https://www.researchgate.net/public ation/316738521_Swedish_Innovation_Policies_-_Design_Selection_and_Evaluation.

Department for Business, Innovation & Skills (2015), "Sharing economy: Government response to the independent review", Department for Business, Innovation & Skills, London, https://www.gov.uk/government/publications/sharing-economy-government-response-to-the-independent-review.

Eurofound (2015), *New Forms of Employment*, Publications Office of the European Union, Luxembourg, https://www.eurofound.europa.eu/publications/report/2015/work ing-conditions-labour-market/new-forms-of-employment.

European Commission (2012), Commission Recommendation of 17.7.2012 on access to and preservation of scientific information, C(2012) 4890 final, European Commission, Brussels, https://ec.europa.eu/research/science-society/document_library/pdf_06/recommendation-access-and-preservation-scientific-information_en.pdf.

FI (2017), "FI's role regarding innovation", Finansinspektionen, Stockholm, https://www.fi.se/contentassets/d3cd30fe473d4a7995f0c38209ddb7f1/fintech_report_engny.pdf (accessed 21 April 2018).

Fuller, M. and A. Lochard (2016), *Public Policy Labs in European Union Member States*, Publications Office of the European Union, Luxembourg, http://dx.doi.org/10.2788/799175.

Government Offices of Sweden (2016), "Collaborating for knowledge: For society's challenges and strengthened competitiveness" (in Swedish), Prop. 2016/17: 50, www.regeringen.se/rattsdokument/proposition/2016/11/prop.-20161750.

Growth Analysis (2017), "Factors affecting the establishment of a testbed: An analysis of Vinnova's 'Environmental Technology Testbeds' program", PM 2017:17, Swedish Agency for Growth Policy Analysis, Östersund, Sweden, www.tillvaxtanalys.se/in-english/publications/pm/pm/2017-12-22-factors-affecting-the-establishment-of-a-testbed----an-analysis-of-vinnovas-environmental-technology-testbeds-program.html.

Ministry of Enterprise and Innovation (2016), "Smart industry: A strategy for new industrialisation for Sweden", Government Offices of Sweden, Stockholm, www.regeringen.se/informationsmaterial/2016/05/smart-industry---a-strategy-for-new-industrialisation-for-sweden.

OECD (2017a), *OECD Employment Outlook 2017*, OECD Publishing, Paris, http://dx.doi.org/10.1787/empl_outlook-2017-en.

OECD (2017b), *OECD Science, Technology and Industry Scoreboard 2017: The Digital Transformation*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264268821-en.

OECD (2016a), *Getting Skills Right: Sweden*, Getting Skills Right, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264265479-en.

OECD (2016b), "New forms of work in the digital economy", *OECD Digital Economy Papers*, No. 260, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlwnklt820x-en.

OECD (2016c), "New markets and new jobs", *OECD Digital Economy Papers*, No. 255, OECD Publishing, Paris, http://dx.doi.org/10.1787/5jlwt496h37l-en.

OECD (2016d), *OECD Reviews of Innovation Policy: Sweden 2016*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264250000-en.

OECD (2015), *Back to Work: Sweden: Improving the Re-employment Prospects of Displaced Workers*, Back to Work, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264246812-en.

OECD (2014), *OECD Employment Outlook 2014*, OECD Publishing, Paris, http://dx.doi.org/10.1787/empl_outlook-2014-en.

Söderqvist, F. (2017), "A Nordic approach to regulating intermediary online labour platforms", *Transfer: European Review of Labour and Research*, Vol. 23/3, pp. 349-352, https://doi.org/10.1177/1024258917711375.

Test Site Sweden (n.d.), "DriveMe", webpage, https://www.testsitesweden.com/en/projects-1/driveme (accessed 21 April 2018).

TUAC (2018), "The Swedish job security councils: A case study on social partners' led transitions", Trade Union Advisory Council to the OECD, Paris.

Vinnova (2018), "Testbeds in Sweden", webpage, https://www.vinnova.se/en/m/testbed-sweden/testbeds-in-sweden (accessed 21 April 2018).

Vinnova (2017), *Annual Report 2017*, Vinnova, https://www.vinnova.se/publikationer/ars redovisning-2017.

Vinnova (2016), *Digitalisering av svensk industry*, Roland Berger AB, https://www.vinno va.se/en/publikationer/digitalisering-av-svensk-industri (accessed 21 April 2108).