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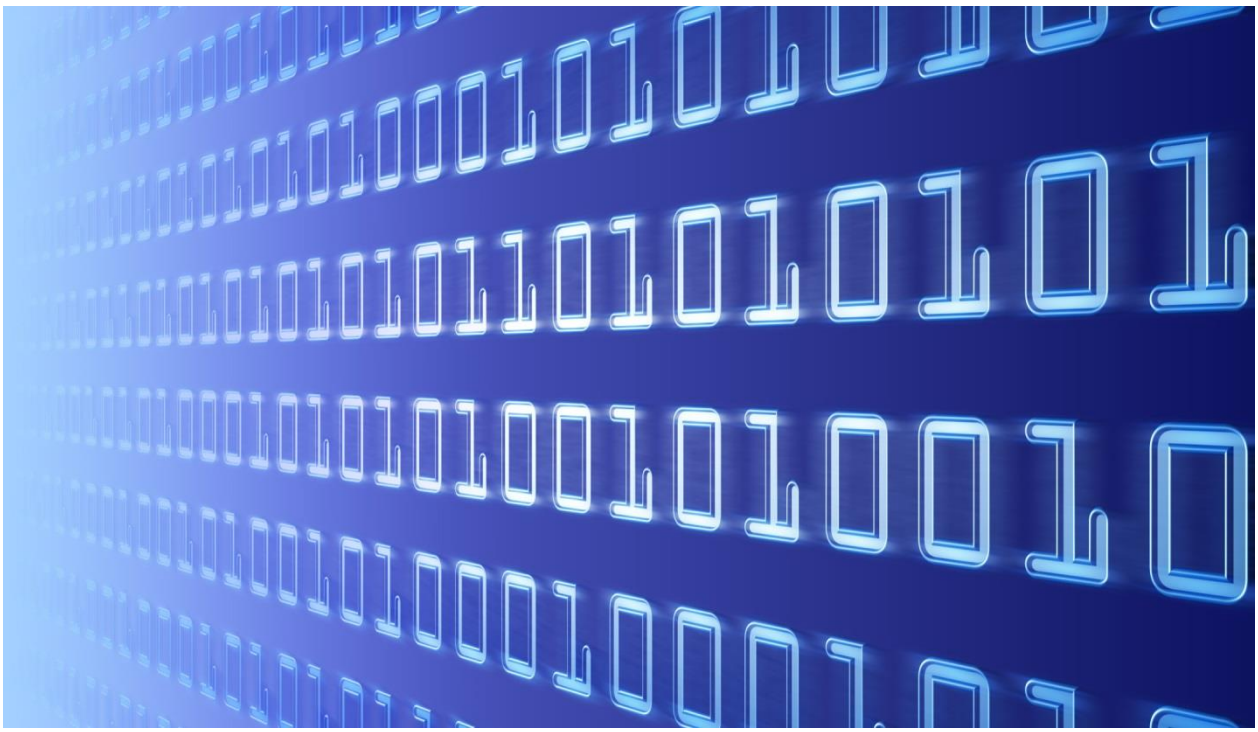

White paper

The transition to a digital society

An exploration of opportunities and challenges

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This white paper has been drawn up by the SERV's Secretariat to support the socio-economic consultation and policy advice by the social partners in the SERV. All of the findings, interpretations and conclusions in this white paper are the responsibility of the SERV's Secretariat and cannot under any circumstances be attributed to the Council, any organisation represented within the Council or any member of the Council.

The white paper describes the principal opportunities and challenges of digitalisation for the economy and the labour market in Flanders with a view to outlining a number of key issues around which discussions can be organised over the coming months among Flemish social partners - and more broadly.

The white paper forms part of the 'economy and labour market of the future' project from the SERV work programme. Besides the theme of 'digitalisation and robotisation', the theme of the 'circular economy' is also explored.

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Along with the rest of the world, Flanders is facing a new and radical technological revolution. Digitalisation affects all aspects of life in society: our homes, how we live and work, how we produce and consume, how we promote health and tackle sickness; how we deal with freedom and safety; how we acquire and share information and knowledge ... It affects our mobility, cultural identity, social (in)equality, government, democracy ... This transformation will be much more far-reaching in scope, speed and complexity than the transformations that society has faced in the past.

At the same time, it is clear that the transition to a digital society will not happen overnight and that there may be great variances between different areas of life and business sectors. Furthermore, the developments and their consequences do not depend solely on the technological possibilities. All of this can be managed, supported or regulated so that the developments and their consequences go in a socially desirable direction, for example by making the most of the associated cost and economic benefits, the labour market dynamics and competences of the workforce, social acceptance, etc.

A crucial factor here is the capability of enterprises, workers, citizens, governments and organisations to reap the benefits of digitalisation and avert the threats. The government and the social partners have an important role to play in this. They can offer perspective and guidance and help to create the conditions for a smooth transition to a digital economy and society with greater prosperity, inclusion and sustainability.

This white paper is intended to act as a launchpad by describing the principal opportunities and challenges of digitalisation for the economy and the labour market in Flanders with a view to outlining a number of areas and key issues around which discussions over the coming months can be organised among Flemish social partners - and further afield.

The white paper forms part of the ‘economy and labour market of the future’ project from the SERV work programme. Besides the theme of ‘digitalisation and robotisation’, the theme of the ‘circular economy’ is also explored.

Challenges and opportunities

Work and skills

Estimates of the quantitative impact of digitalisation on the labour market prove very difficult and vary widely. This is because digitalisation has varying effects, which can be positive and negative. The technological innovations can lead to substitution effects (less work because jobs are taken over by machines), but also to higher productivity and efficiency and increased market demand since products and services are cheaper.

A great deal of uncertainty and confusion remains as to which effects will prevail. This influences the significance attached to quantitative estimates. However, great differences are expected between sectors, occupations and qualifications, as well as a further increase in job polarisation (due to the decrease in demand for middle-skilled jobs). Older, low and middle-skilled workers are at the greatest risk. But being highly qualified offers no guarantee. Even certain highly qualified professions (accountants, doctors, lawyers, etc.) may well be replaced by algorithms in future. Especially during the transition phase, transitional problems and adaptation costs are to

be expected because not everyone is capable of making the transition to new activities, jobs or tasks smoothly. A key challenge is not to let frictional unemployment and early retirement develop into structural forms. Prompt further training and retraining is therefore important, combined with a shift from job to career security.

Besides the quantitative impact of digitalisation on the volume of jobs and positions, there is also predominantly an impact on job content. The tasks involved in many jobs will alter radically. This may well have a greater impact than job losses. The debate about the relationship between humans and machines is taking on a new dimension as smart robots also replace cognitive skills rather than just physical strength. The collaboration between humans and technology (cobots) offers a different perspective from the more traditional view of the machine as a substitute for human labour.

Digitalisation also brings about major changes in the required skills and the lifespan of skills and qualifications. It affects digital, complementary and (new) generic skills alike (soft skills) as well as entrepreneurial and employment skills. Especially in the short term, the rapidly changing requirements may lead to increasing skill obsolescence (or skills that are no longer required) and a mismatch between demand and supply for labour. It is not only the formal education and training circuit that must be constantly augmented and updated. Initial training will also have to be augmented and updated constantly, during the entire career. Expanding forms of lifelong and workplace learning is therefore essential. However, it is not obvious where, when and how employees can acquire the new skills required. In practice, solutions arise from coordinated initiatives by training bodies, employers, trade unions and individual employees and from alternative forms of training and (potentially disruptive) forms of training which are partly made possible by developments in digital technologies.

Together with other trends, digitalisation can lead to more polygamous working relationships and new organisational models. This may be accompanied by an increase in flexible contracts or the use of freelancers. Opinions are divided as to whether these new forms of work will catch on. However, the example of the sharing economy with its digital platforms and new forms of work clearly illustrates the challenges to existing working relationships and social outcomes.

Nor is there unanimity regarding the impact of digitalisation on the quality of work. There are various consequences of automation, robotisation and new forms of work on well-being and workability at work. These can sometimes be positive and sometimes negative.

Economy and business operations

Digitalisation creates many new opportunities to make business processes more efficient and boost productivity. New markets and new opportunities for internationalisation and reshoring of manufacturing activities are also created. The economic potential of developments in the areas of big data, cloud computing, the internet of things and artificial intelligence is huge.

However, in the transition to a digital society, enterprises are also faced with many challenges, not least due to the increasing flexibility required. As for employees (e.g. frictional unemployment) and their skills (cf. skill obsolescence), significant transitional problems and adaptation costs are also to be expected here in the short term, for example because capital goods are depreciated quicker because they become obsolete earlier due to rapid technological developments (stranded assets).

The future of innovation and value growth increasingly lies in networks, alliances and the creation of relevant information and products and services from data (smart industry, smart cities, smart medicine, smart agriculture, smart care, etc.). Sectoral boundaries and boundaries between

producers, sellers and consumers are blurring. Existing models, value chains and economic systems are being challenged to reorganise themselves. Here also, the impact of digitalisation can vary greatly between and within sectors.

A specific form of new competition arises from the emergence of ICT-based platforms and new business models based on this, such as e-commerce and the sharing economy. They lower the barriers for new entrants and create new markets with new products and new ways of providing services. But the platform economy can also lead to new problems such as market power and exclusion. Furthermore, legal, contractual or criminal responsibilities are often not properly regulated yet, so that there is no level playing field with existing companies offering similar products or services.

Digital technologies and new business models are sometimes held back by limited access to finance, which may be experienced by innovative SMEs in particular. On the other hand, digitalisation facilitates the emergence of new financial instruments (e.g. fintech) and forms of finance (e.g. crowdfunding).

The regulation of investment in and use of infrastructures is becoming more and more important because the proper operation of up-to-date ICT, telecom and energy infrastructures and systems is crucial. Increased reliance on digital applications, the integration of software, data and production processes (even beyond company boundaries) and developments in the area of intelligent energy networks, for example, have a major impact on the operation and security of all kinds of business processes and data streams in the economy.

Increased reliance on digital applications is a challenge to the security and privacy of all kinds of personal data, business processes and data streams. Enterprises have to manage cyber risks in the same way and at the same pace as their digital innovations and services. Cybersecurity and the reliability of ICT and telecom infrastructures and systems are crucial in view of Industry 4.0. There are also significant effects on privacy, increasing the need to reflect on the ethical code for (dealing with) intelligent machines and an intelligent environment.

Digitalisation also offers special opportunities in the social economy for supporting disadvantaged groups, boosting activities and reaching a wider audience.

Social justice

The digitalisation of society creates new opportunities for empowerment of citizens, transparency and democracy, social protection (e.g. automatic authorisation) and opens up opportunities for some vulnerable groups (e.g. the social economy). Digitalisation can also mean greater prosperity and accessibility of goods and services. As a result of digitalisation, for example, many items become cheaper or ‘free’ once they are made digital, because they can be used or ‘consumed’ an infinite number of times. This also makes the goods and services in question more accessible and affordable for all population groups.

But digitalisation also creates new social risks. Digital inequality can lead to digital exclusion that reinforces existing and new mechanisms of social exclusion. In the absence of redistributive measures, the expected technological developments also threaten to be divided unequally in the future. Digitalisation also has an impact on broader social issues and challenges, including how we organise and finance the protection and solidarity we want to offer as a society.

Environment

Computer intelligence and robot power can be deployed to realise the transition to a sustainable low-carbon society. Automation, sensors, big data and other ICT applications make many

processes more efficient, thus saving resources and energy. The innovations of the fourth industrial revolution are also essential in the transition from a linear to a circular economy. On the other hand, servers and data centres consume a large amount of energy and the use of (rare) materials poses a problem, as does the large mass of electronic waste.

Government

The government also has to deal with technology and a society in flux. As a result of digitalisation, public services can operate in a swifter, more efficient, effective and customer-friendly manner. The government can also take the lead by applying innovative concepts and technologies in its own services and creating faster learning and scale effects in public procurement and tendering processes. Opportunities for more interaction, collaboration and partnerships are also expanding. Better collection and opening up of government data (open data) makes innovative products and services possible for governments and other actors and big data and enables a better, more evidence-based policy.

However, the challenges are more extensive than introducing digital technologies in public administrations and services (e-government) or adapting the organisation and nature of work and the competences and skills required of government staff. It represents a comprehensive digital transformation affecting all branches of government. The role of governments is evolving into that of facilitator (government as a platform). The government has to provide policy frameworks and regulations that are not only more digital-friendly, but also – and more importantly – respond more swiftly to new developments, while tackling abuses and offering the necessary security and protection. Ethical and social issues represent a specific focus here.

Digitalisation generates special attention and energy at local level with the concept of smart cities as a way of making urban areas safer, more efficient, sustainable, liveable and competitive through the smart use of ICT technologies and data.

Themes and key issues to be explored in greater depth

In the near future, working areas and key issues will be outlined around which the SERV will organise discussions among the Flemish social partners – and further afield. The aim is to arrive at a vision, policy recommendations and specific commitments by the social partners on two levels: directions for the longer term and concrete steps for the short term.

1 Introduction

The Flemish social partners stated in the agreement of 23 November 2016 on education and training for people in employment that 'the ever accelerating and radical transformations require forward-looking solutions in a changing context. We want to work together on a constructive approach to create frameworks for a sustainable transition that offers a perspective for people and businesses once more in a disruptive environment. We will do this by conducting consultations and entering into agreements in the near future, primarily to help develop a dynamic labour market which continues to offer everyone many opportunities in the future. (…) In the coming weeks and months, the Flemish social partners will continue to deliberate and consult on the socio-economic challenges facing us.'

The SERV work programme 2017 therefore also incorporates the aim of developing a grand forward-looking social theme that is particularly relevant to the economy and the labour market of the future. Two key themes have been selected from the SERV platform text 2030: (i) digitalisation and robotisation and (ii) the circular economy and new business models.

This initial white paper discusses the first theme. The intention is – based on the available literature, internal discussions within the SERV Secretariat and meetings with the social partners – to state what is 'known' about the implications of digitalisation and robotisation.

Following this introduction, this initial white paper comprises three sections:

- Section two contains an outline. What is digitalisation and robotisation? What are the developments involved and what distinguishes the 'fourth industrial revolution' from previous industrial revolutions?
- A third section explores the socio-economic consequences of digitalisation and robotisation. Key questions include: Will digitalisation leads to mass job losses and will robots take over the tasks of employees? To what extent will the content of jobs change? What skills do employees need in order to be able to participate in the labour market of the future? Will digitalisation lead to greater inequality? How are economic activities affected and which new business models and organisational models are emerging? Will the role of the government alter in a digital world? And so on.
- Section four explains that the SERV intends to organise discussions during the next few months among the Flemish social partners – and further afield. The aim is to arrive at a vision, policy recommendations and specific commitments by the social partners.

In addition to the figures in the initial white paper itself, a statistical supplement contains a series of numbers and figures comprising benchmark information for Belgium on the digital economy and society.

2 Background and outline

Society is in a state of flux. New digital technologies and developments are expected to lead to a radical and rapid transformation of the economy, the labour market and broader society. New technologies, innovative practices, new earnings models, new types of enterprises and jobs and new forms of collaboration are rapidly emerging in response to a variety of challenges and opportunities.

Digitisation is the conversion of an analogue signal containing information (e.g. sound, image, text, etc.) into binary bits. Once digitised, this information can be used universally. All microprocessors can process these bits and save them as data. Unlike analogue information, digital data can be used an infinite number of times (processed, saved, filtered, monitored, identified, reproduced, forwarded, etc.) without any loss of quality, at very high speed and at negligible marginal cost. The internet has resulted in increasing interconnections, making this possible on a global scale.

Information and communication technology (ICT) is itself a generally applicable 'technology' and makes other generally applicable technologies possible, which each reinforce one another, such as mobile internet, automation of skilled work, the internet of things (already with us but the internet will increasingly be used primarily for communication between systems and devices instead of between humans and computers), cloud computing, digital manufacturing (including 3D printing), advanced sensor and robot technology (autonomous robots, interactive robots, 'wearables' such as exoskeletons, etc.), autonomous and semi-autonomous vehicles and aircraft (drones), big data technologies (collection, analysis and use of huge quantities of personal and usage data), algorithms that convert this data into usable information, digital platforms that bring together demand and supply, blockchain applications that enable transactions without central authority, next-generation genomics, implantable technologies, new forms of energy generation, control and storage, home automation and smart cities, advanced materials (light, strong, adaptive, self-healing, self-repairing, etc.), artificial intelligence (AI), deep-learning technology (self-learning machines without further intervention or programming by humans), free access to processes and data (open source and open data), etc.

This 'digitalisation and robotisation' is leading to a transformation of the economy and society right across the board. Information is becoming the most important factor of production and ICT has a place in almost all activities of economic production and interaction. Digitalisation is changing what the economy produces and values, the way in which this is produced, the way in which production is organised and manage, the location of (production) activities, the skills required for production activities, the infrastructure required to support it, and the necessary legislation and regulations. Digitalisation also impacts on all aspects of life in society: how we live and work, how we promote health and cope with sickness, how we deal with freedom and safety, how we acquire and share information and knowledge, how we conduct ourselves, individually and with respect to one another... It affects our mobility, cultural identity, social (in)equality, government, democracy.

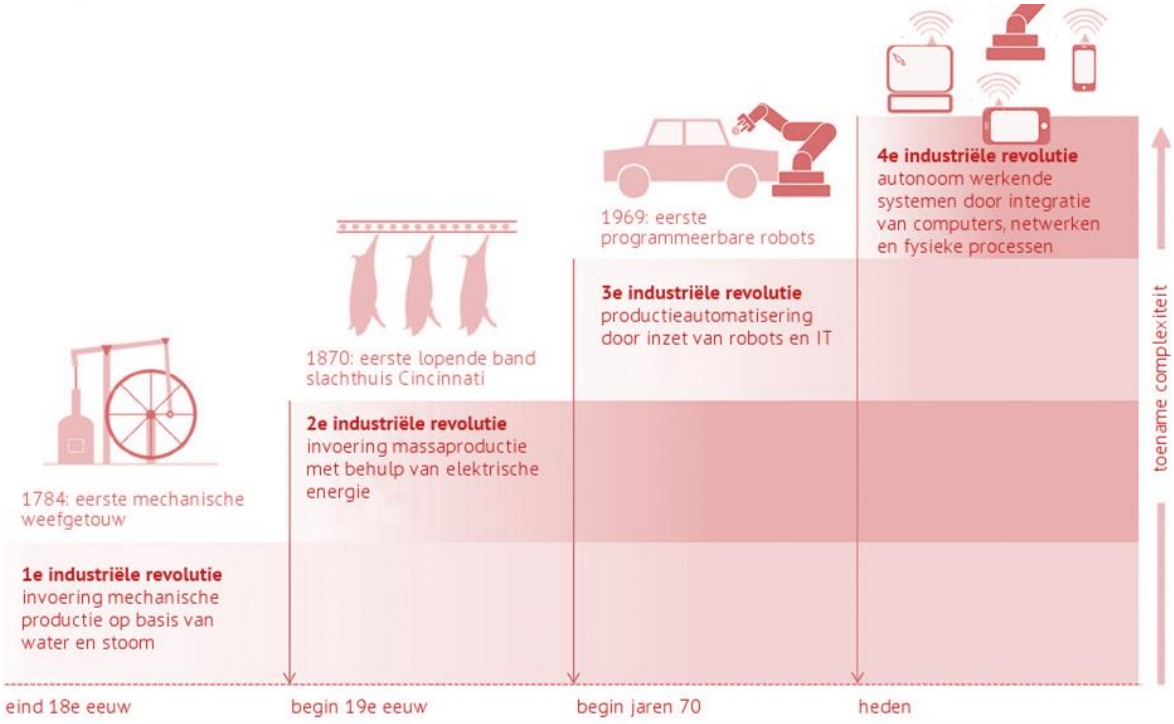
Some of the changes take place at lightning speed, are broader and deeper than traditional academic disciplines, converge, revolutionary in nature and alter our entire social system (Schwab 2016, Steenbergen 2016). Eventually, digital technologies will lead to systematic changes, as happened previously with the introduction of steam, mass production and computers in previous industrial revolutions.

These developments are therefore also known as the 'fourth industrial revolution'. They are characterised by all-encompassing connectivity, in which machines and objects become

intelligent and replace cognitive skills instead of just muscular strength, the physical and virtual worlds converge, a digital transformation of manufacturing takes place (Industry 4.0), new (ways of using) products and services emerge, etc. The predicted changes are far-reaching in scope (they build on previous revolutions and combine different technological innovations), speed (exponential instead of linear evolutions) and scale (radical transformations of entire systems).

The rapid changes evoke mixed feelings in society. Thus, as in the three other industrial revolutions, digitalisation may well offer many opportunities to raise the prosperity and quality of life of the population. New markets, new opportunities for the internationalisation of business, new business models (e.g. e-commerce) and new forms of organisation and work (e.g. network companies), new opportunities for employment and for less physically demanding and more enjoyable work are emerging. Digitalisation can also help resolve many social issues such as high-quality and affordable healthcare, a more rational approach to scarce supplies of energy, materials and commodities, sustainability of mobility, safety, food supply, etc.

Figure 1 Illustration of the four industrial revolutions



Source: German Research Center for Artificial Intelligence (DFKI)

Digitalisation also creates major challenges since, just like previous industrial revolutions, it can or will be accompanied by major shifts and undesirable effects. People fear that there will be less work and more inequality, less meaningful work, loss of privacy, digital exclusion, etc. Technology can also go awry. Think, for example of eugenics or cybernetics or autonomous AI weapons systems (killer bots or drones). Meanwhile, cyberwars are already being fought between superpowers.

In any case, there remains a great deal of uncertainty. For example – especially in combination with the internet of things and big data – the consequences of artificial intelligence are impossible to assess at present. Nobody knows how fast the changes will take place and what the implications will be. People tend to overestimate the consequences of the technological revolution in the short term, but to underestimate them in the long term (Ford, 2015). Our imagination is based on how the world is now established. Technological innovations can also have different results in the future than in the past. Developments can take place very rapidly so that there may

be disruption. This shows that significant changes have to be allowed for, which may be greater than in the past or head in a different direction than currently predicted (Dutch House of Representatives, 2017). At the same time, it is clear that the transition to a digital society will not happen overnight and that there are great variances in impact between different areas of life and business sectors.

This does not mean that technological changes will overwhelm us. It is us humans who can make the decisions as to how we deal with technological developments and how we take advantage of the opportunities they offer. All of this can or should be managed, supported or regulated so that the developments and their consequences head in a socially desirable direction. This can be achieved, for example, by making the most of the associated cost and economic benefits, the labour market dynamics and skills of the workforce, social acceptance, etc. As in previous industrial revolutions, the government has an important role to play, together with the social partners, by offering perspective and stability and helping create the conditions for a smooth transition to a digital economy and society with greater prosperity, inclusion and sustainability.

In the rest of this white paper, the opportunities and challenges of the digital revolution will be explored first. Then the key policy areas for the social partners will be discussed, in order to make the most of the opportunities and avert the threats.

3 Challenges and opportunities of the digital revolution

Potential or expected key effects, challenges and opportunities of digitalisation are discussed in more detail below, in the areas of:

- Work and skills;
- Economy and business operations;
- Social inclusion and justice;
- Environment;
- Government in a digitised world.

3.1 Work and skills

Digitalisation affects the labour market of the future via various channels and mechanisms, both quantitatively and qualitatively. The main challenges and opportunities in this area are explained below.

Impact on the level of employment

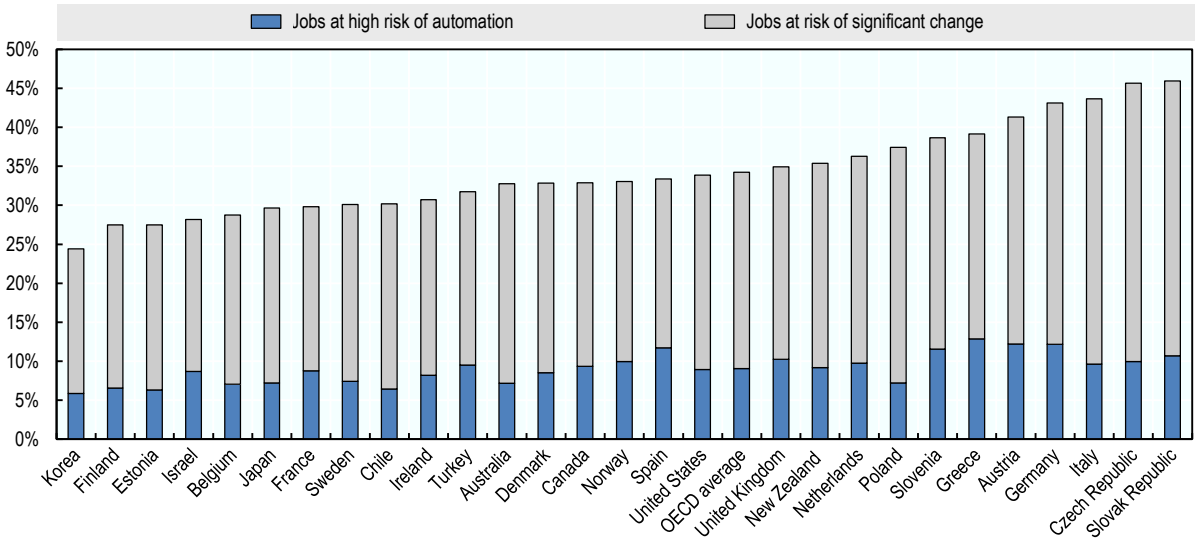
More or less employment

As a result of automation, digitalisation and robotisation, some of the work that is now done by humans will be taken over by machines or no longer necessary. Several authors (Brynjoffson and McAfee, 2001; Frey and Osborne, 2013) consider that, overall, this will be associated with less employment and jobs. A study by the High Employment Council (HRW 2016) on the impact of digitalisation on occupations and their set of tasks in Belgium confirms that (although digitalisation leads to both job destruction and job creation) 39% of employment will be lost due to the digital revolution. Arntz et al. (2016) for instance think that just 7% of jobs in Belgium would be lost as a result of digitalisation (9% at OECD level).

Other organisations or think tanks such as the European Commission or the Centre for Economic Performance, argue that higher investment in ICT and robotisation lead to a net increase in employment. Both labour productivity and value added in a country can increase due to the use of robots (Graetz and Michaels, 2015). In theory, this increase in productivity makes products cheaper so that consumers can purchase more and also new products or services with the same income. For example, the introduction of barcode scanners in supermarkets has not resulted in a decrease in the number of cashiers. Increased demand also creates new jobs, for instance to make, maintain and operate robotics[1].

The OECD recently conducted studies based on technological foresight for various countries of the average share of jobs at high risk of automation in the next 10 to 20 years (see figure 2).

Figure 2 Average share of jobs at high risk of automation in the next 10 to 20 years



Notes: Jobs are at high risk of automation if the likelihood of their job being automated is at least 70%. Jobs at risk of significant change are those with the likelihood of their job being automated estimated at between 50 and 70%. Data for Belgium correspond to Flanders and data for the United Kingdom to England and Northern Ireland.

Bron: OECD 2017g.

The widely varying predictions illustrate that it is very difficult to estimate the consequences of radical technological changes on employment. This is because it is unclear which effects will prevail, partly due to the uncertainty about future technological developments. The rate and extent to which digitalisation will spread through society and the extent to which this will affect the scope of employment, does not depend on technological developments alone. Many other factors also play a role: the cost of the technology, investment readiness, labour market dynamics, the organisation of work, wage costs developments, social acceptance, legislation and regulations, etc. However there is great uncertainty surrounding most of these factors. This makes prediction a tricky undertaking and influences the significance attached to quantitative estimates.

1 "Greater use of machines leads to more productivity, more economic growth, more consumption and therefore ultimately also to new jobs. Anyone who denies this, it is sometimes said, is guilty of the Luddite fallacy, which refers to the Luddites, who destroyed weaving machinery in England in the early 19th century, because they were losing their jobs due to these machines.In the end, the first industrial revolution and the new textile mills created many jobs." (Malcorps, 2017).

In any case, judging by a couple of recent surveys (Voka 2017, Randstad 2017), employers in Flanders are not so pessimistic about the impact of digitalisation on the number of jobs in future. They see the impact of digitalisation mainly in terms of changing skills requirements (see below).

However, great differences are expected between sectors, occupations and qualifications (see below also). In a recent econometric study, the OECD found no proof that digitalisation has led to a net loss of employment so far, but that it has contributed to relatively slow growth in industry and a stronger growth in service sectors (OECD, 2017g). It is difficult to say where the (job) opportunities lie. Presumably, they can be found in healthcare and personal services, in ICT and technology, in making the economy more sustainable, etc. In several sectors, the risk of offshoring of jobs is set to increase as digitalisation and robotisation make it easier for the manufacturing sector to compete with low-wage countries and keep jobs here. In other sectors, there would be a net decrease in employment due to digitalisation (e.g. banking and insurance).

It can also be observed that, simultaneously with the digitalisation trend, other trends, such as the ageing population, will have an impact on the labour market of the future. According to a study by McKinsey (2017), the global economy will probably need every person of working age to counter the negative impact of demographics on the working-age population. In this way, digitalisation and robotisation can help to ward off the problem of a compelling shortage of workers.

Importance of a smooth transition

Even if, in the long term, digitalisation does lead to the creation of more jobs than are destroyed, in the shorter term – i.e. during a transitional phase – the labour supply will merely gradually adapt. A crucial question is how to cope with the expected transitional problems and adaptation costs in the short term, with radical changes for people and sectors, and how to look after the 'losers' (OECD, 2017d). Research reveals that at-risk groups for restructuring are (in order of importance) technical professionals and support staff, employees on a permanent contract, the higher skilled and employees aged over 35 (HIVA, 2016). However, it is virtually impossible to say anything about this transition with certainty at present: how long it will last, whether it is a temporary or continuous process, who will find this period hardest, who will reap the greatest benefits from it, etc. is all unclear.

Presumably there will be frictional unemployment, because not everyone is capable of making the transition to new activities, jobs or tasks smoothly. A considerable challenge is to minimise frictional unemployment and early retirement and not to let them develop into structural forms. Prompt further training and retraining is therefore important, but cannot always ensure that everyone can continue to work in the same organisation, because the activities and scope of the business may change and the required standard is not achievable for all current employees. It is therefore very important to maintain general (professional) skills, promote a flexible and open attitude to learning, provide an up-to-date offer of education and training (see below) and support in the shift of focus from job security to career security.

Impact on the structure of employment

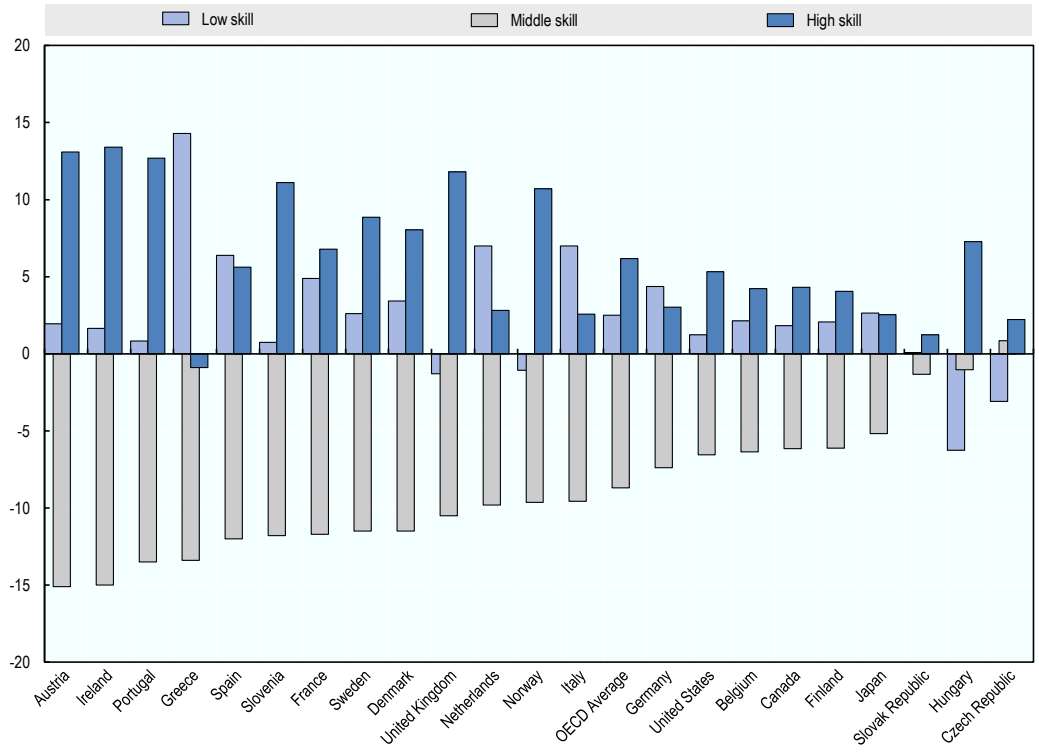
More job polarisation

The labour market in Belgium and other OECD countries appears to be polarising between a small number of hyper- skilled employees and a large group of low-skilled workers (OECD, 2017g, see figure 3). Calculations by the OECD reveal that there are several explanations for this, but that, out of the factors investigated, digitalisation is the most important and has primarily led to polarisation at the top (middle to highly skilled, OECD 2017g).

The High Employment Council (HRW 2016) also investigated the impact of digitalisation on the structure of employment in Belgium. It found that job polarisation as recorded for the years 2000-2013 will continue to increase[2]. This is because the share of employment that may be fully automated eventually is noticeably higher among middle-skilled jobs. Middle-skilled jobs often involve routine tasks. Low-skilled jobs appear to be relatively less prone to digitalisation because they more often require greater flexibility from the person carrying them out and more often involve location and person-related services. In highly-skilled jobs, problem-solving skills and cognitive tasks play a major role. This explains why the percentage of 'automatable' jobs for low-skilled jobs is more than twice as high as that for high-skilled jobs. There also appears to be an upgrading of employment so that more opportunities (many new applications and more and different work) arise in particular for people with higher qualifications (skill-biased technological change). Many of the new jobs actually make different and often higher demands on employees. Nevertheless, being highly qualified offers no guarantee. Even certain highly qualified professions (accountants, doctors, lawyers) may well be replaced by algorithms in future.

Figure 3 Polarisation in the labour market 1995-2015

Percentage point change in share of total employment, 1995 to 2015



Bron: OECD, 2017g

Low-skilled most vulnerable

Low and middle-skilled workers will apparently run the greatest risk globally, but in Flanders the low-skilled in particular appear to be especially vulnerable. Employment is currently high among

[2] During the period of 2000-2013, the share of middle-skilled jobs in Belgium decreased by 3.3 percentage points, while the share of highly-qualified jobs increased by 3.9 percentage points and that for low-skilled jobs remained roughly stable.This shift was already in progress before the crisis emerged due to digitalisation and other major global trends such as globalisation of production. This is a structural shift occurring in several major sectors.

the low-skilled[3] and, compared with other European countries, industry accounts for a large proportion of jobs for the low-skilled (35%). Since digitalisation mainly appears to lead to the loss of jobs in industry, and there could be some displacement by the middle-skilled who cannot find work 'at their level', there is likely to be even higher unemployment for the low-skilled.

Impact on job content

Primarily impact on tasks

Besides the impact of digitalisation on jobs and job levels, there is also an impact on job content (tasks). After all, jobs are sets of tasks. Just because some tasks are performed digitally or automatically, this does not mean that the job will disappear (WRR, 2015). A job is not either secure or doomed to disappear. Arntz et al. (2016) say for example that in many occupations that are supposedly highly likely to be automated, many tasks are carried out that are difficult to automate, for example tasks requiring intuition, common sense and inventiveness (creativity and transdisciplinary tasks), tasks linked to social interaction and emotional intelligence (interpersonal skills), tasks based on sensory experiences and fine motor skills (physical skills) and tasks linked to ethics, morality and politics. In other words, if we take into account the heterogeneity of the set of tasks involved in occupations, the threat of technology for jobs is much lower. In any case, so far, digitalisation has mainly affected routine occupations mainly consisting of tasks that follow a series of well-defined procedures and can easily be carried out by sophisticated algorithms or digital services.

The likelihood of the digitalisation of specific jobs or occupations therefore depends strongly on the content of the set of tasks (routine or not, cognitive or not). However, the set of tasks of many jobs will alter radically (HRW, 2016). Many jobs will be revised and reorganised significantly and employees will be required to adapt to this. Thus, several studies have also found that digitalisation has more impact on job content than on the extent of employment (Chui, Manyka & Miremadi, 2015).

Complementarity between technology and humans as a goal

A nuanced view is required, with complementarity at its centre (Ford, 2015). Some tasks can be fully automated, others can best be carried out when robots and humans work together and complement one another ('cobots'). Thanks to close cooperation with smart robots, employees can concentrate even better on the work where they offer added value.[4] Therefore, the WRR (2016) argues for co-creation in which 'engineers' collaborate in the development of new means of production and production processes with the people who will have to use them, to ensure that technology makes a real contribution to better services and results. In the same vein, De Wachter et al (2016) argue (2016) in favour of 'inclusive digitalisation'. This is a model where automation and digitalisation serve the workers and increase their productivity.

Excellent examples can be found in healthcare, such as the lifting robot that lifts patients out of bed or the surgical robot that enables doctors to perform operations with precision. Examples can also be found in other sectors, such as car mechanics who use computer diagnostics in their

[3] Half of those with low skills are seeking work and half of those seeking work are low-skilled.

[4] For example, the Volkswagen Group's Smart Production Lab in Wolfsburg has developed an intelligent robot set-up, based on a collaborative robot. In manufacturing hall 55, humans and robots assemble a gearbox together in a small room. The robot responds to gestures by employees, thanks to AI controls. Volkswagen's goal is to develop a factory of the future in which humans and robots can perform complex tasks together with an even higher degree of specialist expertise, creativity and problem-solving ability.

work. Many companies and governments are already active in this area. It is therefore important to achieve a good combination of the new generation of high-tech machines and human skills, which offers a very different perspective than the more traditional view of the machine as a substitute for human labour. Working with machines and robots, complementarity between technology and humans and making the most of human skills through technology are the key concepts here.

Impact on competencies and skills

Changing mix of skills

Digitalisation brings about major changes in required skills. They lie on multiple levels. Individuals firstly have to develop the right skill mix because the radical impact of technologies on daily life is fundamentally changing access to and processing of knowledge (OECD, 2016a). Digital and complementary skills (handling information, problem-solving ability, etc.) and soft skills or general competencies are all becoming more important. We discuss these different types of skills below.

- Firstly, learning and maintaining digital skills is crucial. Broadening and upscaling the digital skills level strengthens people's position in the labour market and in society (EESC, 2016). At a macro level, there is almost a one-to-one relationship between e-skills and competitiveness (Titan et al., 2014). These digital skills are primarily specialist ICT skills for programming occupation-specific software, developing applications and managing networks, but also generic ICT skills for using such technologies for professional purposes (OECD, 2016a). It is significant that many job profiles require advanced[5] digital skills, including job profiles that are not immediately classed as professional or specialist ICT roles.[6] Permanent updating of these digital skills is very important. In most job profiles, a generational problem is emerging in this respect since older employees tend to be less familiar with ICT. Currently, Flanders also appears to be in the middle bracket for digital skills[7]. Rectifying the lack of know-how and skills therefore represents a key challenge for the future adoption of ICT.
- Along with these ICT skills, so-called complementary skills are also becoming more important. The digital economy requires new knowledge and skills such as ideation (seeing the essence, analytical capacity), broad pattern recognition and complex communication besides maintaining general (vocational) skills. A key element in the development of ‘smart industry’

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5 The OECD definition of ICT (OECD Information Technology Outlook 2010) related employment distinguishes between three categories and levels of digital skills:

1. ICT specialists, these are capable of designing, managing and maintaining an ICT system. ICT is the main component of their job.
2. Advanced users, these are competent users of advanced and often sector-specific software tools. ICT is not their main job but a tool.
3. Basic users, these are competent users of generic tools (such as Word, Excel, Outlook, PowerPoint) necessary for the information society, e-government and the working environment. Once again, ICT is not their main job, but simply a tool.

6 The European Commission (2016b) investigates the impact of ICT on work, specifically on 12 ‘non- office’ profiles: dairy farmer, machine operator, industrial designer, building electrician, transport clerk, car mechanic, police detective, property caretaker, doctor in a hospital, animator, desktop publisher and VET teacher. The study reveals that the use of digital technologies has a profound impact on the tasks that are carried out and the skills that are required.

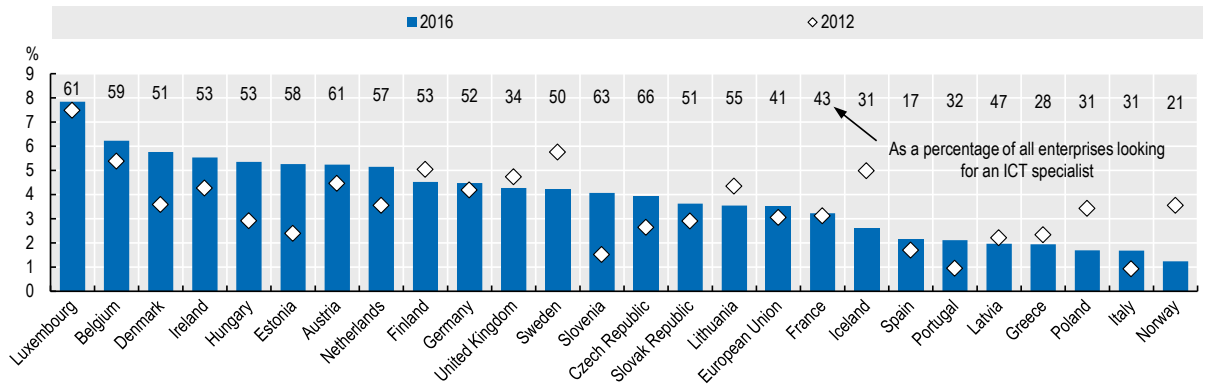
7 A quarter of the Belgian population have few digital skills and just one in three have more than basic skills, despite the fact that Belgium has a large number of highly-skilled workers and a high rate of participation in higher education. It also emerges that 19% of Flemings aged between 16 and 65 are not confident users of ICT, digital machines, multimedia, etc.

is operating in networks. Collaborating in networks places high demand on production and work processes and requires appropriate knowledge and skills of staff at all levels. The development of digital citizenship is also important, involving security and ethics besides ICT literacy (SERV, 2016a).

- Thirdly, generic skills will also remain important, particularly soft skills, because in future these will probably play a greater role in the tasks to be carried out by employees. This is because, in society and in business, greater emphasis is placed on complex and coordinating tasks, collaboration and multidisciplinarity and social skills, communication skills, motivation, team spirit, a positive attitude, creativity, curiosity, imagination, tenacity, flexibility and an open attitude to learning. Profiles with 'T-shaped skills' are therefore becoming more important. They are also important in view of the switch from job to career security as they facilitate the transition to other roles inside or outside the enterprise.

Entrepreneurial and employment skills are also becoming more important. Digital transformation requires the adaptation of organisational and production processes and appropriate business models. Enterprise, innovation and inventiveness are key aspects of this. Technological readiness therefore requires of enterprises the right management and entrepreneurial capacities to make the most of opportunities for growth and achieve the further digitalisation of organisation and business processes (including integration of IT, corporate strategy and operational management). Employment skills involve being able to position oneself in the labour market and develop career competencies, knowing one's rights and obligations, being able to form good attitudes to work, engaging in lifelong learning and maintaining one's skills by developing a focus on innovation, creativity and responsibility as competencies. Appropriate attention should be paid to the promotion of both entrepreneurship (converting knowledge and energy into creative and innovative entrepreneurship) and intrapreneurship (the enterprising employee who can play an important role in innovation and transition).

Figure 4 Businesses experiencing difficulties in recruiting ICT specialists, 2012 and 2016
As a percentage of all enterprises



Bron: OECD, Eurostat Information Society Statistics, 2017.

In all of the areas mentioned, the requirements are rapidly evolving due to the disappearance or transformation of existing jobs, the emergence of new roles and the rapid obsolescence of knowledge and skills. Especially in the short term, this could lead to a growing skills gap or a mismatch between demand and supply for labour and between education and society. For example, in Belgium 59% of companies are currently finding it difficult to recruit ICT specialists (compared with 41% on average in the EU28 countries, see figure 4) and there are currently already 27,000 vacancies for ICT professionals in Belgium that will not be filled by 2020. The job

vacancy rate, or the number of vacant positions compared with the total number of jobs (occupied + vacant) for a specific role x 100), is very high in Belgium (more than 2.0). The reason lies in a shortage of ICT staff, researchers and school-leavers (see supplement, figures 1 to 5).

Lifelong learning and learning differently are becoming the norm

The lifespan of skills and therefore also of qualifications will shorten substantially. Studies by Deloitte (2014, 2016) outline the impact of robotisation and digitalisation on the Dutch labour market and the world of education: from commercial, healthcare and technical disciplines in secondary education and from accountancy and finance to economics, marketing, business management and journalism in higher education, a quarter to more than half of those currently studying in that sector will see their jobs lost in future, according to Deloitte.

Another consequence is that employees in the labour market of the future will gradually cease to be recruited and assessed solely in terms of (pure) professional expertise, but increasingly in terms of skills (basic skills, digital literacy, social and emotional skills, learning to learn, etc.)[8]. Investing in training, retraining and further training of employers and jobseekers is therefore very important to remain up to date.[9]

This also emphasises the importance of boosting forms of lifelong and workplace learning to avoid forms of skill obsolescence (the 'loss' of skills due to the rapid changes in the labour market) and achieve career security. This may take the form of formal schooling, informal schooling, learning on the job or learning by doing, but also task rotation and a deliberate focus on talent development and learning. Attention is also drawn to the importance of a better connection between informal learning and formal learning, of combining work, innovation and learning and culture change; we no longer learn just for our first job or a specific career, but continue to learn for constantly changing work.

Digitalisation therefore has major, possibly even disruptive consequences for the role of qualifications and education. It is then not so much or only a question of the (significant in itself) use of digital technologies and modern technological resources in the formal education and training circuit[10]. It is not only the formal education and training circuit that must be constantly augmented and updated. The challenge is more fundamental than that. The model for receiving the best possible education (translated into qualifications), as early as possible (at a young age) in order to reap the benefits of this for the rest of your career, is outdated. In numerous

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8 Incidentally, this does not just refer to jobs in a traditional office setting (office jobs). A recent study by the European Commission (2016) reveals that the use of digital technologies also has a profound impact on the tasks carried out and the skills required for many non-office jobs.

9 Although, generally speaking, Belgium has a large number of highly-skilled workers and a high participation rate in higher education, relatively few people study science, technology and mathematics (STEM) there.The shortages in these areas could form a substantial barrier to growth and innovation.In fact, shortages are already emerging for certain roles for which digital skills, for example, are required.In 2015, 46% of enterprises with vacancies for which specialist ICT skills were required reported problems filling these vacancies. There is therefore a shortage of qualified ICT specialists, which is forecast to increase from around 8,000 people in 2012 to 30,000 in 2020.

10 Partnerships between policymakers, colleges and enterprises from the digital sector or with smaller enterprises or independent entrepreneurs can contribute to this. For example, the Flemish government and the company Siemens have entered into a partnership for software for Computer aided design (CAD), Computer aided engineering (CAE) and Computer aided manufacturing (CAM). The target group of the agreement are the industry-oriented STEAM study programmes in secondary, adult and higher education (STEAM: Science, Technology, Engineering, Art and Mathematics). Besides the software offer, the contract also provides support for academic projects and competitions, train-the-trainer courses and online teaching materials and exercises.

occupations, as already mentioned, it has become necessary to learn new skills because existing skills are no longer necessary. A qualification still provides the main access to most jobs, but initial training will also have to be augmented and updated constantly, during the entire career.

Two dilemmas emerge here. The first is that such specific expertise will often have to be built up on the job. However, in some countries, employers appear to be less prepared to invest in training their employees. The reasons given vary: resources for education and training are the first to be cut in difficult times, employers fear that better trained employees will move to competitors so that the investment made does not pay off, and there are multiple alternative options for getting work done such as automation, offshoring, use of freelancers, etc.[11] A second dilemma is that competency requirements are changing faster than before. However, academic institutions and other training bodies are wrestling with the challenge of offering rapidly changing content. Furthermore, unlike 'regular students', many employees cannot afford long periods of 'inactivity', part-time working or evening classes to undertake long-term training. If these trends continue, difficult times are looming for all kinds of workers. They face the challenge that their skills might cease to be necessary in the foreseeable future, but it is not obvious where and how they can acquire new skills.

In practice, many processes are underway to rectify this in several countries. Solutions arise from coordinated initiatives by training bodies, employers, trade unions and individual employees. Examples of this include trade unions which support people throughout their career, tripartite agreements between employers, employees and governments on education and training, industry transformation roadmaps based on information from employers and employment services relating to the skills required for the future. Some businesses, sectors and governments are rolling out ambitious programmes for training and retraining. Work and education are being combined in new ways by making it easier to enter the labour market (lower importance of qualifications and experience, greater scope for evidence of experience and recognition of competencies acquired, elimination of entry barriers for certain jobs) and combining work and learning throughout the career (lifelong reskilling via learning credits and other tools), etc.

A second solution comes from the 'market' and could prove disruptive for traditional forms of education and training. In several countries, alternative training providers are emerging - sometimes in partnership with employers - who want to respond faster and better to issues and problem areas in the labour market, offer more flexible, modular and accessible training and aim for maximum employment security (employability). In several countries, as for other activities (see below), new business models are emerging in this area, including boot camps, online courses (sometimes free but with a paid assessment and accreditation at the end of the course), training courses divided into modules (and modules into study packages, study packages into short parts), skills and competencies that are built up block by block (stackable credentials), etc. This change is influenced by the extent to which the formal education and training circuit is permanently augmented and updated and therefore meets a range of requirements.

These changes are partially made possible by digital technologies.[12] This is because they create new opportunities for the development of skills (OESO 2016a). Massive Online Open Courses

11 An organisation like Manpower (employment consultancy) sees that 'organisations have moved from creating talent to consuming work'.

12 The trends are sometimes compared to developments in the music industry, where songs used to form an album and the music industry made its living from the sale of these albums, but songs are now streamed individually via digital channels virtually for free and this industry now makes its living from the 'premium experience' of live concerts. Similarly, some say that universities and colleges should offer more online courses and MOOCs as an

(MOOCs) and Open Educational Resources (OER) are changing teaching methods and giving a wider audience access to high-quality study packages with more flexible hours. Big data analysis allows more precise monitoring of changes in demand for skills and test the optimal duration of training[13]. Credentialling platforms enhance the credibility of high-quality training outside traditional educational and training institutions. Experts from all over the world are used online to offer and constantly update training material. And so on.

Particular attention is required in any case for the lower-skilled, for whom all MOOCs are far removed from their environment and learning capacities. The costs of further training and retraining, in time and money, are also easiest to bear for people with savings who can and want to opt for a career change, people who have control over their working hours or employees working in companies with a comprehensive internal training policy.

Impact on labour organisation and labour relations

Far-reaching technological changes are often accompanied by new business and earnings models which can lead to different work processes and organisational changes.

New forms of work

Several authors use the term 'virtual work' as a generic term for all forms of work carried out in an unconventional workplace (e.g. at home or in a public space), using digital technologies (internet, computers or other ICT tools) and new contractual arrangements.

An example of where this is apparent, which also illustrates the opportunities and challenges, is the growth of the sharing economy. On the one hand, this creates opportunities for specific profiles (people returning to the labour market, students, etc.). On the other hand there is a risk of displacement. Anyone who moonlights in the sharing economy or hires (out) equipment is possibly also squeezing jobs and wages at the bottom of the labour market. But, fundamentally, the emergence of the sharing economy with its digital platforms and new forms of work generates debate about current social and working models (see also below). Questions arise regarding employment law, terms of employment and social protection since the sharing economy is sometimes at odds with existing working relationships and social outcomes of employees (SER, 2016). The question is whether this will lead to a new standard for labour relations. Much will depend on the course followed by the government and the courts (Sels et al 2017).

More generally, digitalisation, together with other trends such as globalisation, is set to lead to other more hybrid and polygamous working relationships in which people are either both an employee and a self-employed person on the side or a freelancer. The traditional working relationship is then more difficult to define and leads to discussions about how to distinguish between an employee and a self-employed person. In this context, Eurofound (2016) has identified nine new forms of employment (see table). Freelancers, for example are entrepreneurs without staff who mainly provide services in a business-to-business (B2B) context, on the basis of temporary contracts, assignments or projects. They operate in a wide variety of sectors, such as IT, media, consultancy, photography, languages, etc. ICT and digital technology make it possible to break down or reorganise tasks within jobs and since digitalisation enables remote control, it is easier to outsource parts of a business to flexible workers who are available on

alternative to lectures and turn on-campus events into a premium experience (also aimed at developing soft skills, see above).

[13] Six minutes appears to be the ideal length of an online video and four weeks for a study package.

demand all over the world. This is sometimes also called the 'uberisation' of work: the on-demand economy in which providers of labour are no longer employees in the traditional sense but independent workers performing specific tasks.

New forms of employment (Eurofound, 2016)

- Employee sharing, where an individual employee is hired jointly by a group of entrepreneurs and works in various enterprises on a rotation system
- Job sharing, where an employer contracts two or more employees to carry out a job and where these employees perform the same task in the same enterprise on rotation
- Interim management, where a highly specialised expert is temporarily hired by an enterprise, often for a specific project
- Casual work, where a contract of employment specifies that employees may be called upon on a flexible basis when necessary, rather than on the basis of regular rosters
- ICT-based mobile work, where employees do not use the employer's business premises as their usual place of work and spend most of their time working with ICT (computers, internet, email and social networks). Their work is different from that of usual forms of mobile working such as customer or patient visits, working on construction sites, delivery or transport and can be characterised as remote/teleworking without a fixed location.
- Voucher-based work, where the working relationship assumes payment for services in the form of vouchers purchased from a third-party organisation (usually a government agency). These vouchers cover both pay and social insurance contributions.
- Portfolio work, where an individual carries out small assignments on an independent basis for a large number of clients.
- Crowdworking, where an online platform matches employers with employees and projects are often divided into micro-assignments and distributed across a 'virtual cloud' of employees.
- Collaborative self-employment, observed in several countries where more flexible forms of collaboration (such as co-working spaces[14]) are used to escape the limitations of traditional business partnerships.

According to the OECD, a larger share of non-standard workers (NSW) in employment has major implications for private individuals, businesses and government (OECD, 2017f). For private individuals, NSW arrangements can offer more flexibility and extra opportunities to supplement the family income. On the other hand, existing systems of social protection are largely based on traditional employee-employer contracts and stable career patterns and working as an NSW can mean that there is no (comparable) right to payments, minimum wage or protection by various other employment, anti-discrimination, health and safety regulations. Moreover, under NSW arrangements, people may be vulnerable to low income or future unemployment. In an empirical study carried out for the OECD countries, NSW schemes appeared to correlate with lower wages, lower opportunity for education and training financed by the employer and higher risks of ending up unemployed (OESO, 2015).[15]

The phenomenon of new forms of work is also recognised by the High Employment Council in its report from 2016. The Council writes: "Although traditional paid employment remains the most established form of employment, several new forms of work are actually on the increase. However, for any one individual, the forms of work succeed or overlap with one another

14 Co-working is a way of working that involves a shared work environment, often an office, and independent activity. Unlike a typical office environment, co-workers are not usually employees of the same company or organisation, but form a collective of self-employed persons, freelancers, homeworkers, or people who have to travel a great deal but still want to work from a workplace with colleagues.

15 The median annual income of all 'atypical employees' turned out to be half of that of the level for 'standard employees' within the OECD. Full-time, atypical employees turned out to have 20% less chance of being trained compared with standard employees.

throughout their career. For example, more and more people are combining several activities, workers with the status of entrepreneur, self-employed persons as a main or secondary occupation, freelancers, employees on a temporary contract, temporary staff, part-time workers, etc. It is highly likely that the share of independent employment will continue to grow due to the impact of digitalisation, particularly the emergence of the online platforms. For newcomers or people wanting to return to work, these forms of work can offer faster access to the labour market than traditional paid employment (open-ended employment contracts) where there is more intense competition with experienced employees. However, the persistent instability that arises from the increasing proportion of precarious contracts of employment highlights more than ever the need for appropriate adaptation of existing employment law, which was drawn up based on traditional paid employment, so as to better cover non-standard forms of work (e.g. secondary occupation, freelance, teleworking, etc.)."

As stated, in the case of temporary contracts, there is also a higher probability that less investment is made in training and sustainable employability than is necessary to promote continuous competency development. The SER (2016) warns more generally that, if the growth in flexible working relationships continues, the dividing lines in the labour market will become sharper. Aspects such as the distinction between wage-earners and the self-employed or legal and/or economic disadvantage will be highlighted more sharply. Some say that the creation of a specific status, between that of wage-earner and that of self-employed person, is required to protect these workers better. Others consider that the current statuses are sufficient and that a new status would mainly increase segmentation in the labour market. The High Employment Council advised against creating a new status, but rather to consider how all statuses can be adapted to the digital economy (De Wachter et al, 2016).

In any case, opinions are divided as to whether these new forms of work will catch on. In most Western countries, atypical and flexible forms of work have grown steadily in recent decades. However this is not the case for Belgium, where the trends are more modest than in many other European countries (HIVA, 2016). Full-time salaried employment under an open-ended contract is still the standard form of work. Even in the Netherlands – one of the most flexible labour markets in north-western Europe – 70% of workers have an open-ended, permanent contract (WRR, 2017).

According to a recent survey of employers in Belgium (Randstad, 2017), flexibility in general is still an important topic for Belgian companies. However the prediction that the status of employee is on its way out and that more and more work will be carried out by the self-employed, does not meet with much agreement. This study concludes that, at first sight, it does not appear that the status of employee will become less important, let alone disappear.

Recent survey results for Flanders (Stichting Innovatie & Arbeid, 2017b) indicate that, over a ten-year period, the outsourcing of basic activities has strongly declined, both in industry and in the services sector. In industry, there also appears to be little or no difference from ten years ago as far as globally deployed flexibility instruments such as temporary work, student jobs, open-ended contracts, flexible hours, use of self-employed workers and freelancers, and temporary unemployment are concerned. The only significant differences relate to the substantial increase in part-time work and the decrease in multi-skilling (the ability to perform at least two different roles). In the services sector, there is an increase for most flexibility instruments (apart from temporary staff and weekend working) with open-ended contracts, the adaptation of leave arrangements and part-time work standing out. The use of self-employed workers and freelancers has increased slightly. There is a decrease in the application of temporary unemployment and

here also, the number of enterprises applying multi-skilling is also falling (Stichting Innovatie & Arbeid, 2017b).

New organisational models

As the economy becomes less predictable, more attention is focussed on organisational models that facilitate flexibility, including project work. Compartmentalisation within enterprises and institutions is broken down and staff are deployed based on knowledge and skills.

More generally, the business culture plays a greater role in the successful enterprise in a digitalised business world (Avent, 2017). Numerous enterprises are trying to open up new digital markets, but it is above all the business culture that determines which company succeeds. Enterprises with less hierarchical structures, more team and network-oriented models, a good information flow and intrinsically motivated employees invent productive new ideas and react more quickly to changes in the market (Schwab, 2016).

Impact on quality of work

Nor is there unanimity regarding the impact of digitalisation on the quality of work. There are various consequences and these can be both positive and negative.

Positive consequences for quality of work

The consequences can be positive because digitalisation increases the speed, flexibility and independence of work, for example. Time-consuming work processes can be carried out more quickly. At the same time, some employees can perform more tasks autonomously and work more independently. This leads to greater 'ownership' (i.e. engaged employees with control over their tasks) and autonomy. Then, workers appear to be readier to learn skills, less likely to suffer from stress at work and burnout and there is less sickness absence.

Automation replaces routine tasks, leaving the more interesting elements of a job. Digitalisation and robotisation are also expected to further reduce physically demanding, dangerous and repetitive work. Technological tools can make physically demanding tasks less strenuous and enable everyone to continue working longer.

Digitalisation can also lead to better transport facilities and thus to shorter commuting times and less stress. Forms of teleworking can also contribute to this.

Digitalisation also offers opportunities for work for people who are very remote from the labour market and for people with occupational disabilities. More flexible and decentralised forms of work can also offer vulnerable groups more opportunities in the labour market and potentially have a positive impact on well-being at work and workability.

Negative consequences for quality of work

The consequences can also be negative because teleworking for example can also lead to different, longer and more unpredictable working hours. In certain jobs, digital technologies can create a constant connection with work, which in some cases can impact upon free time and private life[16] and create extra work pressure for employees.

[16] Eurofound (2016) writes that the 'friendly and flexible anytime always' working model can soon change into an 'always and everywhere' working model.

Digitalisation could also lead to some tasks becoming so simple or heavily divided that that the employees concerned cannot be creative enough and can no longer initiate their own activities, reducing their autonomy and job quality.

A recent report by the Dutch Scientific Council for Government Policy (WRR, 2017) refers to the negative impact of increased flexibilisation on well-being. The uncertainty associated with flexible contracts[17] has a detrimental effect on people. For instance, the WRR states that 'increasing uncertainty in society can lead to financial stress, declining well-being and possibly to putting off having children'. The greatest job insecurity is found among workers on temporary contracts, the lower-skilled, blue-collar workers, young people and employees of foreign origin (HIVA, 2016). There is also a risk that some people with a flexible contract will be faced with the negative aspects of a digital economy, for example because they participate in less training and partly because they have a vulnerable position in the labour market. If there are more low-skilled jobseekers, they will be more inclined to accept flexible contracts and poorer conditions of employment.

New forms of crowdworking can give people more individual freedom, but also isolate employees, undermine social rights and in the worst case scenario can lead to new forms of homeworking in virtual sweatshops (Schwab, 2016) and other forms of generalised (self-)exploitation (Malcorps, 2017).

In any case, several trends such as digitalisation, e-commerce and the fierce market competition and adaptation issues they involve appear to have some impact on mental fatigue and stress at work (Stichting Innovatie & Arbeid, 2017a)[18] and it is not easy to adapt existing health and safety at work regulations to new forms of work and work organisations.

3.2 Economy and business operations

Digitalisation has an impact at both macro and microeconomic level. Several key opportunities and challenges in terms of economic and business operations are explored below.

Impact on productivity and growth

Driver for new opportunities

Digitalisation, robotisation and automation allow business processes (supply, production, distribution, accounts, etc.) to be organised differently among various actors (enterprises, government, organisations), made more efficient and carried out with greater customer focus and productivity to be boosted[19]. Industrial production in particular is digitising and automating rapidly due to competitive pressure (Industry 4.0).

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17 The WRR defines a flexible contract as a contract of employment for a fixed period or for an unspecified number of hours. This also includes temporary work, pay rolling and on-call working. The temporary contract, a relationship between an employer and an employee where the contract of employment is for a fixed period, also comes under this.

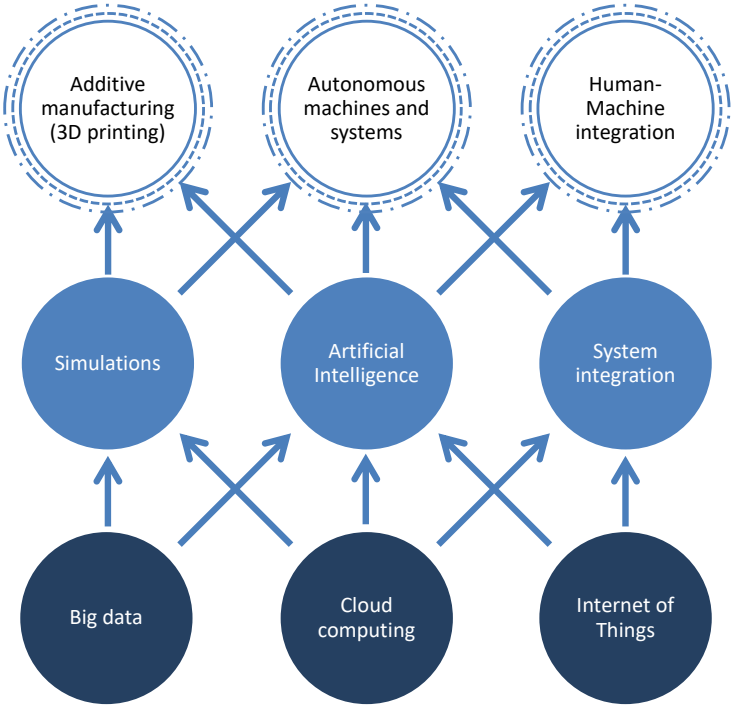
18 Between 2004 and 2013, the workability rate rose from 52.3% to 54.6%. In 2016, the monitor recorded 51.0% workable jobs: all of the progress made has therefore been lost.. The achievement of a workability rate of 60% therefore seems like an ambitious task.

19 The impact of digitalisation on the measurement of productivity and economic growth is not explored further here. As an illustration of the issue, we can for instance refer to the example of digitalisation in the music industry (e.g. Spotify). This may well lead to lower GDP, but also to value added for society.Cf. in this respect, among other references, the SERV academy 'Future of Productivity' of 23 September 2016. See also De Cock (2017).

The advent of digital technology (and the associated reduction in transaction and coordination costs) means that in some sectors enterprises require a smaller scale than before to make a profit. New markets and new opportunities for the internationalisation of business are emerging. This dynamic offers plenty of opportunities for new and existing sectors, for clustering and networking of large enterprises, SMEs and knowledge institutions, for new start-ups and platforms in the area of entrepreneurship, innovation and sustainability, etc.

However, quantitative data on the economic impact of the digital transformation of industry is limited.[20] It is nevertheless clear that the huge potential is currently still greatly underexploited in all sectors, regardless of the size of enterprises (OECD 2017d). According to the OECD, two trends are causing digital technologies to redefine industrial production (OECD, 2017e): the reduction in the cost of these technologies, so that they are more widely distributed, including among SMEs, and, most importantly, the combination of different digital technologies forming new sorts of application (see figure 5).

Figuur 1 Some 'key technologies enabling the industrial digital transformation'



Bron: OECD, 2017e

- The use of big data is transforming all sectors of the economy. Production is becoming more and more data-intensive. The use of big data can mean a considerable improvement in products, processes and organisational methods (DDI or data-driven innovation).[21] This

[20] Estimates from Japan indicate that the use of big data and data analytics has already led to lower electricity and maintenance costs in some companies, corresponding to more than 15% of turnover in 2010.Estimates for Germany suggest that advanced ICT in industry has increased productivity by 5% to 8%. It is expected that 'Industry 4.0' applications in mechanical, electrical, automotive, chemical, agricultural and ICT sectors in Germany will increase value added by 15% by 2025 (OECD, 2017e).

[21] Based on provisional figures, DDI should increase labour productivity by around 5-10% (over and above the increase in productivity due to other investments in and use of ICT) (OECD 2017e).

therefore goes further than using sensors to monitor and optimise the efficiency of machines, but also linking company data to external data.[22]

- Cloud computing makes processing power more widely available and affordable. Along with autonomous machines and systems or complex simulations, many industrial applications are 'computationally' highly intensive and require supercomputers. Thanks to cloud computing, this is also becoming more possible for start-ups and SMEs and new opportunities are arising for example to share data between departments, companies and other organisations (Cloud as a Platform for Service Integration). Cloud computing services can take the form of software (Software as a Service), platforms (Platform as a Service) or infrastructure (Infrastructure as a Service), and can be used privately (for exclusive use), publicly (open to the general public) or in hybrid form.

- A third key technology and game changer is the Internet of Things (IoT). Interconnected objects with sensors combined with big data analysis and cloud computing make autonomous machines and intelligent systems possible. This creates major potential for further efficiency gains and cost savings, improvement of service to customers, faster decision-making, transparency and predictability of costs; new markets and applications, etc.

- Together with big data and cloud computing, the IoT is also the main explanation for the breakthrough of artificial intelligence (AI) applications. Robots have already been used for a very long time in manufacturing and agriculture. So far, this has mostly happened in situations where speed, precision, heavy work and work under hazardous conditions are important. However, traditional robots could only work fast in very precisely defined environments. These robots often had sensors, but most of their movements had to be planned and programmed in advance and they allowed little flexibility in production. It took months or even years to set up a robot-based production environment. For these reasons, the manufacture of consumer electronics still often involves manual labour, since the whole lifecycle and time to market is so short that by the time a new robot-based factory was ready, there would already be a successor on the market. This is changing radically due to AI. Machines are becoming more and more flexible and autonomous as they can perform a wider range of more complex manual work.

Based on the available indicators, in these areas and in the area of progressive ICT in production (ERP or enterprise resource planning), Belgium and mainly larger companies are currently not doing badly internationally compared with other OECD countries (see supplement, figures 10-13).

Importance of a smooth transition

The upshot of all this is that companies are faced with a more complex competitive landscape because the competition can come on multiple fronts and from various angles at the same time. As an illustration, for example, we can mention the automotive sector, where traditional car companies are now also experiencing competition from new entrants such as Tesla but also from large ICT companies such as Apple, Alphabet (Google) and Uber Technologies (Uber), to name but a few, and from new business models based on mobility as a service. They are also faced

[22] In agriculture, for example, there are more and more precision agriculture applications that link real-time data relating to weather forecasts, soil condition, fertiliser use and crop yields to savings on pesticide and fertiliser use, irrigation, working hours, etc. Manufacturers of agricultural machinery such as John Deere are developing new machines which use sensors, geodata, weather information, satellite data and so forth not only drive themselves but also analyse data and apply it smartly and communicate between themselves. Smart milking robots are not only used to milk cows but also to optimise the feeding and milking of each individual cow, etc.

with the risk of being relegated to the profitable segments (the production of the hardware of a car), while the profitable software applications are made by the 'Apples and Googles' of this world (OECD 2017e).

There are also numerous other examples of far-reaching and less far-reaching consequences. For instance, some temporary employment agencies have digitised part of their services. Temporary employment contracts can be signed electronically. CVs and vacancies are automatically linked, via a profile on an app on a smartphone. Everything happens online, there is little or no interaction any longer from a temporary employment agency and no paper is involved. According to temporary employment agencies, the advantage of the app is that it offers unprecedented flexibility and speed, and minimises the administrative burden involved (Stichting Innovatie & Arbeid, 2017b). Another example is the electronic patient files that are making their debut mainly in geriatric care but which, by extension, could well generate a strong boost for healthcare processes in all healthcare sectors. In the energy sector, automobile industry and many other areas besides, there are also various radical developments due to digitalisation and new business models.

Thus, in the transition to a digital society, enterprises are also faced with many challenges, not least due to the increasing flexibility required. The possibility for enterprises and entrepreneurs to implement and use new technologies rapidly, learning by doing, innovating and optimising their production, determines the extent to which the benefits and opportunities of the digital economy are cashed in. The rapid introduction of new technologies, which often meet existing needs and requirements in a new way, requires enterprises to adapt their way of developing, designing, delivering or marketing goods and services. This applies both to industrial sectors and to the manufacturing industry, construction and energy and to services sectors such as the financial sector or healthcare, the social economy, etc.

As for employees (e.g. frictional unemployment) and their skills (cf. skill obsolescence above), significant transitional problems and adaptation costs are to be expected in the short term, for example because capital goods become obsolete (stranded assets). Capital goods have to be depreciated more quickly because they become obsolete sooner than before due to the technological developments.

Impact on the economic structure

Sector boundaries are blurred, value chains fragmented

The speed of innovations and the disruptive power that can emanate from digitalisation also make it difficult to estimate the impact of this. The impact of digitalisation can vary greatly between and within sectors. In any case, digitalisation gives rise to new forms of activity that respond to new or changing requirements and blur sector boundaries.[23] R&D is also becoming more dynamic and more multidisciplinary (OECD 2017d).

A newly emerging model of industrial production brings short production flows for mass consumption, global fragmentation of value chains. Services are increasingly linked to the industrial product or the industrial product forms part of a service. There is also the industrialisation of services. This means that, just like industrial products, services are divided up so that sub-services can be provided more efficiently.

[23] In this connection, the question obviously also arises of the implications for the existing structures of social dialogue.

The future of innovation and value growth increasingly lies in networks, alliances and the creation of relevant information and products and services from data. Information is increasingly becoming an important or, some would say, the most important commodity and it is a question of how it is processed (Avent, 2017). This requires smart algorithms and employees who have the knowledge and experience to reflect on this and put it into practice: in smart cities, smart genetics, smart medicine, smart agriculture, smart geriatrics, smart care and smart trade.

But the implications may go even further. Information has become a product in itself and the ultimate commodity of the knowledge economy. It is mined on a larger and larger scale and shared more and more rapidly via various channels, applications and services The value of goods and services is increasingly derived from the knowledge used to create or deliver them instead of the materials, the capital goods or labour used in pure manufacturing.[24] A manufacturing company is increasingly a place where information is converted into products via the controlled supply of raw materials and energy (Van Brussel et al 2016). As data and knowledge become more important along with labour and capital, the discussion is not only about 'pay versus profit' but also about access to and power over data (Mason, 2015).

Data also has a specific characteristic compared with other products or commodities. Once created, it can be used or 'consumed' an infinite number of times. The costs of reproduction are small or zero (e.g. digital music files). Combined with free access to this data (open source, open data), this intersects with traditional value chains and business models and even challenges traditional economic approaches and systems based on scarcity, ownership and aiming to protect and privatise data.

Some (e.g. Rifkin) see in digitalisation great opportunities for a new 'collaborative economy' with the blurring of boundaries between producers, sellers and consumers. Consumers become prosumers, their own producers of energy, products (via 3-D printing) and services (via social media platforms). The trends are driven by online platforms, fab labs, microfactories and crowdsourcing (global sharing of knowledge via the cloud). In this regard, we also talk about a new 'economy of commons', in which peer-to-peer production sets the tone, and of the 'next economy' in which many freelancers, DIYers and new digital technologies come together and create a new kind of productivity (Malcorps, 2017).

Importance of a strong ICT sector, start-ups and innovators

In practice, disruptive innovations are often exploited and commercialised by ICT firms, especially by start-ups and via mergers and acquisitions by major players (OECD 2017e).

Established, traditional companies are more inclined to capitalise on their existing customer base and thus tend to ignore new, disruptive innovations, even if they invest a lot in research. The reason is firstly that scarce resources have to compete harder with other investments, especially with investments in the most profitable business units, in order to remain competitive in the current markets, while disruptive innovations are often very risky and probably not profitable in the short term (known as the innovator's dilemma) and secondly that disruptive innovation often also requires significant changes in organisational structures, processes or business models and therefore in established companies have more to do with internal resistance from management and employees.

[24] 'We used to say: "follow the money." Well, today, we need to "follow the data" and we need to rethink all our policies, from tax to trade to transportation, from this perspective.' From: Cancun Ministerial closing remarks by the OECD Secretary General (2016).

The growth of the digital economy is largely dependent on a strong ICT sector (in which Belgium is doing less well, see supplement, figures 1-2 and figures 11-12), on start-ups which put new innovative digital products on the market and the extent to which they can continue to grow and upscale. However they often find financing difficult. Innovative SMEs in particular encounter this problem. On the other hand, digitalisation can also help alleviate cases of market failure in the finance of innovative enterprises. New financial instruments (e.g. Fintech) and forms of external finance are emerging (e.g. crowdfunding).

Belgium is not among the leaders when it comes to R&D in ICT either - in terms of input (R&D spending on ICT) or in terms of output (patents) (see supplement, figures 16-18).

Impact on business models

New business models

Digitalisation is sometimes a major challenge for existing traditional business strategies and models. The conventional value chain is under pressure. The value chain consists of suppliers of commodities and materials, produces, distributors and consumers, joined by an extensive commercial infrastructure and a set of stable transactions. Digitalisation creates networks and transactions outside this traditional value chain. There are already several examples not only involving incremental innovations (to ensure lower costs and better services or a larger market share in existing markets) but more disruptive innovations, where new markets are developed and new business models shake up the value chain in existing markets and push existing companies out of the market (process of creative destruction). Business models are partially service rather than production-based due to digitalisation (OECD, 2017e).

In many cases, platforms are the new value chain (PWC, 2017). Due to the emergence of digital platforms and new business models based on this, a different form of competition is emerging, as in the sharing economy, for example. A digital platform is an online functionality whereby interested parties can get in touch with one another directly. Digitalisation means that the cost of setting up such a platform is much lower than before. Unlike conventional enterprises, the platforms do not have to invest heavily, incur lower production costs and have few staff paid in proportion to their economic valuation. With this new economic way of working, it is no longer important to possess physical capital, but it is a question of setting up a large online network. The activity involves bringing supply and demand into contact. Access to these digital platforms often allows innovative start-up entrepreneurs to provide consumers with a faster, higher quality and cheaper service existing enterprises. They lower the barriers to co-production with customers and for new entrants. They create new markets with new products and new ways of providing services. These platforms not only offer different ways of consuming goods and services (sharing, recycling, etc.), they also blur the boundaries between consumer and producer. Thus, digitalisation has major consequences for the retail trade and certain service sectors.

This new ‘platform economy’ business model is causing shifts in the economy and society and generating a lot of discussion. Platforms benefit from size. This can lead to a ‘winner-takes-all’ situation due to network effects combined with low upscaling costs (scale without mass)[25]. This can cause problems such as too high prices, vertical or horizontal exclusion, buyer power and other strategic behaviour. Furthermore, legal, contractual or criminal rights and responsibilities tend not to be properly regulated yet. There are issues around aspects such as remuneration, the

[25] The aim of this is for aspects such as low marginal costs and global access to the internet to allow companies and platforms to grow very rapidly, often without many employees or tangible assets.

extent to which these activities should be taxed, the distinction between self-employed activities and paid employment, the market power of large platforms, consumer rights or protection of personal data. The risks that are generally borne by traditional enterprises are sometimes passed on to other parties. Suppliers or enterprises from this platform economy often find themselves in a legal and fiscal grey area. A level playing field in terms of taxation, regulations and other legal provisions is therefore important.

Another example is e-commerce. Commercial transactions are executed digitally via computer networks or electronic media (websites, smartphone apps, social networks, platforms for exchange, online sales, auctions, etc.). Developments are radically changing the behaviour of businesses and consumers and this has major consequences for the retail trade via traditional shops and for both B2C and B2B transactions. Key aspects of e-commerce include 24-hour availability (ubiquity), global accessibility, universal technical standardisation (internet), the wealth of information available, rapid two-way communication on a large scale, the large quantity of high-quality information available to all market participants (transparency and comparability) and the personal approach to the consumer (personalisation), responding to individual preferences (customisation). Pure e-commerce actors such as Zalando have challenged conventional retailers to come up with innovative and creative business models, based on complementarity between e-commerce and physical stores. Flanders and Belgium score very highly in general when it comes to e-commerce indicators (see also the supplement). However the share of online purchasers buying from suppliers in a different EU country is very high in Flanders (61%) compared with the EU28 average (29%) (SERV, 2017b).

New forms of collaboration

Another trend is for traditional partnership structures such as mergers, acquisitions and joint ventures to be replaced by a new trend: the industrial *mash-up*. In an industrial *mash-up* , an enterprise temporarily shares assets or a competency with one or more partners with a view to developing new opportunities for the participants. The essence of this is to enter into strategic, innovation-based and flexible alliances inside and outside the sector. Unlike mergers or joint ventures, *mash-ups* operate on the basis of simple cooperation agreements aimed primarily at achieving mutual advantages from the actual sharing and use of resources. They therefore do not bind the participants to achieve synergies or make efforts towards integration.

Thus, enterprises are not putting all their eggs in one large merger basket but opting for smaller, heterogeneous alliances. These partnerships look set to gain in popularity.

One example is the collaboration between banks and other institutions around blockchain technology for the security of digital transactions. It is difficult for individual companies to acquire the necessary knowledge and expertise (technological, legal, organisational) to apply blockchain technology. Companies from various sectors such as logistics, financial services, energy, ICT and the security sector and various knowledge institutions are working on this together (Accenture, 2016).

Impact on network infrastructure

Need for high-quality digital and other infrastructure

The rapid technological developments are only possible and can only grow if there is a well-developed, state-of-the-art network infrastructure. By this we mean mobile broadband, internet, next-generation networks, integration with energy grids and mobility infrastructure.

An attractive infrastructure in terms of connectivity, data storage and ICT applications is a major location factor. Powerful infrastructure attracts enterprises that use digital facilities, such as e-commerce, app developers and media companies. Digitalisation is making increasing demands on this digital infrastructure.

But the significance goes much further. With the internet of things, more and more items are being interconnected, anytime and anyplace. After all, the core of Smart Industry lies in the connection between machines and enterprises in the chain by ICT and the internet. Energy grids are increasingly interwoven with ICT and telecoms infrastructure. A smart grid manages and transports electricity using digital datastreams. The number of systems and devices connected to the energy grid is expanding. The systems and devices are capable of communicating with one another through the addition of measurement and control systems. The same applies to the mobility infrastructure for the management of transport and traffic flows, for example.

This kind of development requires a high-quality, reliable infrastructure. Conversely, an inadequate digital infrastructure will hinder the use of digital technologies and hold back the development of an innovative ICT sector and Industry 4.0 (CRB, 2015).

Importance of the right framework

Belgium and Flanders have a relatively high-quality ICT infrastructure and a high ICT density[26] (see also supplement, figures 24-32). But the requirements are growing in this area too. It is important that the right framework is created. This involves aspects such as coverage, digital security, standardisation and competition. Investments in ICT and networks do not automatically result in economic growth and jobs, however. The impact of such investments varies depending on how they are exploited and used by users and developers of ICT goods and services. The extent to which these investments are well regulated, and accompanied by complementary (including organisational) innovations and investments in knowledge and skills, is a factor here.

There are important policy questions such as:

- What is provided publicly and what is left to the market?
- What is the most efficient aspect and what are the implications for access and finance, for example?
- Who pays for the financing of new infrastructure: the user or society? To what extent does everyone contribute (discounts, charging basis, control via tariffs)?
- What is charged in what way?
- Who reaps the benefits of the public infrastructure developed and the potential for data arising from this?
- When is which infrastructure rolled out (e.g. the discussion about smart meters in the energy sector)?
- How futureproof and flexible are the decisions made in view of the sometimes rapid developments (are there for instance advantages in postponing investment to wait for costs to fall or would that mean missing the boat)?
- What synergies could there be and who monitors them?

[26] In the McKinsey Global Institute's Connectedness Index, Belgium is ranked ninth out of 139 countries and in the 2016 DESI (Digital Economy and Society Index) 2016, Belgium was in second place for connectivity. The entire country is covered by fixed broadband and 99% of the population can enjoy access to 'new generation' networks such as fibre-optic networks, upgraded cable networks and some wireless networks. More than three quarters (78%) of fixed broadband subscriptions have a speed of at least 30 Mbps. As far as internet usage by individuals is concerned, Belgium is in third place and in fourth place for the integration of digital technology into business life.

It is also clear that the features of or requirements for a good regulator change. The information asymmetry with the sector has to be bridged. This requires new skills that are not present - or not to a sufficient extent - with conventional regulators (e.g. VREG) (for example electromechanical versus digital, privacy issues, monitoring issues, etc.)?

Impact on (cyber)security and privacy

Increased reliance on digital applications is a challenge to the security and privacy of all kinds of personal data, business processes and datastreams.

Importance of cybersecurity and continuity management

The intensity and integration of the use of digital applications in communication, data storage and control processes increases reliance on their correct operation as well as the potential for and impact of digital sabotage and espionage or cybercrime in general. Cyber incidents can have a systematic impact here, for example due to the lack of certain financial processes and/or a loss of public confidence in the integrity of a certain system-relevant financial institution or the entire system.

Enterprises and governments are faced with the challenge of managing these cyber risks at the same pace as their digital innovation or services. We still have a long way to go. This is clear from surveys of businesses[27] (see also supplement, figures 3-36). The traditional prevention techniques used by organisations thus far for their cyber security, are also evolving more slowly than cyber threats. Organisations must improve their defence mechanisms further if they want to be able to detect breaches even faster and respond appropriately. Such active defence[28] and the response to cyberattacks require special skills.

The fact that organisations can fall victim to cybercrime such as hacking will probably mean that the focus of the security measures shifts from repeatedly raising the digital walls (resilience) to the capacity to act in a resilient manner. Detection of and response to incidents (recovery) must be organised. In order to minimise the disruption to customers and the organisation's own business process, attention should be paid to the restorative capacity of continuity management. Raising environmental awareness of the digital world should take place in all sections of the organisation: among employees/users (awareness and basic knowledge of threats), among decision-makers and their advisers (awareness, external cooperation with partners in the chain, companies in the same line of business and the government, a good translation from and to cyber experts) and finally among cyber specialists/experts (manpower, capacities, motivation, training, method of control and in-depth knowledge).

Cybersecurity and the reliability of ICT and telecom infrastructures and systems are important factors in view of Industry 4.0. Products are becoming smarter (more software in the products)

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27 A VBO/FEB (Federation of Entreprises in Belgium) survey from October 2014 revealed that 51% of companies taking part said that they had already had to deal with cybercrime; 68.5% of enterprises considered that there was a real risk of their encountering cybercrime in future; 61.5% of respondents did not know which authorities they should contact in relation to cybercrime; 75.4% said that they were not aware of the regulations concerning cybercrime; 65.6% of the companies required additional information about developing an adequate cybersecurity policy.

28 Many cybercrimes remain unnoticed for a long time because the traces they leave are easily overlooked. An Active Defence goes beyond traditional security. It is led by Cyber Threat Intelligence. It involves more than just capturing feeds. By analysing the actual threats, users of Active Defence can identify potential attackers, understand their motives and methods and develop tailored countermeasures.

and production processes are also interlinked beyond company boundaries. This requires cybersecurity in the product, the process and the chain. The technologies used are built on open i-platforms, process more data and connect organisations at a digital level. This data is increasingly stored in the cloud or with third parties, resulting in less control, higher risks and a more complex cyber ecosystem. Smart devices and services contain a mass of sensitive data and unavailability, inappropriate use or data leakage can have far-reaching consequences.

Alongside ICT and telecom infrastructure, the energy infrastructure, for example, is also more vulnerable to cybercrime. Energy grids are becoming intelligent but as a result a new requirement is also growing for increased security to prevent cyberattacks aimed at obtaining sensitive information or damaging the energy infrastructure and economy[29]. There are cyber risks in the generation, transport and supply of energy. The energy structure of tomorrow therefore also requires cyber protection throughout the energy value chain.

Impact on privacy

There is also a major impact on privacy in a world where software, objects, networks, robots (all interconnected) play a greater and greater role. This offers many advantages but also involves new risks: all of these intelligent devices are constantly watching us, know all of our personal data, monitor our health, take over routine tasks, try to predict our behaviour and can even anticipate our decisions. Altogether, they play the role of the perfect butler, but at the expense of some privacy and self-determination for the people involved. They may well also share the personal data they manage with shops, banks, insurance companies, opinion pollsters, etc. (Malcorps, 2017). The debate arises with regard to the new terms and conditions for Facebook, when a bank wants to sell the data about electronic payments or when someone is obliged to install smart energy meters containing lots of information about behaviour patterns. It is unclear who has, keeps or analyses what information. This is rarely just one organisation, but often a chain of organisations, public and private. So, who can do what with what data and who is responsible for what? (See also supplement, figures 37-39).

Hildebrandt (2015) refers to that fact that we now purchase a great deal of our free internet freedom by exposing ourselves to ‘massive spying and subliminal nudging’. We are happy to give up some privacy in exchange for convenience, for example, or to gain a financial advantage. Strictly speaking, this may be voluntary, but in view of the monopoly of the search engines and the insidious nature of data collection, it is also often an unconscious choice by people. Should the government then intervene or is the value society places on privacy changing? How does privacy relate to broader general interests? Specialists often talk about concepts such as ‘privacy by design’ or ‘privacy by choice’. But what is the deeper meaning of these concepts, who monitors them, who can organise this, what is necessary for this? Is the concept of ‘informed consent’ due for further exploration and updating? (Steenbergen, 2016). This means that there is also an increased need to reflect on the ethical code for (dealing with) intelligent machines and an intelligent environment (Edge, 2016).

[29] Two specific components of a smart grid offer cyber criminals access to the grid: advanced metering infrastructure back (systems that measure, collect and analyse energy consumption) and supervisory control and data acquisition (systems that control, monitor and measure industrial processes electronically).

Impact on social economy

Opportunities for the social economy

Internet-based services, digital technologies and networking opportunities can therefore increase the autonomy, diversity and participation level of the social economy and boost the potential and value added of the social economy.

Enterprises in the social economy can turn digitalisation to their advantage, just like regular enterprises. For the social economy, the aspect of the complementarity between humans and technology is certainly a key aspect for the realisation of specific value added for society and support of its target group. Technology and robotisation can be used creatively so as to broaden the opportunities for the enterprise (responding to greater demand, new products, etc.) and so that it can strengthen its competitive position, at the same time also guaranteeing employment for disadvantaged groups and supporting them better. This is already happening now in many social economy businesses. Technology and data management can also be used to support employees in the target group in their work, enabling their employment. Examples are also known of this.

By committing to also promote and offer digitalisation and products and services digitally, social economy enterprises can reach a wider audience. Online and offline aspects of the social economy are linked. There is already talk of the 'digital social economy' as an emerging and rising sector within the conventional social economy. For example, in the area of e-commerce, there are opportunities for the sector as a valuable addition to traditional marketing and sales methods.

Social economy enterprises can also use new digital technology and the digital market to highlight their social identity as providers of sustainable and socially responsible goods and services produced by disadvantaged people.

3.3 Social inclusion and justice

Without (government) control, ICT-driven technological change can influence social cohesion, income distribution and economic (in)equality in various ways.

Impact on inclusion and exclusion

Opportunities for inclusion

The digitalisation of society creates new opportunities for empowerment of citizens, greater transparency and democracy, social protection (e.g. automatic authorisation) and opens up opportunities for some vulnerable groups (e.g. the social economy, see above). Robots in healthcare such as intelligent wheelchairs or exoskeletons for example can help reduce people's disadvantage or loneliness, or assist older people to live independently for longer. Via ICT applications, healthcare robots can be in permanent contact with healthcare providers or carers so that they can serve those requiring assistance better. Digital technologies can enable better access to high-quality education and training for people for whom this is currently difficult or impossible to access. And so on.

The digital developments can also lead more easily to social relationships and networks. Encounters and contacts no longer just take place in physical spaces but also when someone is sitting alone at their computer at home or using their tablet or smartphone on the move. Nowadays, people are often on many networks. Business networks are expanded and deepened

through LinkedIn for example, and holidays are followed in real time on Facebook or via travel blogs (Steenbergen, 2016).

New risks

Digitalisation also creates social risks when knowledge, skills, access or a socio-digital network are lacking.

Having an internet connection is increasingly essential in order to be able to participate fully in society and join in with social intercourse (see also supplement, figures 21-23). However, not everyone is able to enjoy the benefits of this in the same way. In 2016, in Belgium, 11% of the population aged between 16 and 74 had never used the internet (compared with 14% in the EU), 15% had no internet access at home, 25% of internet users did not do online banking and 30% did not have basic digital skills (European Commission, 2017). Not everyone is able to keep up with the sharply increased 24-hour streams of information. Not everyone can absorb and digest these quantities, and not everyone has the same opportunities to initiate activities in a network themselves.

The concept of digital inequality refers to structural differences in access, motivation, use, (digital) skills, support networks, opportunities and learning paths between individuals or groups. This relates to all possible profiles in the population. This inequality can lead to digital disadvantage or even exclusion. This disadvantaged position often appears impossible to overcome on their own and is associated with other (existing and new) mechanisms of social exclusion. Vulnerable groups with regard to the use of digital technologies or media therefore overlap extensively with the 'classic' vulnerable groups in socio-economic terms and e-inclusion involves education, employment, integration, health, poverty and equal opportunities[30].

Especially in the short term, the rapidly changing skill requirements may lead to a growing skills gap with broader implications than just for digital skills. Thus, digitalisation leads directly or indirectly to the emergence of new products and services. This widens the range of options for most consumers (from buying, leasing, hiring or sharing to combining contract options) and makes good choices both more important and more difficult. However, not everyone has the opportunities and capacities to make the optimal choice within this broader range of possible products and/or services.

Another example is the 'platform economy', which can cause problems of vertical or horizontal exclusion. The sharing economy is often expected to increase social cohesion between groups, but it can also provoke or intensify discrimination.

[30] A recent white paper from the Flemish Knowledge Centre for Media Intelligence contains seven policy recommendations for a sustainable e-inclusion policy. These are: engage in transversal, overarching partnerships between federal, Flemish and local level and across the various policy areas; develop a policy from a broad vision for e-inclusion, based on a continuum of profiles from digital exclusion to digital inclusion; insist on a number of essential basic reflections in the development of a digital service - take account of the diversity of digital profiles when starting to develop a digital service; encourage research that can support a forward-looking e-inclusive policy; guarantee affordable and high-quality access by developing supporting measures around infrastructure and high-quality public computer spaces; support training actors in all policy areas, in formal and informal training initiatives, to diversify their training offer and align it with the frames of reference for media intelligence and literacy; provide incentives for training and policy for intermediary organisations which can form support networks for vulnerable groups in the digital area.

Impact on economic (in)equality and social prosperity

Consequences for (in)equality

Digitalisation can mean greater prosperity and accessibility of goods and services. As a result of digitalisation, for example, many items become cheaper or 'free' once they are made digital, because they can be used or 'consumed' an infinite number of times. This also makes the goods and services in question more accessible and affordable for all population groups.

Due to the expected technological developments, it is also predicted that the productivity of the economy as a whole will increase, and therefore total income will rise. There will therefore be more income to distribute. But this would mainly end up with people already enjoying a higher income. In other words, the expected technological developments would also be divided unequally between the population in the future.

The main reason is that capital productivity would rise. This would also increase capital income. Secondly, the erosion of the middle segment of the labour market also leads to a divide in income from work. The disappearance of jobs in the middle segment would result in the displacement of employees at the bottom of the spectrum by people from the middle segment who can no longer find a job at their own level. Income at the top rises because technology increases labour productivity there (skill-biased or capital-biased technological change), while it falls in the middle and at the bottom due to displacement effects. This is in line with the observation of the CPB (2015) that the emergence of ICT from the 80s onwards has widened the pay gap between the higher and lower skilled and led to a fall in employment and pressure on wages in the middle. As already mentioned, the low skilled appear to be particularly vulnerable.

At the same time, it is also predicted that citizens will become more powerful. 'Companies still control the means of production at present, but citizens or users have become much stronger when it comes to the power of information. They can compare the prices of virtually any product and weigh up the quality for themselves against what others offer. Although this by no means puts consumers in charge, it does greatly strengthen their position. Moreover, people do not just exchange information, but produce things themselves. Thus, systems are slowly tipping more towards citizens. Not completely, or all at once, but substantially' (Frankowski, 2015).

Impact on broader social issues and challenges

In this way, digitalisation has an impact on broader social issues and challenges. The active welfare state and the social investment state have had their impact but were unable to prevent low-educated and low-skilled groups from ceasing to benefit from the growth in employment. The changes in the labour market outlined above could intensify this.

Consideration should also be given to the future of the social insurance system and taxation. Due to the changing social risks and polarisation in the labour market, a situation could arise in which vertical and horizontal solidarity are further eroded with consequences for the legitimacy, effectiveness and taxation and funding of social security. Several developments such as the peer-to-peer model, for example, do not always translate into an order in which formal paid employment is the source of tax and social insurance contributions (Sels et al 2017).

These challenges require some thought as to the protection and solidarity we want to offer as a society to the lower skilled, to the lowest incomes and to those who can no longer work at all or sufficiently, as to how the funding of social expenditure can be organised in future and how to maintain the legitimacy of social security and as to how the (inherently) scarce resources can be

used more effectively (e.g. reduction of tax and social security contributions, offsetting of costs, tax credits, direct subsidising of work, replacement income and the arrangements for this,

etc.).

Others would take things further and maintain that the idea that people should receive an income in exchange for work is no longer valid. What might that mean? Do we need to find other ways of generating and distributing income? (Steenbergen, 2016).

3.4 Environment

Digitalisation also has an impact on the environment. Here too, there are positive and negative effects.

Positive impact on the environment

Computer intelligence and robot power can be deployed to realise the transition to a sustainable low-carbon society (Edge, 2016). Automation and ICT applications mean that many processes can run more efficiently, also leading to large savings on resources and energy and less pollution. The Internet of Things is set to offer huge opportunities for tracking products, flows of materials and energy via sensors and achieving major efficiency gains by preventing waste and wastage (Schwab, 2016). The innovations of the fourth industrial revolution are also essential in the transition from a linear to a circular economy (e.g. sustainable subsystems). Big data can help encourage more sustainable behaviour.

Negative impact on the environment

On the other hand, digital technologies and the virtual world of the internet are not immaterial. Servers and data centres in particular consume a lot of energy. To keep the internet running, a lot of energy is required to run computers, servers and routers and to manufacture them. Besides energy consumption, consumption of (scarce) materials and chemicals is another problem, as is the huge pile of electronic scrap. Much electronic waste is exported to developing countries where the facilities are not present to process the electronic waste safely. More fundamentally, there are also warnings that the ‘smart revolution’ could mask the fact that radical (sustainable) decisions are necessary (e.g. better public transport in cities instead of smart satnavs that steer us through the queues) (Malcorps, 2017).

3.5 Government in a digitised world

Digitalisation of society also poses major challenges for the government, not least to help steer, support and guide developments in the various areas already discussed.

There are also opportunities in several areas. Public services can operate in a swifter, more efficient, effective and customer-friendly manner. Opportunities for transparency, interaction, collaboration and partnerships in public services are also expanding. Open data and big data can lead to innovative products and services for governments and other actors. Better policy data enables a better, more evidence-based policy. The government can also take the lead and create faster learning and scale effects by applying innovative concepts and technologies in its own services and in public procurement and tendering processes and so on.

There are also major challenges, including for work organisation, the nature of work and the competencies and skills required of government staff. The government’s role as a regulator

becomes more important to provide policy frameworks and regulations that respond more swiftly to new developments and regulate investment in and use of infrastructures while offering the necessary security and protection.

Below, we zoom in on several specific opportunities and challenges facing governments.

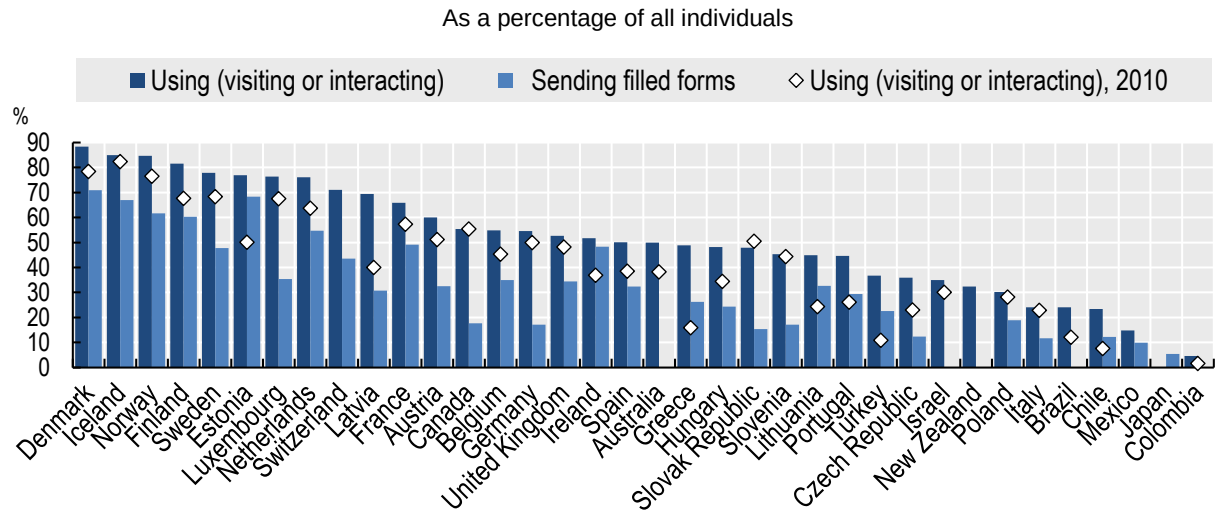
Impact on public services

Source of improvement and innovation

Information and communication technologies are also a major lever for efficiency gains and innovations in the public sector. ICT applications and information infrastructures facilitate the collection, processing, management, use, protection and sharing of information. Social media and ICT applications create opportunities for more and better interaction with citizens and enterprises, for greater transparency and better accountability and for tailored services.

Digital services that are accessible anytime, anyplace are also becoming the norm for government. Citizens and entrepreneurs expect to be able to interact with the government just as they do with other segments of society. Countries are using state-of-the-art applications in their public services, with interactive features that are available on mobile apps whenever and however best suits the citizen or the enterprise (including outside office hours or at weekends) (see figure 6).

Figure 2 use of e-government services, 2010 and 2016



Note: Data includes responses to 'Individuals who have used the Internet for downloading official forms from government organisations' web sites, in the last 12 months' and 'Individuals who have used the Internet for completing/lodging filled in forms from government organisations' web sites, in the last 12 months'.

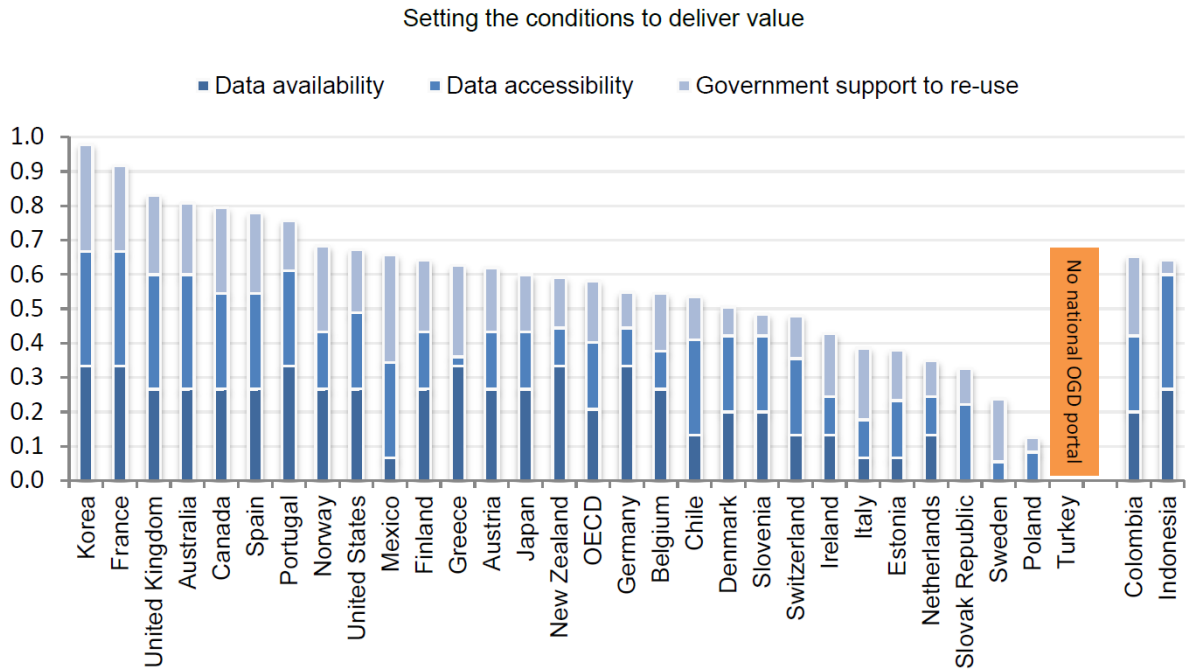
Bron: OECD, ICT Access and Use Database; Eurostat and Information Society Statistics, 2017.

Digital government can shorten the duration of administrative processes because certain actions/checks can take place automatically or because data is collected automatically. Systems for automatic authorisation are also becoming possible. One-off data requests, maximum data-sharing between authorities, digitalisation of processes (e.g. permits, grants, authorisations, e-notification, e-tendering, etc.) and open data are other examples of key principles designed to increase the effectiveness and efficiency of government by reducing the amount of administrative work and eliminating the risk of errors and duplication.

Development and use of government data

Information has become a product in itself. It is the ultimate commodity of the knowledge economy. It is mined on a larger and larger scale and more rapidly distributed via various channels, applications and services (see above). Governments play a crucial role in this also. They have huge quantities of data that can be shared and used more efficiently.

Figure 3 Open data: OECD OURdata Index: Open, Useful, Reusable Government Data, 2014



Note: The composite index contains 19 variables that cover information on three dimensions: 1. Data availability (Providing a wide range of data produced by the public sector in open format) 2. Data accessibility (Providing those data in a user-friendly way which includes the provision of metadata and machine readable format e.g. CSV) 3. Pro-active support from the government to foster innovative re-use of the data and stakeholder's engagement.

Bron: OECD, Survey on Open Government Data, 2014.

Open data means that government departments make their data freely accessible in a form that makes the data directly usable by users (citizens, enterprises, research institutes, etc.) in an open, machine-readable format and with minimum conditions.[31] This concerns data collected by the government in the course of its public duties, which is subject to no restrictions in terms of privacy, security, patents, copyright, time limits, etc. Examples include geographical data, healthcare and educational data, social and economic data, mobility-related and spatial data, environmental and meteorological information, etc.

Making this data open creates greater transparency about the operations of government. The general public can consult more data. Open data can also lead to effectiveness and efficiency gains and new partnerships. Innovative products and services can arise with attractive use and market opportunities for governments and other actors. It allows the data to be reused and linked to other data. In this way, more information is created than what a government organisation could ever have done before with a single data source. Governments can also encourage citizens, enterprises and organisations to put forward proposals for applications which can be built with this (by government or themselves). However, making data open and linking all kinds of data files

[31] The G8 Open Data Charter contains a series of five principles for open data: 1) open data by default; 2) quality and quantity data; 3) usable by all; 4) releasing data for improved governance and; 5) releasing data for innovation.

and data (data mining) is not sufficient. At least two other steps are crucial to the impact of open data: the ability to analyse data with algorithms and arrive at intelligent connections with other files (data analytics) and the design of the user environment (data design in a user interface,

in other words, how the data is presented). Further great steps forward can be made in this area.

From e-government to government as a platform

However, the challenge is more extensive than introducing digital technologies to public administrations and services (e-government) or using data (i-government). It represents a comprehensive transformation affecting all branches of government (OECD 2014, 2016). Several countries are currently evolving from 'departments.gov' and 'services.gov' models to 'me.gov' approaches where governments reorganise themselves around user expectations and requirements instead of according to their own internal logic and the arrangement of the government apparatus (WPP, 2015)[32]. This also requires new capacity on the government's part to better understand citizens' requirements, specific needs, behaviour and mental models.

There is also an evolution towards open innovation in public services based on the idea that the private sector, the academic world, the social-profit sector and the public can generally achieve more together than what the government can achieve alone. More generally, the OECD sees a clear trend towards governments that operate according to the concept of 'government as a platform' (O'Reilly, 2010). The role of governments is changing and moving towards that of facilitator and data steward (Helbig et al., 2012); the government offers institutional and non-institutional actors the platform to create and reuse data and above all to work out solutions together.

Impact on regulations and policymaking

Need for new forms of regulation

The digitalisation of society requires digital-friendly regulations. Administrative transactions with governments are then made digitally executable so that all regulations allow or eventually require the use of digital information and communications. Since digital technology is particularly prone to change and obsolescence, as far as possible, new regulations are also drawn up as technology-neutral, from a functional point of view, not based on specific technology.

But the impact goes further. Development, interlinking and use of policy data is increasingly essential in order to arrive at valuable new insights for policy and underpin policy decisions[33].

Digitalisation and new activities resulting from this or moving onto the fast track, also challenge existing regulatory frameworks. Because, when legislation lags behind, friction arises between regulation and innovation and the regulations can contain conditions and criteria which are not adapted to the new ideas and developments. Uncertainty arises as to the admissibility and/or the applicability of the existing regulations. Examples include employment legislation concerning

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32 me.gov: The Next Generation of Digital Government. me.gov: "The next stage transitions relationships online – holistic digital experiences tailored to individual needs. Digital journeys begin and end in the real world, moving seamlessly between government channels and search, social media, advertising, email, CRM (Customer Relationship Management) and apps. Design is driven by deeper, broader insight into how users feel about their service experiences and how that drives outcomes. Agile iteration supported by machine learning continuously improves algorithms that underpin digital experiences."

33 Based on recent OECD data, Belgium does not appear to be among the leaders so far in terms of availability of open data, its accessibility and initiatives to encourage reuse.

nightwork in e-commerce, the regulations for specific initiatives from the sharing economy and the regulations around drones. These regulations came into force in Belgium a long time after most countries. However, speed and an appropriate regulatory framework are essential to counter undesirable effects but also to exploit the social and economic advantages of major technological and social innovations. For example, from an international perspective, with a view to first mover advantages, in view of the urgency of the effective tackling of some problems or due to numerous other considerations (PBL, 2016).

A specific challenge in (making) regulations is to deal better with the inherent uncertainty and speed of innovations. Other countries force the updating of regulations by limiting their validity. They also reduce the need to adapt regulations through flexible and adaptive regulations (examples include performance standards and open standards, which do not prescribe the means of procedures but only the objectives to be achieved, systems based on some form of right to challenge and in certain cases alternative regulations such as via economic policy instruments or agreements). Another solution is to introduce mechanisms allowing work to take place in an experimental setting and to create legislation or adapt existing legislation after evaluation (experimental legislation, low-regulation zones).

Broader challenges and discussions

Digital technology also offers an opportunity to make the operations of government more transparent and increase participation in aspects such as planning, budgeting and policy-making (e-democracy). It increases the opportunities for two-way communication with citizens via the various channels and for co-creation of policy. If the government and its officials make full use of such policy developments, there may also be changes in patterns of control. Direct communication is harder to control hierarchically than forming ideas via policy documents sent between ministers, government and parliament. This requires attention to the internal work processes and cultures, but also a deeper analysis of constitutional and political/administrative relations (Steenbergen, 2016).

Online legislation will also be necessary, but what will it look like? Will it be a pop-up window? Or a government computer makes changes to a smart meter or sends a message to a shopping program? There are scenarios for making, communicating and adapting legislation, monitoring compliance, adapting communications, identifying infringers, threatening with penalties, evaluating the impact of the law - and all in one week. ‘If we think this unlikely...’, says a report for the European Commission. (Madeline & Ringrose, 2016), ‘we know little of how the internet already functions for citizens and businesses’. And if rules can or must be developed and adapted so quickly, via rapid prototyping, what does that mean for the democratic process itself? What will the new role of parliaments be? ‘Six months on the details of a useful legislative initiative will become as unthinkable as a Google homepage that doesn’t change every day’, predicts the report...

Ethical and social issues represent another key focus here. Robotisation and digitalisation raise the question of which technological innovations are (un)desirable from an ethical, security and privacy perspective (see above). The discussion about privacy arises for example with regard to the new terms and conditions for Facebook, when a bank wants to sell the data about electronic payments or when someone is obliged to install smart energy meters containing lots of information about behaviour patterns. It is unclear who has, keeps or analyses what information. This is rarely just one organisation, but often a chain of organisations, both public and private. So, who can do what with which data and who is responsible for what?

The WRR (2016) states that it should also be considered here to what extent people accept the decisions of technology and machines and find this desirable. Questions of responsibility may also arise around this sort of issue. It is possible that a totally new kind of embedded standards and even justice will be necessary to cope with the intelligent environment (Hildebrandt, 2015). More generally, there is an argument for giving the issue of the relationship between digital technological developments and society a new place within government: no longer primarily the domain of ICT specialists from internal business operations alone, but also of the boardroom with a view to a more strategic and more value-oriented approach by government (Steenbergen, 2016).

Finally, we can also refer to the need for new statistics and policy data. The OECD states in this regard: 'It will also require a vast improvement in our evidence base. We have infinite detail on agricultural products, which constituted less than 4% of total value added in 28 of 34 OECD countries, but have no idea about the composition, flows or stocks of data which now empower economies and societies' (OECD 2017d). A concrete implication to which the OECD refers, among others is that traditional definitions of large and small businesses which are often used for de minimis regulations and varying regulations in different policy areas may no longer be usable in view of the scale without mass effects resulting from digitalisation (see above).

Importance of international and local levels

It is clear that digitalisation offers challenges and opportunities for government on various levels (international, national, regional, local).

In particular, there are various aspects that play out on an international scale. The internet is international and more and more activities and transactions are taking place online. What regulations apply there and to whom? Who is accountable? And where can citizens and businesses go to in case of abuses or complaints? What if a major international company is concerned? And so on.

Digitalisation also generates special attention and energy at local level with the concept of smart cities. This is a means of making urban areas safer, more efficient, sustainable, liveable and competitive. Smart cities meet the various challenges by optimising the city with smart use of ICT technologies and data so that an efficient interaction is created between the economy, spatial planning, accessibility, environment, sustainability and participation. The basis for smart cities lies in the availability and smart use of large amounts of data, but smart cities essentially run on a combination of technology and people. The real intelligence arises when the government aligns the city with the real requirements of users, who themselves become smart actors of the city.

'Smart cities' aim for concrete optimisation, connection and cooperation between six 'systems':

- Smart economy (enterprise and innovation, productivity, local and global connectedness, scope for economic activities);
- smart people (inclusive society, 21st-century education, embracing creativity, etc.); smart mobility (multimodal accessibility, environmentally friendly non-motorised transport, integrated ICT, etc.);
- smart environment (sustainable construction, sustainable energy and water management, sustainable urban development, etc.);
- smart living (health, safety, cultural environment, etc.);
- smart governance (ICT and e-gov, participation in policy, transparency and open data, public and social services).

4 Looking ahead

It is clear from the above that, in all sectors and areas, digitalisation will present new opportunities, promising challenges, new threats and dilemmas for Flemish society. The digital/technological trends can open the way to greater prosperity, health, well-being, safety and sustainability. But they will only do this only if enterprises, employees, citizens, organisations and governments are supported in making the transition and adapting promptly to the new circumstances. In fact, the developments and their consequences do not depend on the technological possibilities. The situation can and should be managed, supported or regulated so that the developments and their consequences go in a socially desirable direction.

As in previous industrial revolutions, the government has an important role to play, together with the social partners, by offering perspective and stability and helping to create the conditions for a smooth transition to a digital economy and society with greater prosperity, inclusion and sustainability.

In the near future, working areas and key issues will be outlined around which the SERV will organise discussions among the Flemish social partners – and further afield.

The ultimate aim is to arrive at a vision, policy recommendations and specific commitments by the social partners on two levels:

- directions for the longer term on which the debate is to continue and
- concrete steps for the short-term which can still be set in motion during this government.

This will not start from zero. The Flemish government and the Flemish social partners have already taken various steps that partially engage with the challenges and opportunities outlined.[34] To answer some questions there is also a substantial SERV collection which can be drawn upon and updated.[35]

Alignment is also sought with the initiatives of the social partners at federal level. In the IPA 2017-2018, the NAR/CRB are commissioned to produce a diagnosis of the sharing economy and digitalisation by June 2017, to organise a colloquium about this in September 2017 and to put forward concrete proposals by the end of the year. The NAR will set out the specific issues of sharing platforms and develop proposals for adapting existing regulations. The CRB aims to define the impact (opportunities and risks) of digitalisation on the labour market more specifically and then zoom in on the regulatory and fiscal framework. Within this, three themes will be examined: the issues around a level playing field, the implications for the fiscal and parafiscal framework and the impact on the (lifespan of) public finance and social security. Finally, the CBR will also look into e-government in the Federal Public Services.

Furthermore, in the next few months, within the framework of the Flemish government's Vision 2050, we are working fully on the implementation of the initial white papers for the seven transition priorities. A number of them have clear links to digitalisation (transition priority Lifelong learning and the dynamic career path, transition priority Industry 4.0, transition priority circular economy,

[34] As an illustration, we refer, for example to the agreements on education and training at the end of 2016, the 2016-2017 sector agreements, the policy on cutting-edge clusters, innovative procurement and the economic support instruments (SME portfolio, Win-win loan, Guarantee Scheme, R&D and Innovation support, strategic transformation support, cluster support, testing grounds, etc.), the initiatives around the qualification structure, the discussion around educational reforms, new forms of learning and learning and working, various measures in the area of digital skills (SYNTRA training programs, STEM action plan, ICT monitor, ICT impulse plan), the Flanders Radical Digital Program, etc.

[35] See list of references.

transition priority well-being 4.0, etc.). Alignment is also sought with this, where possible because the social partners are not closely involved in all activities. In any case, the SERV's own activities can be viewed as a significant contribution to the planned discussions with various stakeholders and design of system visions, roadmaps and transition paths.

Supplement: benchmark information

A separate supplement, available atwww.serv.be/ contains, in addition to the figures already contained in the initial white paper itself, a series of figures comprising benchmark information for Belgium on the digital economy and society. They mainly originate from the OECD's 'Digital Economy Outlook' project (OECD, 2017h). They also include some figures from the European Commission's Digital Economy and Society Index (DG CNECT).[36]

[36] More information about DESI is available at http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard.

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