Module 4
Unit 1

Unit 1 – The impacts of digitalization on the labour market and key sectors

Module 4: LABOUR MARKET AND NEW SECTORAL RESPONSES TO DIGITALIZATION

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Unit 1: The impacts of digitalization on the labour market and key sectors

Module 4: LABOUR MARKET AND NEW SECTORAL RESPONSES TO DIGITALIZATION

1. **The impacts of digitalization on the labour market and key sectors**
2. Labour market monitoring and available tools
3. Policy responses to digitalisation

The objectives of this Unit are:

- To better understand how digitalisation is affecting the labour market and world of work
- To look in detail at the kind of jobs and sectors that are undergoing change
- To appreciate the need to change the way we work and the way we learn

Contents

1.1. Digital technologies and society

- Digital transformation is generating a fierce debate among policy-makers, economists and industry leaders
- Digital technologies have a huge impact on society and will lead to changes in people's routine, relationships and behaviour
- As society changes, so does the way it consumes and, consequently, the behaviour of our education markets
- As digitalization disrupts society, it is affecting issues such as jobs, wages, inequality, health, resource efficiency and security
- All sectors have started to use digital advances for decision making, mobility, social media and other smart devices incorporated into their daily routines
- Automation, the introduction of robotics, expert systems and computer aided design and manufacturing has displaced jobs
- However, this job displacement has largely been countered with job creation in other sectors - such as the software sector
- Digital technologies have revolutionised the way people can work - Cloud technology and collaborative working allow multiple employees to access files synchronously
- Many people face the prospect of retraining to acquire the skills needed to access these new or modified role

1.2. Evidence of impact on the labour market in Europe

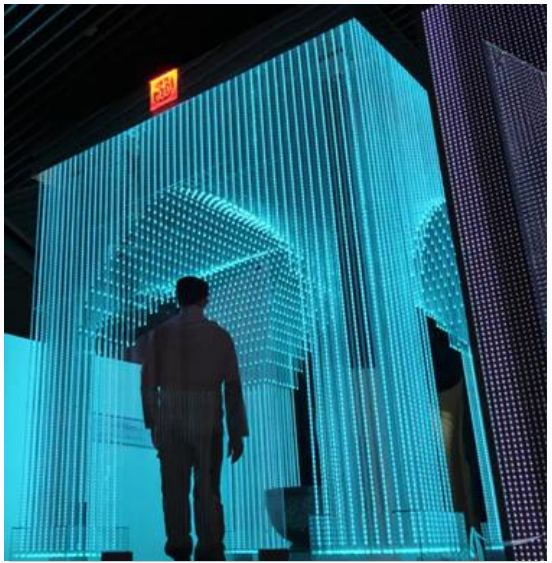
- Digital transformation affects most workers but high skilled workers have tended to benefit more as they have soft skills that complement technology in undertaking non-routine tasks
- The share of employment in high-skilled jobs has increased in most OECD countries, while the share of employment in middle-skilled jobs has decreased
- The evidence on net impact of technologies on employment is mixed:
  - Productivity gains may also expand jobs or enable new activities, thereby creating jobs
  - US data shows the adoption of robotics has led to a net destruction of jobs, whilst evidence from other countries points to job losses only for low-skilled workers
- Business leaders consistently cite difficulties when hiring skilled employees for Data Analysts and Scientists, AI and Machine Learning Specialists as well as Software and Application Developers, among other emerging roles
- Analysis for this work suggests that despite COVID-19, hiring demand is high for most advanced technology related skill sets and reflects a gap in finding sufficiently skilled professionals

Source: [1,2]

1.2. Evidence of impact on the labour market in Europe

Digital skills shortage

- EU firms currently lag behind the US in adopting digital technologies
- Citizens without basic skills are at risk of being left behind by the digital transformation
- Estimates suggest that 15% of adults in Europe lack basic digital skills, and 13% lack basic digital, math and problem-solving skills[1]
- On average in the OECD, 6.6% of young graduates have low literacy and numeracy skills (almost 20% in some countries)
- Skill shortages are more acute in emerging professions, with cloud computing, big data and e-commerce high priorities
- There has also been a significant rise in interest in encryption and a significant increase in the number of firms expecting to adopt non-humanoid robots and artificial intelligence, with both technologies becoming a mainstay of work across industries



Source: [1, 2]

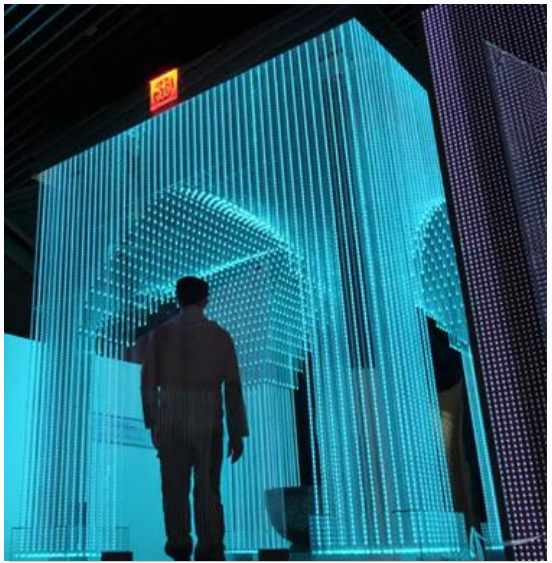
1.2. Evidence of impact on the labour market in Europe

Digital skills shortage

To maximise the chance of success in the digital economy, job seekers need to develop both basic and specific digital skills.

Baseline digital skills:
- Such as those required to use productivity software tools

Specific digital skills
- Such as those required for digital tools such as Adobe Photoshop for designers; computer-aided design for engineers and manufacturing workers; customer relationship management software for sales and marketing professionals; and computer programming and networking for IT professionals.
- These specific digital skills are required in 28% of low-skill jobs, 56% of middle-skill jobs, and 68% of high-skill jobs
- These skills are key to unlocking opportunities for job seekers and addressing the shortage of digitally skilled workers.



Source: [1, 2, 3]

1.2. Evidence of impact on the labour market in Europe

Evidence from the UK

- The UK is already experiencing this skills shortage. Start-ups struggle to attract developers and there is a concern that this shortage may become more acute. Although the UK benefits from a strong ICT workforce, it is still under-performing in the digital skills of the wider workforce.
- Between 2018 and 2019, UK job site Indeed recorded a 15% increase in cybersecurity postings, a trend that is expected to continue.
- The UK also has a relatively low share of STEM graduates. These challenges could lead to rising skills gaps and a potential shortage of labour in the near future, hampering the growth of the digital economy and especially the digitalization of other sectors outside the ICT industry.
- In the UK, on average, employers expect that 37 per cent of the roles in their workplace are likely to alter significantly within the next five years as a result of digital disruption, which means as many as twelve million employees across Great Britain could be affected.

Source: [5,6]

1.2. Evidence of impact on the labour market in Europe

Evidence from Germany and Romania

- In Germany, 38% of SMEs surveyed in 2020 reported a lack of IT skills among existing employees or a lack of IT specialists in the labour market (up from 29% in 2018). The skill which will be in greatest demand in Germany by 2023 is complex data analysis.
- In Romania, only 22 percent of companies use business software for sharing electronic information (compared to 34 percent EU average), 8 percent use social media, 5 percent use cloud computing (compared with an EU average of 18 percent) and only 7 percent sell online.
- In a 2018 McKinsey report, Romania was amongst a group of Central and Eastern European Countries which were described as “Digital Challengers” as they demonstrate strong potential for growth in the area of “digital”.

Source: [7]

1.2. Evidence of impact on the labour market in Europe

Evidence from Spain and Italy

- In Spain it is estimated that 2 out of 3 companies are lagging behind in the digitalization process, and only 20% of their income currently comes from digital products and services.

- In Italy three out of ten people do not use the internet regularly and more than half of the population does not have basic digital skills.

1.3. Predictions of future impact on the labour market

- The world of work is changing in response to technological progress, globalisation and ageing populations
- New organisational business models and worker preferences are contributing to the emergence of new forms of work.
- 14% of jobs across the OECD face a high risk of being automated and 32% are expected to undergo substantial changes[7]
- Despite widespread anxiety about potential job destruction, a sharp decline in overall employment seems unlikely
- In its 2018 report the World Economic Forum projected nearly 75 million jobs may be displaced, and 133 million new roles will emerge
- Studies on the impact of digitalisation estimate the potential job destruction primarily based on currently known technologies. They do not yet take into account new technologies that still need to be developed or consider potential gains due to enhanced productivity, activities previously outsourced and the development of new products and industries.
- Automation, in tandem with the COVID-19 recession, is creating a 'double-disruption' scenario for workers. The challenge lies in managing the transition of workers in declining industries and regions towards new job opportunities

Source: [2, 8, 9]

1.3. Predictions of future impact on the labour markets

Changing roles and professions

- Roles growing in demand include: Data Analysts and Scientists, AI and Machine Learning Specialists, Robotics Engineers, Software and Application developers, Digital Transformation Specialists, Internet of Things Specialists and Information Security Analysts, reflecting the acceleration of automation and the resurgence of cybersecurity risks.
- Emerging professions also reflect the increasing demand for new products and services, which are driving greater demand for green economy jobs, roles at the forefront of the data and AI economy, as well as new roles in engineering, cloud computing and product development.
- The roles which are set to be increasingly redundant by 2025 include: Data Entry Clerks, Administrative and Executive Secretaries, Accounting and Bookkeeping and Payroll Clerks, Accountant and Auditors, Assembly and Factory Workers, as well as Business Services and Administrative Managers.

Source: [2, 6]

1.3. Predictions of future impact on the labour markets

Jobs at risk of automation and digitalisation

The diagram opposite highlights jobs at greatest and least risk of automation and likely 'new jobs' – from a 2016 ETUI publication.

Estimates vary widely, but on average for the 22 OECD countries/regions in PIAAC, between 9% and 13% of jobs were judged to be at high risk of automation.

Jobs at greatest risk of automation/ digitalisation	Jobs at least risk of automation/ digitalisation	New jobs
Office work and clerical tasks	Education, arts and media	'Top of the scale'
Sales and commerce	Legal services	Data analysts, data miners, data architects
Transport, logistics	Management, human resources management	Software and application developers
Manufacturing industry	Business	Specialists in networking, artificial intelligence, etc.
Construction	Some aspects of financial services	Designers and producers of new intelligent machines, robots and 3D printers
Some aspects of financial services	Health service providers	Digital marketing and e-commerce specialists
Some types of services (translation, tax consultancy, etc.)	Computer workers, engineers and scientists	'Bottom of the scale'
	Some types of services (social work, hairdressing, beauty care, etc.)	Digital 'galley slaves' (data entry or filter workers) and other 'mechanical Turks' working on the digital platforms (see below)
		Uber drivers, casual odd-jobbing (repairs, home improvement, pet care, etc.) in the 'collaborative' economy

Source: Christophe Degryse (ETUI 2016) on the basis of data from Frey & Osborne, Ford, Valsamis, Irani, Head, Babinet

Source: [10, 11]

1.3. Predictions of future impact on the labour markets

Skills in demand

- Specific digital skills are required in 28% of low-skill jobs, 56% of middle-skill jobs, and 68% of high-skill jobs.[11] Estimates suggest that occupations that require low or high skills are growing in importance, leading to polarisation of the labour market.
- Human interaction is also required in the new economy. Physical, but unpredictable skills, such as in healthcare, will see rising demand.
- Specific digital skills commonly complement uniquely human skills such as design, writing and complex, nuanced communication.
- Tasks less susceptible to automation involve managing people or applying expertise and social interactions. It is likely that jobs requiring coaching, caring or creativity will be less affected by AI.
- Global teams will boost demand for virtual-collaboration skills and additional technical complexity will increase the need for adaptive thinking and accelerating disruption will emphasize leadership and transdisciplinary skills.

Source: [2, 12, 13]

1.3. Predictions of future impact on the labour markets

The value of jobs

- Automation will not only alter the types and numbers of jobs available but also their value.
- Cedefop estimate that the existing skills of the EU's workforce are one fifth short of those required.
- It is predicted that by 2025 about 48% of all job opportunities in Europe will need to be filled by individuals with tertiary-level qualifications and that about 85% of all EU jobs will need at least a basic digital skills level.
- The replacement of workers doing routine tasks which can be done by machines places a premium on workers with problem solving, creativity, leadership, empathy and design skills.
- It is imperative that workers retrain and upskill to face these enormous challenges.

Source: [14]

1.3. Predictions of future impact on the labour markets

Training for the Future of Work (i)

- Reaping the full benefits of digitalisation will require modernisation of education and training systems and, crucially, more investment in digital capital infrastructure and continuing learning for groups excluded from the digital economy.
- Currently, many employers are focusing on developing the skills of highly valued employees, but there is a need for employers to develop inclusive workforce strategies for skills development.
- Workers in occupations at high risk of automation and the low-skilled are less likely to participate in on the job training than other workers.
- Education and learning programmes need to target more technical, creative and entrepreneurial skills demanded by automation
- Analytical and interpersonal skills need to be embedded in learning regardless of 'vocational' or 'academic' routes.

Source: [1, 10]

1.3. Predictions of future impact on the labour markets

Training for the Future of Work (ii)

- The Future of Work has already arrived for a large majority of the online white-collar workforce. Eighty-four percent of employers are set to rapidly digitalize working processes, including a significant expansion of remote work, with the potential to move 44% of their workforce to operate remotely.
- To address concerns about productivity and well-being, about one-third of all employers expect to also take steps to create a sense of community, connection and belonging among employees through digital tools, and to tackle the well-being challenges posed by the shift to remote work.
- Skills gaps continue to be high as in demand skills across jobs change in the next five years. The top skills and skill groups which employers see as rising in prominence in the lead up to 2025 include groups such as critical thinking and analysis as well as problem-solving, and skills in self-management such as active learning, resilience, stress tolerance and flexibility.

Source: [2]

1.3. Predictions of future impact on the labour markets

Impact of COVID 19 (i)

- COVID-19 has hit labour markets at a time when digitalisation, automation and AI are already reshaping the way we live and work.
- These megatrends are likely to accelerate in many sectors, offering the opportunity to boost productivity and create new ways of working.
- Workers who suffer a job loss may not always have the skills needed to find new employment in a rapidly changing labour market.
- Highest risk for job disruption is for the low-skilled, those in the informal economy, self-employed and the vulnerable groups such as 'youth' (especially young men), migrants and refugees
- This crisis has highlighted the plight of many gig and platform workers that have been providing essential services in vulnerable employment conditions.
- The key for the future lies in investing more in skills training: re-skilling, up-skilling, adult training, and making access to online skills training available to everyone (with a focus on digital skills).

Source: [15]

1.3. Predictions of future impact on the labour markets

Impact of COVID 19 (ii)

- Automation, in tandem with the COVID-19 recession, is creating 'double-disruption' for workers.
- In addition to the current disruption from the pandemic-induced lockdowns and economic contraction, technological adoption by companies will transform tasks, jobs and skills by 2025.
- Forty three percent of businesses surveyed indicate that they are set to reduce their workforce due to technology integration, 41% plan to expand their use of contractors for task-specialized work, and 34% plan to expand their workforce due to technology integration.
- WEF estimate that by 2025, 85 million jobs may be displaced by a shift in the division of labour between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labour between humans, machines and algorithms.

Source: [2]

1.3. Predictions of future impact on the labour markets

Impact of COVID 19 (iii)

- Online learning and training is on the rise but looks different for those in employment and those who are unemployed.
- Those in employment are placing larger emphasis on personal development courses, which have seen 88% growth among that population.
- Those who are unemployed have placed greater emphasis on learning digital skills such as data analysis, computer science and information technology.
- The window of opportunity to reskill and upskill workers has become shorter in the newly constrained labour market.
- Companies need to invest in better metrics of human and social capital through adoption of environmental, social and governance (ESG) metrics and matched with renewed measures of human capital accounting.
- The public sector needs to provide stronger support for reskilling and upskilling for at-risk or displaced workers.

Source: [2]

Did you know...

Impact of COVID and Digitalisation

Current estimates of global job losses due to digitalization range as high as 2 billion by 2030 (World Economic Forum).

There is currently great uncertainty, with concerns also about its impact on wages and working conditions.

These are exacerbated by the disruption related to COVID-19.

1.4. Evidence of impacts on selected European sectors

- Digitalisation and the move to embrace AI impacts all sectors, but the level of digitalisation is strongly associated with the sector of activity and impacts and responses will vary. The disruptive effect of digital technology can be seen in an increasing number of sectors including manufacturing, agriculture, energy and health.
- Highly digitalised establishments are most common in financial services and least common in construction.
- Those with high computer use but limited use of other digital technology are also most common in financial services and least common in transport.
- Organisations embracing significant use of robots and other digital technology but limited computer use are found most in manufacturing industry and least in financial services.
- While a third of media, telecom, and financial-services companies see AI as an opportunity to expand their products and services, only 17 percent of transport companies and 10 percent of construction companies express the same view.

Source: [6]

1.4. Evidence of impacts on selected European sectors

Sectors most impacted by digitalisation

The following sectors have led the business world in digital growth:

1. Retail - Digitization has completely transformed the customer experience across the majority of retail subsectors. As online retail platforms offer shoppers unprecedented convenience.

2. Financial Services - The financial sector spends more than any other industry on information and communications technology.

3. Professional Services - Like the financial sector, the professional services industry is primarily information-based. It benefits greatly from the ability to digitally automate products and processes.

4. Transportation - cars now include a plethora of digital enhancements, and vehicle automation develops swiftly.

5. Technology - the rapid evolution of technology has given rise to a business sector in which product designers, manufacturers, and assembly companies occupy separate spheres.

6. Telecommunications and Media - Due to its proximity to emerging technologies on the value chain, this sector is often the first to adopt new digital tools.

7. Publishing - Technology has been an extremely disruptive force in the publishing sector, rendering the future of print media uncertain at best.

Source: [16]

1.4. Evidence of impacts on selected European sectors

Patterns of technological adoption vary across sectors

- The past two years have seen a clear acceleration in the adoption of new technologies including cloud computing, big data and e-commerce.
- There has also been a significant rise in encryption, reflecting the new vulnerabilities of our digital age, and the number of firms expecting to adopt nonhumanoid robots and AI.
- These patterns of technological adoption vary according to industry.
- AI is finding the broadest adaptation among the Digital Information and Communications, Financial Services, Healthcare, and Transportation industries.
- Big data, the Internet of Things and Non-Humanoid Robotics are seeing strong adoption in Mining and Metals
- Governments and the Public Sector have a distinctive focus on encryption.

Source: [2]

1.4. Evidence of impacts on selected European sectors

Disparities in the use of new digital tools

There are huge disparities in the degree to which employers use digital tools to ramp up productivity:

- Companies in leading sectors have workforces that are 13 times more digitally engaged than the rest of the economy.
- In lagging sectors, the digital engagement of the workforce can be erratic; some organizations have made progress but have not yet addressed foundational tasks their workers perform.
- Many health care organizations, for instance, use incredibly sophisticated technology in diagnostics and treatment but substantial parts of their workforce use only rudimentary or no technology.
- Established EU firms lag their US peers in terms of digitalisation activities. This difference is particularly large in the construction sector, where the share of digital firms is 40% in the European Union and 61% in the United States.
- The difference in adoption rates between EU and US firms is 13 percentage points in services and 11 percentage points in the infrastructure sector.

Source: [4, 17]

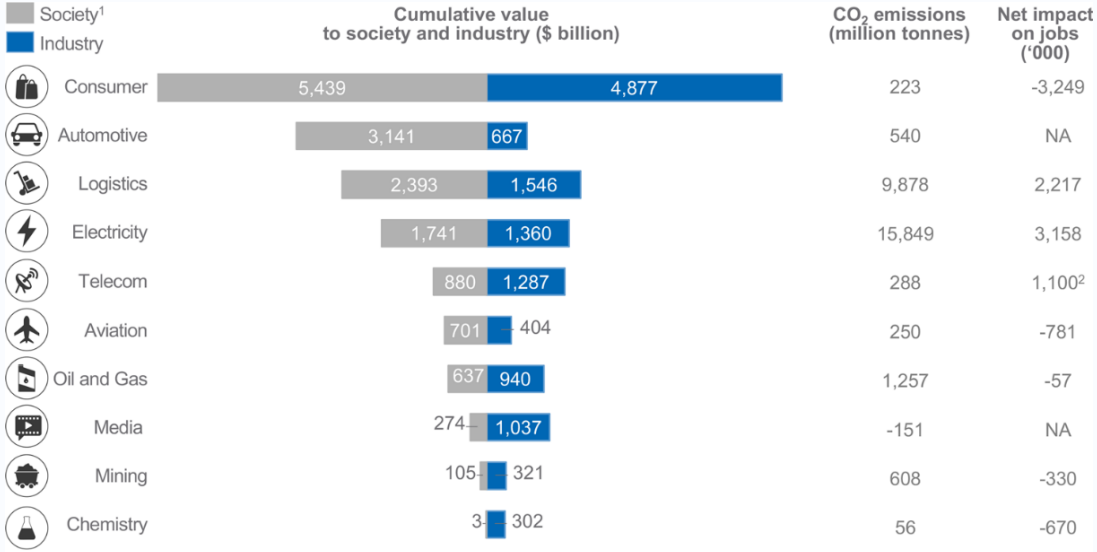
1.5. Predictions of future impact on selected European sectors

- Digitally enabled automation and AI are likely to create more jobs in sectors including ICT, telecoms, healthcare and education services
- Sectors including construction, travel-tourism, manufacturing and transportation will likely require fewer workers
- These changes are already happening and the adoption of digital technologies will accelerate the process (as may COVID-19)
- While the majority of the occupations will remain in existing industries, the capability requirement of those occupations will determine which are more likely to be replaced by robots
- Some sectors might use AI primarily for efficiency purposes rather than job creation, and implementation is likely to be outsourced, limiting direct job creation.
- Digital transformation has the potential to create a significant number of jobs, but there will be winners and losers. WEF analysis suggests that digitalization could create nearly 6 million jobs in just the electricity and logistics industries by 2025 and while the net impact on jobs in these industries could be positive, many sectors will experience job losses. (see graphic in next slide)

Source: [6,18,19]

1.5. Predictions of future impact on selected European sectors

The 'combined value' to industry and wider society of digital initiatives across ten industries (cumulative, 2016-2025).



Note: [1] Total societal value at stake includes impact on the customers, society and environment. Impact on external industries has not been considered.
[2]Excludes Extending Connectivity digital initiative.

Source: World Economic Forum / Accenture analysis

1.5. Predictions of future impact on selected European sectors

Changing roles (i)

A new set of roles are distinctively emerging within specific industries. This includes:

- Materials Engineers in the Automotive Sector
- Ecommerce and Social Media Specialists in the Consumer sector
- Renewable Energy Engineers in the Energy Sector
- FinTech Engineers in Financial Services
- Biologists and Geneticists in Health and Healthcare
- Remote Sensing Scientists and Technicians in Mining and Metals

The nature of these roles reflects the trajectory towards areas of innovation and growth across multiple industries.

Aside from those working in the information and communications departments, the employees most likely to be affected by automation in the next five years are those working in administration, operations, HR and training, and customer services.

Source: [2,12]

1.5. Predictions of future impact on selected European sectors

Changing roles (ii)

- Categories experiencing the highest growth due to automation include: healthcare providers; professionals such as engineers, scientists and analysts; IT professionals and other technology specialists; managers and executives; and educators and people in creative industries (artists, performers and entertainers).
- It is anticipated that economies where creative occupations make up a large part of the workforce, may be better placed than others to deal with the disruption of employment from future advances in automation.[1]
- The UK's "Working Futures" projections expect expansion demand to be positive for almost all high-skill occupational groups but the biggest expansion in absolute and relative terms will be in caring personal service occupations.
- Global teams will boost demand for virtual-collaboration skills and additional technical complexity will increase the need for adaptive thinking.
- Accelerating disruption will emphasize leadership and transdisciplinary skills.
- Demand for physical skills is likely to continue declining, which should mean more safety at work and fewer repetitive tasks. These trends are already in place, but the impact of automation will likely accelerate them.

Source: [13, 18, 20]

1.5. Predictions of future impact on selected European sectors

Training and reskilling

- There will be a major shift in the type of skills needed. Technological, cognitive and new creative and interpersonal skills will account for nearly half of work activities by 2030, compared with 37 percent in 2017.
- On average around 40% of workers will require reskilling of six months or less. That figure is higher for workers in the Consumer industry and in the Health and Healthcare industry, where employers are likely to expect to lean on short-cycle reskilling.
- The share of workers who can be reskilled within six months is lower in the Financial Services and the Energy sectors, where employers expect that workers will need more time-intensive reskilling.
- By 2030, without a change in industrial policy, digital technologies will accelerate the shift from sectors such as manufacturing to services.
- The digital part of the economy will account for 19 percent of jobs in digital front-runner countries, up from 8 percent in 2017.

Source: [2, 18]

Key takeaways

- The world of work is changing. As a consequence, employers and education policymakers will be anticipating a complementary shift in the skills and aptitudes that Higher Education students acquire as part of their university experience.
- Digital technologies have a huge impact on society. Digitalization is affecting every sector.
- As digitalization disrupts society ever more profoundly, concern is growing about how it is affecting issues such as jobs, wages, inequality, health, resource efficiency and security.
- While there have been many new employment opportunities in the software sector, digital technologies may well have contributed to the decline in traditional manufacturing jobs.
- Automation, the introduction of robotics, expert systems and Computer Aided Design and Manufacturing have displaced many jobs. However, job displacement has largely been countered with job creation in the software sector.
- Because of these changes, many people face the prospect of retraining to acquire the skills needed to access the new roles.

Reflection

- Think about the context of your own university.
- Reflect on the kinds of roles that your students will be gaining upon graduation and what kinds of support they may need to be sure to be digitally ready for work.
- As an institution do you understand the emerging digital world of work well enough?
- If not… how could you learn more?

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