

# Foundation Seminar Series 2016: The impact of digitalisation on work



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# Foundation Seminar Series 2016: The impact of digitalisation on work

## Overview of national contributions

For the Foundation Seminar Series 2016 (FSS 2016), Eurofound brought together participants from 15 Member States to discuss, explore and learn about the impact of digitalisation on work, with the aim of building up national agendas for better implementation of digital changes. The FSS model does not strive to replicate formal social dialogue but creates a space where the social partners can acknowledge challenges and commit to work together without a binding formal agreement. The outputs of the two seminars in 2016 are a series of national contributions drafted by the national teams, reflecting a shared position with space for difference.

This document presents a summary of the main points and topics covered in the national contributions, which vary in focus and scope depending on the specific interests and themes agreed by the national teams. It also recaps some key points from the background paper produced for the FSS. Almost all the national contributions cover transversal topics, such as the urgent need to promote e-skills. These can be grouped into four broad categories:

1. descriptions of national policies and strategies aimed at supporting digital change;
2. a critical examination of the issues raised by the collaborative economy, in particular digital platforms;
3. the implications of digital work for working conditions and health and safety;
4. the challenges for education and training systems.

## Digital diversity across Member States

All the national contributions produced in the FSS 2016 outlined a brief country digital profile, mostly based on the EU indicators, namely the Digital Economy and Society Index (DESI) scoreboard,<sup>1</sup> as well as other national and international studies and statistical sources such as the OECD Survey of Adult Skills (PIAAC). Based on the DESI, countries are clustered into high-, medium- and low-performance groups.

Some countries involved in the FSS 2016 (Croatia, Italy, Slovenia and Spain) belong to the catching-up group: these are countries that scored below the EU average but have developed faster than the EU as a whole over the last year. Other countries are already well placed to capitalise

on advances in digital technology. Finland, for instance, ranks fourth out of the 28 EU Member States, particularly in terms of human capital: 91% of the population use the internet regularly, and the workforce has the highest proportion of information and communications technology (ICT) specialists in the EU by far (6.7% of employed people).

The country profiles reveal two main trends:

1. highly connected but with low skills levels;
2. high levels of digital skills and initiatives, but low use of digital technology in business or social media.

Indicators show that Portugal is a highly connected country,<sup>2</sup> and e-commerce is widespread among trading companies. However, the proportion of ICT employees is at the lower end of the scale (2.5% of employed people) compared to the EU27 average (3.7%). Moreover, 28% of Portuguese people never use the internet, and 45% of its labour force has few or no digital skills.

In Finland, the social partners and the government have a longstanding tradition of shaping and developing working life through tripartite and bipartite projects, and the social partners' joint initiatives are usually supported by the government. In addition, in terms of readiness to adopt digitalisation, Finland performed well in international ICT scores between 2012 and 2014,<sup>3</sup> although there are still gaps to overcome. Yet such good preparation does not fully translate into a competitive advantage for Finnish businesses. For example, the use of social media is rather low, particularly in industrial companies, and they are used by just 1 in 10 companies for the development of products and services.

Debate throughout the FSS 2016 seminars demonstrated that participants assume that digitalisation will generate greater opportunities and increase potential growth. The Irish team noted that the value of the digital economy in Ireland has grown from €4.3 billion in 2009 to €12.3 billion in 2015, and may grow to €21.4 billion by 2020. It also has the potential to create at least 56,000 extra jobs and to enhance productivity.

1 The DESI is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. It is structured around five dimensions: connectivity; human capital; use of the internet; integration of digital technology; and digital public services.

2 As shown by the fifth edition of the GfK Connected Consumer Index Study, which evaluated 78 countries.

3 According to the MEADOW survey, funded by Tekes (the Finnish Funding Agency for Innovation).

## National strategies and initiatives

Most of the national contributions reported plans and strategies designed to support digital transformation and to exploit the benefits of the new digital era.

Many of these initiatives (those from Croatia, Italy, Portugal and Spain) follow EU guidelines under the Digital Agenda for Europe<sup>4</sup> and pursue the consolidation of a digital single market, as well as general goals to improve skills and inclusion (digital literacy) and the use of ICT to meet societal challenges.

Croatia, Italy, Portugal and Spain have developed national strategies aimed at creating conditions for digital transformation towards an economy based on ICT, innovation and creativity. The aim is to enhance productivity and competitiveness through the transformation of the economy and society based on the efficient and intense use of ICTs by citizens, businesses and public administration bodies. For example, Portugal (through the Coalition for Digital Employability) and Italy (through the National Coalition for Digital Skills) have responded to the European Commission's Coalition for Digital Jobs initiative by promoting collaboration between national and local public institutions, the business community, the education and research sectors, and other stakeholders, including trade unions and civil society organisations.

In Spain, ongoing initiatives include the Digital Inclusion and Employability Plan and the Strategic Action for the Economy and Digital Society as part of the Spanish Strategy for Science, Technology and Innovation 2013–2020. Its objective is for the digital environment to become the main medium for economic transactions, providing effective and efficient public services while defining a new model for the organisation of labour and social relations.<sup>5</sup>

In Croatia, the Ministry of Economy established a strategic framework for the development of the digital economy, in line with the objectives of the Europe 2020 strategy and the Digital Agenda for Europe. In Hungary, the EU structural funds have co-financed the supply of IT equipment in schools.<sup>6</sup>

In Finland, the government launched the National Working Life Development Strategy in 2012 in cooperation with employee and employer organisations. The aim of the strategy is to increase the employment rate and improve the quality of working life, well-being at work and work productivity. The strategy has been implemented by the Working Life Programme 2020, which involves both the private and public sectors. One of the main implementation tools across companies has been the Liideri programme, aimed at modernising business operations by improving management and applying new forms of working, as well as actively exploiting personal skills and competencies to the full.

## Best practice ICT initiatives

Several national FSS 2016 contributions reported interesting initiatives, mostly related to establishing a platform for dialogue and developing stronger mutually beneficial links between the ICT sector and other industries, and across all economic activities. These include an annual National ICT Summit in Croatia and initiatives to encourage entrepreneurship in the ICT sector (for example, Osijek Software City) with the aim of creating more jobs.

In Hungary, the Vodafone Digital School Programme provides devices for use in the classroom and for exam preparation and assessment, while the Hipersuli (Hyper school) initiative promotes innovative digital education through the use of mobile devices and the internet and by improving the digital skills of the adult population, and is estimated to involve around 260,000 participants.

Most of the good practices refer to education and training in ICT as complementary tools to formal education programmes in order to match the needs of the labour market. Two examples from Croatia are the Croatian Makers League (for the development of robotics, automation and programming in education) and the pilot project e-Schools: A System for Developing Digitally Mature Schools in the 2015–2022 period.

Social dialogue is also covered, and in the field of collective bargaining, the social partners in Portugal have agreed on vocational training and retraining in new technologies to better prepare workers or to update their skills in order to transfer them to other roles. In Italy, the training activity developed by Fondimpresa<sup>7</sup> to increase specific competences and skills in the ICT sector has been evaluated positively.

## Developments in Industry 4.0

'Industry 4.0' refers to the automation of manufacturing through digitalisation; the term originated from a German government project to establish Germany as a leader in high-tech manufacturing.

In Germany in 2015, the federal government launched the Green Paper *Work 4.0: Re-imagining work*, paving the way for dialogue with the social partners and other stakeholders on the implementation of digital transformation in employment, education, qualifications and other related topics. These debates highlighted the importance of the Industry 4.0 approach and the challenge of strengthening the country's position as a leading industrial and export nation, as well as issues such as sustainable urban development and individualised medicine.

The German social partners (BDA and DGB) share common

4 The Digital Agenda constitutes one of the seven emblematic initiatives under the Europe 2020 strategy for smart, sustainable and inclusive growth.

5 Gobierno de España (2013), *Spanish National Plan for Scientific and Technical Research and Innovation 2013–2016*, Ministerio de Economía y Competitividad, Madrid, p. 38.

6 Through the Social Infrastructure Operational Programme (SIOP).

7 Fondimpresa is the largest Italian interprofessional training fund, set up by an agreement between Confindustria and Cgil e Uil. It covers more than 180,000 member companies, which means that over 4,600,000 workers are involved. Fondimpresa is financed through a dedicated contribution (0.3% of the salary) paid by member companies.



## Digital transformation in SMEs

Although small and medium-sized enterprises (SMEs) are the backbone of Europe's economy,\* most of the FSS participants reported a lack of adequate preparation in these companies for the changes that digitalisation brings. For example, even in a well-positioned country like Finland, in terms of digitalisation, only 15% of SMEs sell their products and services online – below the EU average of 16%. By way of contrast, 19% of SMEs in Croatia sell online, and 8.9% sell online across international borders, higher than the EU average of 7.5%.

The national contribution from Slovenia analysed the main drivers for SMEs wanting to embrace the digital economy: internal efficiencies, cost reductions, better collaboration, and new product and service offerings. Furthermore, there is a significant skills shortage in the field of digital technologies that is affecting the workforce in SMEs. There are many programmes to encourage SMEs to acquire digital skills in order to foster entrepreneurship, innovation and job creation. Participation by SMEs in e-skills training is substantially constrained by time, costs and content. SMEs' priorities vary over time, and in most cases, they depend on the services of local IT companies.

\* They represent 99% of all businesses in the EU. In the past five years, they have created around 85% of new jobs and provided two-thirds of the total private sector employment in the EU.

concerns about the digital transformation but differ on the approach to labour market measures, namely on the need to regulate the online platform economy and other new forms of employment.

Similar initiatives aimed at triggering debates and applying measures to develop the potential of technology and digitalisation in industry and the manufacturing sector are taking place in Italy, the Netherlands (the Smart Industry project), Slovakia and Spain.

In Spain, the government launched the Connected Industry 4.0 initiative in collaboration with a number of large companies. The aim is to boost the digital transformation of Spanish industry through joint and coordinated actions in the public and private sectors. The government plans to stimulate multidisciplinary collaboration by setting up clusters, particularly among SMEs, on developing the regulatory framework. This initiative is aligned with the Agenda for Strengthening the Industrial Sector in Spain. A related platform brings the social partners together to involve them directly in the implementation of the national plans and strategies related to digitalisation. As it is clear that digital transformation will affect the traditional economy and employment models, the social partners stress that any actions must be developed on the basis of social dialogue and collective bargaining.

In 2016, the Italian government signed an agreement to define a pathway for the promotion and support of Industry 4.0 in order to boost investment in and the growth, development and competitiveness of the national production system, with explicit reference to the negotiation and involvement of the social partners. In this agreement, one of the objectives is 'to spread the skills of Industry 4.0 and reduce the skills mismatch' through education and training.

The Slovakian Ministry of Economy has published the strategy Smart Industry for Slovakia to prepare for digitalisation.<sup>8</sup> The government has set this as a priority, underlining the need for the national economy to adapt to digital trends and modernise industries, business models and society if it is to remain competitive and profitable. It identifies threats from the undercapitalisation of

businesses associated with low innovation performance, especially in SMEs, as well as the high dependence on the automotive industry.

## Impact of technology in sectors

Digitalisation presents a huge challenge to economies and businesses as it changes production systems and markets at an increasingly rapid speed. New technologies, processes and products are profoundly altering the world as we know it. Advanced robotics, 3D printing and other machines are modifying the way in which traditional manufacturing production operates. Cloud computing and the internet emphasise the crucial role of being connected and sharing information. Other technologies such as biotechnology and nanotechnology impact on outputs and products. All these digitalisation processes are game changers, disrupting industries, services, businesses models, jobs and the skills needed for jobs.

Digitalisation impacts on all sectors and industries. While the potential benefits in terms of increasing competitive advantage, productivity and changes in the workplace are extremely far-reaching in some sectors – notably traditional sectors such as textiles, construction, energy, the automotive industry and services – the effects in other activities are more uneven.

Digitalisation is setting in motion significant restructuring processes in most sectors, including manufacturing but also in services such as finance. New business models based on digital technologies, such as the collaborative economy, are driving the acceleration process and creating a fast-changing market for goods and services. The very nature of these businesses is at the centre of current debates and disputes about the threat to working conditions and the levels of protection of workers.

At company level, digitalisation is reshaping corporate strategies and business models. It is changing the relationship between companies and customers and has profoundly affected efficiencies by redefining the way in which companies organise and manage their assets and resources – for example, through automation or outsourcing.

8 Ministry of Economy (2015), *Smart Industry, Slovakia going digital*, Bratislava.

## Awareness of collaborative platforms among EU citizens

A recent Eurobarometer survey found that 52% of respondents are aware of the services of collaborative platforms. The survey found that 17% had used the services of such platforms at least once, with 9% stating that they do so once every few months and 4% at least every month. Unsurprisingly, respondents aged between 25 and 29 years (27%) and those who finished education aged 20 or over (27%) were found to be the most likely to use the services of collaborative platforms. Similarly, a growing number of people are providing services on collaborative platforms. Of those respondents who have visited collaborative platforms, 32% said that they have provided a service at least once. Irish users are some of the main users of collaborative platforms, with 35% of Irish respondents stating that they have used such services. Only France had a higher proportion of users of collaborative platforms (36%). \*

\*European Commission (2016), *Flash Eurobarometer 438: The use of collaborative platforms*, Brussels.

## Emergence of new business models

With developments in technology, new business models have emerged, giving rise to new and different production and work processes and enabling businesses to reach larger, distant markets. Digital technology (and the resulting decrease in transaction and coordination costs) means that companies no longer need to operate on the same large scale in order to be profitable. However, the trend towards downscaling does not include all companies and sectors

Contributions from Estonia and Ireland specifically identified digital platforms as one of the fastest-growing and most controversial forms of digitalisation. These online platforms match consumers requiring a task to be completed or a problem to be solved with companies or workers who can respond to the consumer's particular need – the platform (generally) acts only as an intermediary. Having made the link between the consumer and the worker, the platform no longer requires further involvement in the business of the two parties. The emphasis of these legal entities' transaction models has shifted from interaction between legal and natural persons primarily to transactions between private individuals.

Online platforms offer a wide range of activities and services and cover a wide variety of business models including consumer-to-consumer, consumer-to-business, business-to-consumer and business-to-business. In some cases, the service providers or individuals seek a profit, in other cases they do not. While they share certain characteristics, like the use of ICT to facilitate interactions between users, they can operate differently, and not all online platforms necessarily form part of the collaborative economy.

The collaborative economy, although still relatively small, is growing rapidly. The European Commission estimates that gross revenue from collaborative platforms and providers in 2015 within the EU was €28 billion.<sup>9</sup> The digital platforms belong to some of the fastest-growing start-ups such as Uber, which has grown from a local company to a global corporation with a market valuation of \$60 billion in just five years.

## Employment in digital platforms

Apart from the number of jobs affected or displaced by digital platforms, there is increasing concern about the growth of the new business models and the forms of employment they offer. Companies based on online platforms are giving rise to serious questions about the future of work, workers' rights and labour laws, as they network with or employ 'crowd workers' through internet platforms regardless of geographic boundaries.

The effects on the labour market and on labour relations of these forms of on-demand services on digital platforms are highly controversial. Trade unions are concerned about certain forms of the collaborative economy that result in the blurring of the employer and employee concept. They also raise questions about the potential casualisation of work, as many platform workers must establish themselves as (forced) self-employed. This leads to the transfer of all risks and costs from the employer to the employee and the loss of standard provisions of social security as well as the absence of collectively bargained terms and conditions. In short, the concern of trade unions is that the casualisation of the work environment is giving way to a casualisation of employment rights. Moreover, as current legislation has not caught up with these fast-growing forms of collaborative economy and business models, unions are seeking specific employment regulation for digital platforms.

In turn, employer organisations point out that regulation could obstruct the economic potential and impede the efficient development of necessary consumer protection mechanisms, particularly if specific regulations were introduced for each new innovation or business model. Ensuring that the existing rules are effectively and properly enforced to meet the new challenges posed by developments in this area would be far more effective. Furthermore, the significant differences between the various business models of online platforms must be acknowledged and any measures in this area would have to be flexible and future-proof. A one-size-fits-all regulation for workers engaged by disparate online platforms would not be the right approach.

<sup>9</sup> European Commission (2016), *A European agenda for the collaborative economy*, Fact sheet, 2 June, Brussels.

## Population attitude towards ride-sharing service in Estonia

People's willingness to participate in a ride-sharing service in Estonia and their attitude to this activity was examined in a study of around 600 people in 2016. It found that the general population's attitude towards the new service was overwhelmingly positive both in terms of general attitudes, including personal willingness to participate in this service, and in expectation that state and local governments should support the expansion of such a service. This study showed that a considerable proportion of the population of car owners are at least potentially prepared to provide a ride-sharing service on their usual travel destinations. Of the respondents, 30% of those whose family has a car and who have the right to drive a car would provide such a service themselves.\*

\* University of Tallinn (2016), Perspectives on developing a ride-sharing service in Tallinn.

## New employment relationships

Several national contributions gave rise to interesting debates about the nature of platform work, specifically whether or not the characteristics of many of the new jobs created in the collaborative economy and other related forms of economic activity threaten core elements of the employment relationship affecting working conditions. The key notion of the 'subordinate relationship' was the most debated issue.

Platform operators claim that network workers are not employees but a different category of self-employees or 'micro-entrepreneurs'. The traditional definition of the employment relationship does not fit well with these forms of work. The criterion of legal subordination established more than a century ago to protect the manufacturing worker is no longer suitable for the new types of workers who may have much more autonomy in their tasks. Furthermore, the notion of a traditional hierarchy and work organisation in companies is also questionable in the case of digital workers, who are required to be creative, innovative and proactive in structures that are neither designed nor prepared for this setup.

Apart from the labour issues, other issues lack clarity such as risk and liability and the way in which the status of permits, insurance and qualifications are updated, monitored or maintained. Few of these questions have been addressed by the online platforms themselves or by national legislators. This leads to a relatively unclear situation where some countries or municipalities choose to ban totally or partially certain collaborative economy services rather than providing a regulatory context.

In addition, these forms of collaborative economy also affect traditional economic sectors including tourism, hotels, restaurants and catering, and transport, and standard regulated professions such as taxi-drivers. The issue of fair competition is particularly pertinent, especially in terms of fiscal and tax issues. In Estonia, new legislative initiatives have been introduced to improve the regulation of the collaborative economy such as the Public Transport Act, which regulates ride-share services. This measure is followed by an initiative related to taxation (the Enterprise Account) aimed at promoting small businesses.

In Belgium, the government introduced an advantageous

(but limited) tax regime for individual service providers who operate through a digital platform.<sup>10</sup> This law sets an effective low tax rate of 10% for income earned from the sharing economy, as long as the income does not exceed €5,000 per year. To qualify for this new tax regime, the income must have been earned outside a professional activity by way of services delivered by one individual to another (also acting in a private capacity) on the basis of agreements that have been put in place by a recognised digital platform or a digital platform set up by the authorities. The tax will be withheld at source by the digital platform and paid to the tax authorities. This requires a commitment from the start-ups of the sharing economy – they will have to register with and be approved by the tax administration, and they will have to ban cash payments. All transactions are to be paid electronically through the digital platform so that payments can be traced. When the income from this activity exceeds €5,000 per year, the entire income will be deemed to constitute income from a professional activity and be taxed as business income. The text of the law is restrictive; it is limited to services in the sharing economy. The supply of goods (such as takeaway meals) falls outside the scope of this legislation. Moreover, the mere letting of real estate property (such as with Airbnb) or movables is excluded.

With this new measure, the Belgian government intends to provide additional support for the growth of the digital economy, enabling people with regular jobs to try their hand at entrepreneurship in a small sideline activity. However, it is quite revealing of the government's vision that the law introducing this new measure is part of a chapter relating to self-employed workers. Consequently, the way the government has responded so far to the emergence of new forms of employment created by the digital economy is based on the premise that these workers are freelance 'mini-entrepreneurs'.<sup>11</sup>

## Transition to future employment and working conditions

Some elements of the employment relationship are being transformed by digitalisation. However, it should be acknowledged that the majority of jobs in our economies are still open-ended 'traditional' employment contracts. The future labour market will therefore be different from that of today, but how different and at what rate the

<sup>10</sup> Programme Act of 1 July 2016.

<sup>11</sup> De Croo, A. (2016), *Lower taxes and easy tax regime for sharing economy*, press release, Deputy Prime Minister and Minister of Development Cooperation, Digital Agenda, Telecom and Postal Services, Brussels.

## Fewer routine jobs but more routine work

Recent Eurofound research findings show that both routinisation and de-routinisation tendencies are present in European labour markets.\* While routine jobs are shrinking (in relative terms), work is generally becoming more routine over time. The increase in the reported levels of routine at work seems to be concentrated in occupations that have not traditionally been associated with this kind of work. Managers, professionals and clerical occupations are among the occupational groups that report the largest increases in the levels of routine.

One reason for this paradox may be that computerisation, which has been linked to the decline of routine occupations, can also be related to an increasing repetitiveness and standardisation of work. In general, it seems certainly plausible that an increasing use of performance-benchmarking and quality-management systems across most economic activities (including the public sector) would be related to the reported routinisation of work.

But a process of routinisation of previously non-routine jobs does have interesting implications for the debate on the automation of jobs. Many of the occupations that reported higher increases in routine (particularly in terms of standardisation) are those that have been considered less at risk of automation in previous research. If new technologies and management principles are expanding the range of routine work processes, they may be just laying the foundations for further waves of automation.

\* Eurofound (2016), *What do Europeans do at work? A task-based analysis: European Jobs Monitor 2016*, Publications Office of the European Union, Luxembourg.

changes take place cannot be predicted. We are still in a transitional period in which supply will gradually adapt itself to demand, created by new technology and digital transformation in society.

The effects of digital change in the composition of employment and occupations are still unclear and further intensive research is required. The implementation of digital technologies will target different types of jobs. Some will involve routine tasks and many will be replaced by machines. Other jobs will demand the adaptation of existing skills and require more cognitive tasks, thus increasing the demand for workers with problem-solving and creative skills. This is why up-skilling policies at all levels are so important.

In the meantime, digital transformation increases the risk that a substantial proportion of people currently lacking elementary e-skills will not be employable in the new digitalised labour environment. It is hard to estimate and organise the reskilling needs that will be required to support workers who are and will be made redundant. However, rethinking skills needs is not only related to job losses: workers also have to strengthen their e-skills to complete their tasks and to ensure productivity gains, which may lead to possible wage increases.

What is clear is that frictional unemployment (unemployment arising when workers are between jobs) will be a consequence of uneven levels of education and qualifications within different groups of workers. It is likely that those with a low level of education and older job-seekers will have the most difficulty in finding new jobs. In this transition period, policies and plans to prevent structural long-term unemployment through timely training and retraining are crucial.

## Job quality in the digital era

The blurring of workplace boundaries is giving rise to new ways of working and new forms of employment. Frequent examples are teleworking, ICT-based mobile work and crowd employment. Simultaneously, Europe faces changes in how work is organised in the digital environment. ICT

and digital technology have made it possible to fragment or reorder the tasks within job positions. Some tasks disappear completely, others become more efficient and cheaper, but there are also new tasks and tasks that call for more attention than previously. Furthermore, workload is becoming less predictable and new organisational models that facilitate mobility are appearing, such as the project-based approach.

In principle, social progress due to ICT developments and better transport connections in urban life may lead to a better work-life balance by reducing the stress associated with commuting in large cities and facilitating workers to work from home. As the organisation of work in the new digital era differs from standard working hours, it makes sense to consider what working time means for workers in online platforms. Assuming that they may experience extended and unpredictable work, this can impact on the digital worker's overall well-being. For example, working hours can be at unusual times of the day or night (for example, to be in sync with clients from other time zones or trying to meet extremely short deadlines). The use of digital technologies means that people can be connected anywhere and also anytime, which has an impact on family life and free time. The friendly and flexible 'anytime and anyplace' working model can easily turn into an 'always and everywhere' trap for some workers – with negative effects on psychological health. The rise in mobile working, in particular, has upset the traditional working time framework, highlighting the issue of unpaid overtime hours.

Questions have been raised in relation to the right to not be available all the time, or the right to 'disconnect', and the right to enjoy rest periods that matches EU legislation on working time. In the specific case of crowd work, irregular working time, long working hours, working to tight deadlines, and the blurring of work and private life can increase stress at work and increase the risk of burn-out, posing serious risks for the health and well-being of crowd workers.

Linked to this debate, several of the national contributions address health issues in the digital era, all of them showing



general concern and a high degree of uncertainty: applying existing rules on health and safety at work to the new developments in digital work is challenging. The general principle that the employer has a duty to ensure the health and safety of workers at work is challenged by the transformation of the physical space in which digital work takes place (remote, with no shared workplace).

In addition, the uncertainty of working conditions and the unpredictability of acquiring future work can also have negative impacts on the psychological well-being of workers in online platforms. It has been pointed out that, in the long run, the allegedly poor conditions related to working in online platforms can lead to work-related health problems and may represent an additional burden for health insurance funds in the future.

## Hybrid jobs and human–machine interactions

The contribution from Slovenia highlighted the fact that many of the jobs in the modern digital economy are becoming or already are hybrid jobs, where human workers cooperate with a robot or a smart system in order to perform their tasks. Given that we are seeing a rapid transition to hybrid jobs, little is known of the psychological impact and perceptions that such jobs and interactions have on human workers.

The area of human–machine interaction in the work context has not been researched in detail, whether it is the interaction of surgeons and staff with an automated surgery system, the interaction of assembly-plant workers and supervisors with assembly robots, or white collar workers with increasingly intelligent software systems. Such jobs and working environments change not only the interaction in the workplace but can have profound psychological effects on the worker, especially if they are allowed only a low degree of autonomy and influence over the operation of the automated system. This can have further negative effects on worker motivation and health and safety at work.

## Reviewing educational and occupational training systems

The need to rethink the provision of education and skills in the digital revolution was widely acknowledged by all national contributions in the FSS 2016. The reasons are clearly labour market-oriented. As discussed, the highly disruptive impact that digital technologies have on the structure and content of jobs and occupations is acknowledged. Even though jobs are of varying intensity, this impact is transversal to all sectors, and it is expected to increase in the coming years.<sup>12</sup>

Social partners and government representatives involved in the FSS 2016 pointed to the lack of e-skills as one of the greatest challenges of the digital transformation. This concern is linked to employment issues: the future needs for an increase in the supply of talented ICT workers to the labour market and the digital economy. For instance, it is expected that in 2020, there will be 15,000 vacant positions in Portugal alone (about five times more than projected for 2012), for which it will be difficult to find suitable candidates. In Italy, companies and workers are only partially prepared for new digital tasks: 89% of companies with up to 50 employees have a digitalisation score of ‘low’ or ‘very low’.<sup>13</sup> A pilot initiative on e-skills mapping has been launched in Italy that leads to a certification of digital skills. Another Italian initiative already following the same overall goal is Young Digital, a project aimed at reducing the digital mismatch, the gap between the skills required by ICT businesses and those possessed by young people.

In Spain, there is a significant mismatch between the demand and supply of job skills, which is particularly relevant in the ICT field. This mismatch can be explained by a combination of various factors, such as: the characteristics of the educational system and vocational training and its relationship with productive activities in the economy; the lack of labour mobility; the lack of capacity for intermediation in the labour market; seasonal variations of demand in certain sectors; and the low levels of innovation in many small firms and companies.

## Education and skills beyond the workplace

The impact of digitalisation goes beyond the workplace as it will transform many of the skills required in the coming years. Rather than simply consuming technology, it is necessary to develop a culture where all citizens are familiar, flexible and creative with technology and data so that they can reap the benefits. Digital education needs to start at primary level, while training in soft and harder skills such as computer programming and coding are important for all citizens including students, workers and job-seekers. A long-term perspective is required, anticipating the skills needs of future generations as well as developments in both sectors and companies. The link between today’s standards of education, vocational training and the types of skills needed in the digital era needs to be reviewed and amended accordingly.

New learning schemes and patterns, along with innovative and online methods of delivering education and on-the-job training, are required. Moreover, lifelong learning is likely to become much more important within the context of an ageing workforce. Sustainable work policies need to be designed and applied with a view to delivering balanced transitions over the life course, providing general and specific digital capabilities at different stages and

12 Manyika, J., Chui, M. and Bughin, J. (2013), *Disruptive technologies. Advances that will transform life, business and the global economy*, McKinsey Global Institute, San Francisco, 2013; World Economic Forum (2016), *The future of jobs: Employment, skills and workforce strategy for the fourth Industrial Revolution*, WSF; OECD (2016), *Skills for a digital world*, OECD Digital Economy Papers, No. 250, Paris; VVAA (2014), *E-skills for jobs in Europe: Measuring progress and moving ahead*, European Commission, Brussels; ECORYS and Danish Technological Institute (2015), *The impact of ICT on job quality: Evidence from 12 job profiles*, European Commission, Brussels.

13 Istat (2015), *Cittadini, imprese e ICT*.

with different intensities. A key challenge for national authorities and stakeholders across Europe is how to bring about the massive investment in digital skills, both in the education system and in workplaces.

## EU initiatives to strengthen digital competences and skills

National contributions in the FSS 2016 highlighted two EU frames of reference for strategies and policy reforms aimed at strengthening digital competences and skills in the field of vocational training.

### The European Digital Competence Framework for Citizens:

Also known as DigiComp, this is a tool to improve citizens' digital competence, to help policymakers formulate policies that support digital competence building, and to plan education and training initiatives to improve the digital competence of specific target groups. It also provides a common language on how to identify and describe the key areas of digital competence, thereby offering a common reference at European level. DigiComp was first released in 2013, followed by DigiComp 2.0 in 2016.<sup>14</sup> The tool provides a framework of 21 digital competences, structured around five key competence areas: (1) information and data literacy; (2) communication and collaboration; (3) digital content creation; (4) safety; and (5) problem solving.

**The European e-Competence Framework:** This aims to establish a reference framework of competences applied within the ICT sector.

## Value of social dialogue in the FSS

The discussions and proposals in the national contributions were oriented towards introducing digital transformation issues into national policy debates, providing shared views on the implications for work organisation, skills at work, employment and working conditions. The contributions mostly included information on recent developments in relation to digitalisation processes at national level, identifying problems and challenges and outlining suggestions for possible solutions.

National teams agreed on the importance of social dialogue in order to raise awareness about digital challenges and the subsequent implications for working conditions. The work carried out in the contributions serves as an input to more specific discussions between the social partners and governments. Participants agreed to disseminate and follow up on the content of the contributions, along with the FSS results on their websites. Some of the contributions and issues highlighted are planned to be discussed with the social partners at different national social dialogue structures, such as the Sub-council of the Tripartite Cooperation in Labour Affairs in Latvia, and the Social and Economic Council of the Netherlands.

## Eurofound research in areas and topics related to digitalisation

Eurofound is currently developing a number of research projects closely related to the impact of digitalisation in the field of employment and working conditions, as well as in industry.

### The effects of telework/ICT-based mobile work

Eurofound and the International Labour Organization (ILO) are working on a joint project focusing on the effects of telework/ICT-based mobile work on working time, work-life balance, performance, and health and well-being. It is also looking at policy initiatives that have emerged as a consequence of the spread of the phenomenon and its consequences. The project aims to map the incidence and effects of working outside the employers' premises using ICT and its effects in 10 European countries and 5 countries from other parts of the world.

### The future of manufacturing in Europe

The pilot project 'The future of manufacturing in Europe', delegated to Eurofound by the European Commission, takes its point of departure from the digital technological developments currently occurring in Europe. While much is made in the public debate of the digitalisation of services, it is still the case that, as in previous waves of technological development, it is manufacturing that leads the way. This is clear when one observes that most of the game-changing technologies, such as 3D printing, the internet of things and nanotechnology, are most immediately applicable to manufacturing. The pilot project focuses on the potential impact of these changes in terms of the employment in various sectors, the regional distribution and the implications for skills.

### The digital age: Opportunities and challenges for work and employment

Data from the sixth European Working Conditions Survey (EWCS) related to the effects of ICT and other technological developments on working conditions of specific groups, like e-nomads, will be analysed in the context of the 2017 activity 'The digital age: Opportunities and challenges for work and employment'. In-depth case studies on ICT-based mobile work to complement this quantitative analysis may follow in 2018.

<sup>14</sup> Vuorikari, R., Punie, Y., Carretero Gomez, S. and Van den Brande, G.L. (2016), *DigiComp 2.0: The digital competence framework for citizens. Update phase 1: The conceptual reference model*, Publications Office of the European Union, Luxembourg.



The Foundation Seminar Series (FSS) is an opportunity for governments, trade unions and employers to share knowledge and experiences on the development of EU social, employment and work-related policies. The FSS 2016 was on the topic 'The impact of digitalisation on work: Building up national agendas for better implementation of digital changes'. It held sessions in Dublin (May) and in Berlin (October), with 15 national teams taking part. This report provides an overview of the national contributions.

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**The European Foundation for the Improvement of Living and Working Conditions (Eurofound) is a tripartite European Union Agency, whose role is to provide knowledge in the area of social and work-related policies. Eurofound was established in 1975 by Council Regulation (EEC) No. 1365/75, to contribute to the planning and design of better living and working conditions in Europe.**

