Sector Insights Paper
Good work in the manufacturing and construction sectors in Europe

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60 SECOND SUMMARY

1. Manufacturing employment has seen modest growth across Europe since 2011. This was driven by high value sectors such as motor vehicles and pharmaceuticals. However, some manufacturing sub-sectors have experienced a decline, particularly those with a higher automation risk and those related to clothing and wearing apparel.

2. Construction employment has only experienced a slight decline since 2011 but remains 16 percent below its 2008 levels. Construction has a lower automation risk than most manufacturing sub-sectors as activities are less repetitive and carried out in less predictable environments.

3. There are signs that the pandemic has accelerated the pace of technological change in both sectors, as social distancing and other protective measures have increased the cost of labour relative to machines.

4. However, manufacturing and construction could also experience strong employment growth post-pandemic as many countries look to invest in green jobs as part of their economic recovery strategy.

5. There is need for new approaches to skills, training and lifelong learning to help futureproof workers. Some best practice can be found across manufacturing and construction. Businesses should also explore the potential of new innovations such as digital badges and digital career coaching platforms.

INTRODUCTION

The RSA Future Work Programme aims to secure good work for all. Together with the Autodesk Foundation, we embarked on a period of research to understand what good work innovations have emerged in recent years across Europe and Sub-Saharan Africa. Our aim was to build an online directory to help raise awareness of these organisations and support policy making and social investment.

As part of our research, we also carried out a deep dive into the future of work in manufacturing and construction across Europe. These sectors are at the forefront of many issues including automation and the green jobs revolution. In this insights paper we consider how future of work trends are playing out in these sectors, including in the Covid-19 pandemic context. We draw on a range of different research methodologies:

- To explore how these sectors have evolved in recent years and assess the extent to which automation may have been happening, we examine OECD data on automation risk alongside RSA analysis of the European Labour Force Survey.
- We also review the literature to consider how businesses are adopting new technologies and highlight potential changes in skills demands associated with these shifts. While insights from our horizon scan of the emerging evidence suggest that the pandemic could accelerate the pace of technological change in these sectors.
- In the last section of this insights paper we revisit some of the findings from the RSA's innovation mapping exercise and consider how new approaches to skills, training and lifelong learning might help to futureproof workers in manufacturing and construction.
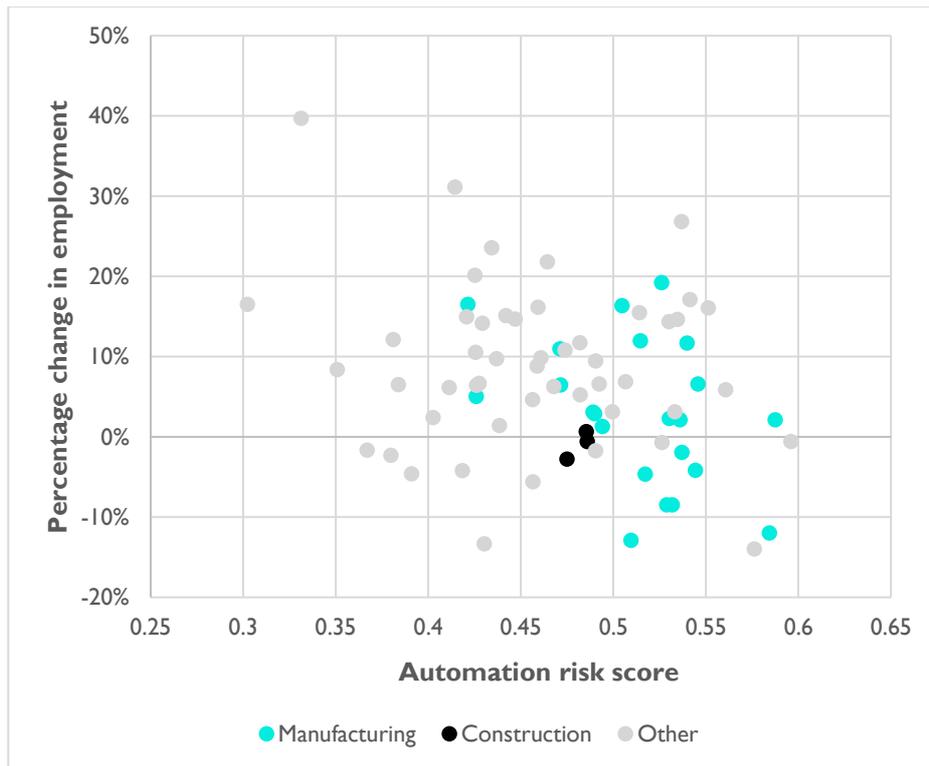
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1. AUTOMATION AND THE LAST DECADE OF STRUCTURAL CHANGE

Debates about the future of work have been dominated by attempts to predict the number of jobs that will be replaced by artificial intelligence (AI) and robots. These predictions draw on expert opinion to understand which jobs could technically be automated. But they can often feel speculative and out of touch with economic reality. In this section we examine how employment in manufacturing and construction has changed over the last decade to access the extent to which automation has been happening and what new jobs are being created. Our secondary data analysis considers OECD data on automation risk alongside RSA analysis of the European Labour Force Survey. We also draw on insights from our literature review to illustrate how new technologies are being adopted by businesses and what impacts this could have on workers.

Figure 1: Changes in employment since 2011 by automation risk score (RSA analysis of OECD data and European Labour Force Survey)

Manufacturing

Overall, the manufacturing sector experienced modest employment growth over the last decade. This is perhaps surprising given that the literature often points to its long-term global decline.[1] This was driven by an increase in jobs in high value sectors including motor vehicles and pharmaceuticals but also in manufacture of essential goods such as food. Similarly, research by Eurofound shows that since 2014, manufacturing employment has been increasing in most EU member states. While this might be considered a positive turn, after decades of decline in employment, the authors point out this is partly a cyclical rebound from the recession.[2]

Table 1: Changes in employment since 2011 and automation risk across manufacturing sub-sectors (RSA analysis of OECD data and European Labour Force Survey)

	Net job creation (000s)	Percent change in employment	Automation risk	Risk rating (quartile rank)
Manufacture of motor vehicles, trailers and semi-trailers	533	19%	0.53	Medium-high
Manufacture of machinery and equipment n.e.c.	451	16%	0.50	Medium-high
Manufacture of rubber and plastic products	171	12%	0.51	Medium-high
Manufacture of leather and related products	52	12%	0.54	High
Manufacture of other transport equipment	87	11%	0.47	Low-medium
Manufacture of food products	261	7%	0.55	High
Manufacture of basic pharmaceutical products and pharmaceutical preparations	45	6%	0.47	Low-medium
Manufacture of beverages	20	5%	0.43	Low-medium
Manufacture of chemicals and chemical products	38	3%	0.49	Medium-high
Manufacture of computer, electronic and optical products	39	3%	0.49	Medium-high
Manufacture of furniture	25	2%	0.53	High
Manufacture of fabricated metal products, except machinery and equipment	72	2%	0.54	High
Manufacture of paper and paper products	12	2%	0.59	High
Manufacture of electrical equipment	17	1%	0.49	Medium-high
Manufacture of other non-metallic mineral products	-24	-2%	0.54	High
Manufacture of wood and cork products	-42	-4%	0.54	High
Manufacture of basic metals	-52	-5%	0.52	Medium-high
Manufacture of textiles	-54	-8%	0.53	High
Repair of computers and personal and household goods	-36	-8%	0.53	High
Manufacture of wearing apparel	-143	-12%	0.58	High
Printing and reproduction of recorded media	-99	-13%	0.51	Medium-high

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[1] Buchholz, K. (2019) *This infographic charts the decline of manufacturing worldwide.* [online] World Economic Forum. Available at: www.weforum.org/agenda/2019/12/the-global-decline-of-manufacturing

[2] Eurofound (2019) *The future of manufacturing in Europe.* [pdf] Luxembourg: Publications Office of the European Union. Available at: www.eurofound.europa.eu/publications/report/2019/the-future-of-manufacturing-in-europe

Generally speaking, the industries that had a higher automation risk tended to experience the greatest decline. While those with a score closer to the average for all industries (0.47) were more likely to experience growth. But other forces may have an impact here. According to the OECD, the strong growth in manufacturing of machinery and equipment can be attributed to the rise of China and other new industrial forces, which has benefitted some European regions while contributing to the decline of others, such as those that produce goods such as textiles.[3]

Some studies also find that European manufacturing lags behind other countries, such as the US, in terms of productivity. According to research by Bruegel this is explained by having more jobs in lower productivity sectors, rather than within-sector underperformance by EU firms.[4] While increased automation could help the region to address this challenge, it is also expected to lead to fewer jobs. This is not only due to increasing wage demands and reductions in the cost of new technologies. Consumer and social preferences also make automation more likely in this sector. The European Commission's Eurobarometer suggests that consumers are generally happy for robots to be used in manufacturing but have much more negative views in sectors such as healthcare and education.[5]

Elsewhere, the International Federation of Robotics (IFR) highlight that orders of industrial robots have doubled between 2013 and 2017. The share of industrial robot sales amounted to $16.2bn globally in 2017, while service robots reached $6.6bn.[6] Other technologies that are disrupting the industry include the Internet of things (IoT) and additive manufacturing.[7] Eurofound put forward two scenarios for the potential impact of automation in the industry. In a high cost, low uptake scenario, they estimate the employment in manufacturing will be 20 percent lower by 2030. While in a low cost, high uptake scenario, this rises to 30-35 percent.[8] The IFR, on the other hand, expect a rise in sales in Eastern European economies without a major net effect on employment.[9]

Automation will also impact the skills profile of the sector. The IFR estimates that over 50 percent of production operators will be working with robots in 10 years. Many operators will need to learn to programme and supervise robots, while technicians will need broad digital skills to analyse data generated by machines. Production managers are also expected to oversee a broader range of automated processes, needing skills in complex systems like enterprise resource planning.[10]

[3] OECD (2018) *Job Creation and Local Development 2018: Preparing for the Future of Work*. Op Cit.
[4] Bruegel (2017) *Remaking Europe: the new manufacturing as an engine for growth.* [pdf] Brussels: Bruegel. Available at: www.bruegel.org/wp-content/uploads/2017/09/Remaking_Europe_blueprint.pdf
[5] OECD (2019) *Employment Outlook 2019: The Future of Work*. [online] Paris: OECD. Available at: www.oecd-ilibrary.org/employment/oecd-employment-outlook-2019_9ee00155-en
[6] IFR, 2018. Global industrial robot sales doubled over the past five years. [press release] 18 October. Available at: ifr.org/ifr-press-releases/news/global-industrial-robot-sales-doubled-over-the-past-five-years
[7] Eurofound (2019). Op Cit.
[8] Ibid.
[9] Szakacs, G. and Hovet, J. (2020) Robots step in as cheap labor dries up in Eastern Europe. *Reuters,* [online] 9 March. Available at: www.reuters.com/article/us-easteurope-automation-idUSKBN20W10K
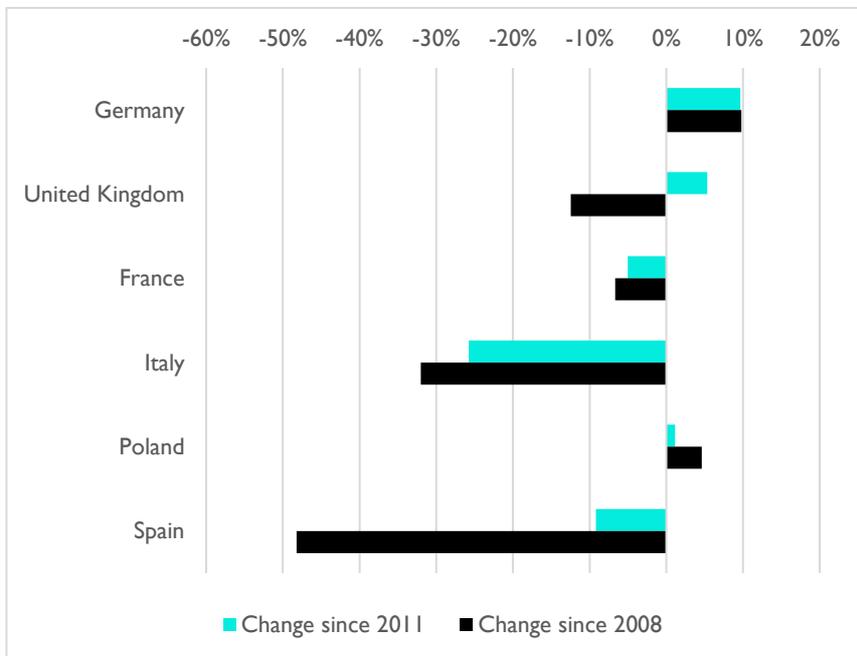[10] Bieller, S. (2021) Up-skilling today and tomorrow's workforce for automation. *IFR Secretariat Blog,* [blog] 5 January. Available at: ifr.org/post/up-skilling-today-and-tomorrows-workforce-for-automation

Construction

The construction industry is naturally volatile, given how sensitive it is to business and consumer confidence. It was one of the hardest hit in the 2008 financial crisis and has experienced a decade of turbulence since, according to the Office for National Statistics in the UK.[11] According to our analysis of the European Labour Force Survey, employment in the sector has experienced a slight decline since 2011 but remains 16 percent below its 2008 levels. However, some countries have experienced a much starker decline than others.

Figure 2: Changes in employment in construction since 2008 and 2011 for countries with the highest employment in the sector (RSA analysis of European Labour Force Survey)

Construction has a lower automation risk than most manufacturing sectors. Activities are considered to be less repetitive than in manufacturing, in part due to the more unpredictable nature of environments in the sector. Most construction projects are unique and respond to different customer demands and architectural design. Indeed, according to analysis by McKinsey, automation could have a straightforward positive effect on employment in the industry. The authors predict that globally, construction jobs will grow in the next decade, with up to 200 million being created to support new infrastructure projects and boost affordable housing supply.[12]

Technological transformation in construction might take different shapes. The first is automation of traditional physical tasks on site, the second automation of modular construction, and the third the digitisation and subsequent automation of design, planning and management procedures. Bricklaying robots

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[11] ONS (2021) *Construction statistics, Great Britain: 2019.* [online] 21 January. Available at: www.ons.gov.uk/businessindustryandtrade/constructionindustry/articles/constructionstatistics/2019

[12] Chui, M. and Mischke, J. (2019) The impact and opportunities of automation in construction [online] McKinsey & Company. Available at: www.mckinsey.com/business-functions/operations/our-insights/the-impact-and-opportunities-of-automation-in-construction

are among the most popular products in the market. Other technologies, including drones and autonomous vehicles, are increasingly used for surveying and monitoring tasks, transportation of materials within sites, and automating excavation and demolition. These changes will impact the skills needed in the sector and workers will need to develop new technical and digital skills.[13]

A 2019 study in the journal of building and engineering suggests why robotics and automated systems have struggled to take hold in the construction sector, despite their capacity to address the problem of low productivity in Europe. Among these reasons are the high levels of initial capital investment needed, and the lack of a strong incentives to improve productivity. Both problems are partly caused by the fact that the majority of businesses in the sector are small subcontractors. A related issue here is the lack of training in the sector, as many workers are in non-standard forms of employment and don't have access to similar opportunities as traditional employees.[14]

2. THE IMPACTS OF COVID-19 AND THE GREEN JOBS REVOLUTION

While governments forced some sectors such as hospitality and entertainment to close as part of national lockdown measures, businesses in sectors such a manufacturing and construction found themselves having to close voluntarily due to a lack of demand, disruptions to supply chains or initial difficulties working under social distancing guidelines.

RSA analysis of Eurostat data shows that manufacturing output was severely impacted at the start of the pandemic, experiencing a decline of 19 percent between February and April. The industry has experienced a partial recovery since recommencing business with social distancing protocols in place and had almost adapted to Covid-19 by the end of last year. By June economic output had returned to 93 percent of its pre-pandemic level, while by November output had reached 99 percent of its pre-pandemic levels.[15]

That said, as our analysis shows, these impacts have varied significantly between manufacturing sub-sectors. For example, demand for cars plummeted during lockdown, as the automotive industry contracted by 50 percent in April. Meanwhile, industries involved in the production of fashion have not only been hit hard by the pandemic, they have also come under fire for poor adherence to social distancing rules, with poor working conditions in 'sweatshop' factories being blamed for the local lockdown in the UK city of Leicester.

Similarly, construction output saw an unprecedented decline in March and April (-25.5 percent in the EU) but bounced back in May 2020 (21.8 percent). And by January 2021, output had returned to 98 percent of

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[13] Ibid.
[14] Davila Delgado, J. M. et al (2019) Robotics and automated systems in construction: Understanding industry-specific challenges for adoption. *Journal of Building Engineering*, [online] Available at: www.sciencedirect.com/science/article/pii/S2352710219300889?via%3Dihub
[15] RSA analysis of Eurostat Index of Production

its pre-pandemic levels.[16] For some countries, including Germany, Slovakia and Poland, output remains below 95 percent of its pre-pandemic level. While in Belgium, Hungary, the Netherlands and Slovenia, a full recovery has been made.[17]

Table 2: Changes in economic output during the Covid-19 pandemic for hardest hit manufacturing sub-sectors (RSA analysis of Eurostat Index of Production)

	Percent change in output (April 2020)	Percent change in output (Feb 2021)
Manufacture of wearing apparel	-29	-18
Manufacture of other transport equipment	-26	-18
Printing and reproduction of recorded media	-23	-13
Manufacture of leather and related products	-33	-13
Manufacture of motor vehicles, trailers and semi-trailers	-50	-13
Manufacture of beverages	-25	-12
Repair and installation of machinery and equipment	-20	-10
Manufacture of coke and refined petroleum products	-15	-10
Manufacture of textiles	-18	-7
Manufacture of other non-metallic mineral products	-16	-3

But Covid-19 may still have increased the business case for automation in manufacturing and construction, as some businesses may have had to restructure to achieve the same productivity capacity with fewer employees. In these sectors, the imposition of social distancing and other protective measures may have increased the cost of human labour relative to machines that can still work in close proximity to each other. Moreover, machines don't require sick pay and don't need to self-isolate if they suspect they may have been exposed to the virus. Andrea Paoli, an expert on food manufacturing, robots and automation at the University of Lincoln in the UK explains that "many factories have had to shut down because of workers refusing to work in production lines where they stand less than 50cm apart on 12-hour shifts".[18]

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[16] Eurostat (2021) *Impact of Covid-19 crisis on construction.* [online] Available at: ec.europa.eu/eurostat/statistics-explained/index.php?title=Impact_of_Covid-19_crisis_on_construction#Covid-19_containment_measures_in_Europe
[17] Ibid.
[18] Paoli, A. (2020) Food manufacture 4.0 – automation and robotics at the service of food manufacturing. New *Food Magazine* [online] 10 June. Available at: www.newfoodmagazine.com/article/111886/food-manufacture-4-0-automation-and-robotics-at-the-service-of-food-manufacturing/

Meanwhile, in construction, the pandemic seems to be accelerating a trend towards modular construction, where buildings are manufactured offsite and labour can be more easily automated.[19]

Automation has also enabled firms to increase their productive capacity in response to increased demand. Machinery manufacturers PIA Automation and Ruhlamat teamed up to introduce fully automated production lines for face masks in Germany.[20] This could limit the number of new jobs created: once firms invest in automation, they may never rehire for those roles. Integrating robots into a business can require a hefty initial outlay, once they are up and running they are often cheaper to deploy than human workers. Equally where automation has been used to respond to specific challenges associated with Covid-19, it may quickly be repurposed once the crisis subsides.

A recent survey by McKinsey shows that business leaders in manufacturing are leveraging Industry 4.0 solutions, including advanced analytics, Internet of things, and additive manufacturing to deal with pressures due to the pandemic, with around 25 percent reportedly fast-tracking programmes. The authors point out, however, that the crisis will probably create a two-track system of technological adoption, as companies face two opposing forces: the need to develop resilience to deal with crisis, and the cash constraints caused by it.[21]

Construction and manufacturing might also receive an employment boost post pandemic, as governments across Europe look to 'build back better'. Many countries are investing in green jobs as a strategy for post-Covid recovery. The UK's Ten Point Plan aims to mobilise £12bn government investment to create and support up to 250,000 highly skilled, high paid green jobs by 2030, including 90,000 this parliament.[22] While separate research commissioned by the Local Government Association (LGA) as many as 700,000 jobs could be created in the low-carbon and renewable energy economy, rising to over 1.2m by 2050.[23]

Many of these jobs will be in the construction and manufacturing sectors. Currently these sectors account for 31 and 34 percent of total employment in low-carbon and renewable energy economy respectively, according to the Office for National Statistics.[24] While the LGA's research provides the following breakdowns of where new green jobs will be created:

[19] Construction Manager (2020) Covid-19 'catalyst for shift to modular', claims manufacturer. *Construction Manager* [online] 24 June. Available at: constructionmanagermagazine.com/covid-19-catalyst-for-shift-to-modular-claims-manufacturer/

[20] Business Wire (2020) Robotics Industry Helps Cope With COVID-19 – VDMA Reports. *Business Wire* [online] 16 April. Available at: www.businesswire.com/news/home/20200415005593/en/Robotics-Industry-Helps-Cope-With-COVID-19-%E2%80%93-VDMA-Reports

[21] Agrawal, M. et al. (2020) *Industry 4.0: Reimagining manufacturing operations after COVID-19.* [online] McKinsey. Available at: www.mckinsey.com/business-functions/operations/our-insights/industry-40-reimagining-manufacturing-operations-after-covid-19

[22] HM Government (2020) *The Ten Point Plan for a Green Industrial Revolution.* [pdf] HM Government. Available at: assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf

[23] Local Government Association (2020) *Local green jobs – accelerating a sustainable economic recovery.* [online] Local Government Association. Available at: www.local.gov.uk/local-green-jobs-accelerating-sustainable-economic-recovery

[24] ONS (2021) *Low carbon and renewable energy economy, UK: 2019.* [online] 29 March. Available at: www.ons.gov.uk/economy/environmentalaccounts/bulletins/finalestimates/2019

- Nearly half (46 percent) of low-carbon jobs will be in clean electricity generation and providing low-carbon heat for homes and businesses. These jobs will range from manufacturing wind turbines, deploying solar panels, constructing nuclear reactors, installing heat pumps and maintaining infrastructure.
- Over one fifth (21 percent) of jobs by 2030 will be involved in installing energy efficiency products ranging from insulation, lighting and control systems.
- Around 19 percent of jobs in 2030 will be involved in providing low-carbon services (financial, legal and IT) and producing alternative fuels such as bioenergy and hydrogen.
- A further 14 percent of jobs will be directly involved in manufacturing low-emission vehicles and the associated infrastructure such as batteries and charging points.[25]

Similar initiatives are also being introduced across Europe. In October 2020, the European Commission announced its Renovation Wave Strategy which aims to improve the energy performance of buildings. Their aim is to renovate 35 million buildings by 2030, creating an additional 160,000 green jobs in the construction sector. The strategy is aiming to double renovation rates in the next 10 years. This is considered as a key strategy for making Europe climate-neutral by 2050, as it will focus on decarbonisation of heating and cooling, tackling energy poverty and worst-performing buildings, and renovation of public buildings like schools, hospitals, and administrative buildings.[26]

Some commentators have expressed scepticism around the net employment gains of the green jobs revolution.[27] Although according to the LGA's research there is some evidence to suggest that renewable energy technologies are more labour intensive compared to fossil fuel-fired electricity generation.[28] Still, the equation here is more complicated. Renewable energy sources will not require the same supply chains as fossil fuels. According to Maritime Strategies International decarbonisation could have a negative impact on the shipping trade.[29] A wind turbine or solar panel only needs to be delivered once, after which the electricity it generates is transferred via the grid, unlike oil which needed to be regularly imported via tanker ships and trucks.

A green transition will also require shifts in consumer behaviour, which will have knock-on effects for carbon-intensive industries that are not directly related to energy production. For example, the arrival of the Mobility as a Service (MaaS) Alliance - often associated with autonomous vehicles - would represent a shift away from car ownership and towards more on-demand modes of vehicle rentals and transport, resulting in less cars on the road and a reduction in the production lines of vehicle manufacturers (who

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[25] Local Government Association (2020). Op Cit.
[26] IISD (2020) *Renovation wave: European Commission aims to boost energy efficiency.* [online] 16 October. Available at: www.iisd.org/sustainable-recovery/news/renovation-wave-european-commission-aims-to-boost-energy-efficiency/
[27] Ford, J. (2020) Jobs are the wrong metric to judge a 'Green Industrial Revolution' [online] Financial Times www.ft.com/content/786c2dd6-9f3d-45b7-854e-09e15a1da220
[28] Local Government Association (2020). Op Cit.
[29] Tunnicliffe, A. (2019) Sink or swim: how decarbonisation will reshape shipping forever. [online] Ship Technology. Available at: www.ship-technology.com/features/how-will-decarbonisation-impact-shipping/

employ nearly 200,000 workers in the UK alone). More generally, electric vehicles are expected to have longer lifespans than today's cars due to reduced vehicle wear.

These impacts will also be felt unevenly across countries and regions. Research from the European Investment Bank suggests that green job gains are expected in many regions, while job losses will be concentrated in a few, particularly those dependent on industries like fossil fuel extraction or car manufacturing.[30]

It will also create new skills demands. In Europe, almost 60 percent of new jobs created are expected be in highly skilled positions, and only around 10 percent will be low-skilled, according to the International Energy Agency. This once again highlights the need for stronger retraining and upskilling systems, to help avoid increases in skills shortages, which can push firms to invest more in labour-saving technologies.[31]

3. INNOVATIONS IN SKILLS, TRAINING AND LIFELONG LEARNING

As the manufacturing and construction sectors evolve, and technology eliminates, creates, and transforms jobs, workers will need to find new ways of reskilling or upskilling. In this section we identify some of the most promising innovations in lifelong learning that are helping workers to prepare for the jobs of the future. As part of our research we identified over 65 innovations in Europe that cluster around six main intervention sets.

Table 3: Skills, training and lifelong learning intervention sets

Intervention set	Description
Online learning	Massive Open Online Courses (MOOCs) and other tools that offer learners a flexible, modular approach to upskilling and reskilling.
Peer learning networks	Programmes where people can connect to support each other to stay motivated through mentoring and peer support.
Technology bootcamps	Programmes that teach people digital skills in an accelerated format and connect them with employment opportunities.
Augmented learning	Augmented and virtual reality systems that enhance the provision of both technical and soft skills in the workplace.

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[30] European Investment Bank (2021) *Building a smart and green Europe in the COVID-19 era.* [pdf] European Investment Bank. Available at: www.eib.org/attachments/efs/economic_investment_report_2020_chapter10_en.pdf
[31] Ibid.

Digital credentials and skills profiles	New approaches to recognise and validate skills, including those developed through on-the-job and informal learning.
Digital career coaching	Platforms that use new technologies to offer workers personalised coaching and labour market information.

Some best practice can be found from across the manufacturing and construction industries. For example, Tata Steel's plant in the Netherlands, has established an advanced analytics academy to train and certify engineers on new analytical approaches used to improve the manufacturing process. Despite the fact that globally there are strong cost pressures in the steel sector, the plant reportedly boosted its earnings by more than 15 percent.[32] Similarly, the Technical University of Munich has developed a programme to train workers in digital construction, through boot camps, hackathons and peer exchanges.[33]

As augmented and virtual reality (VR) systems are become cheaper, and more widely adopted these technologies are being used in various different contexts to enhance training in both technical and soft skills. For example, Gleechi has developed VirtualGrasp, which provides VR training that allows manufacturing workers to interact naturally with their surroundings and learn-by-doing, in a safe environment that reflects real-life operational scenarios. The immersive nature of the training can also serve to heighten sense and re-create the urgency of emergency situations, which is proven to give users more confidence in applying their training to real life scenarios.

But businesses can also learn from innovators from outside of their sector. Workers at risk of automation face a double whammy as they are also less likely to participate in training than those in jobs that are more resilient to technological change.[34] It is something of a maxim that "the single best predictor of later participation in education is earlier participation".[35] Many of the innovators are reimaging the way skills and training are delivered so that it helps workers at risk of automation overcome the barriers that they face.

Technology bootcamps are a useful way of providing any group of people with new skills, but recent initiatives have highlighted their potential to widen access to tech skills for otherwise underserved groups. This is particularly important considering the lack of diversity in science, technology, engineering and mathematics (STEM). TechUP is programme funded by Institute of Coding (IoC) in the UK, which aims to retrain individuals under-represented in the sector into technology careers. The intensive retraining programme is mostly online and is aimed at women from Black, Asian and Minority Ethnic and other excluded groups, such as people with disabilities.

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[32] Ellingrud, K. Gupta, R. and Salguero, J. (2020) Building the vital skills for the future of work in operations. [online] McKinsey. Available at: www.mckinsey.com/business-functions/operations/our-insights/building-the-vital-skills-for-the-future-of-work-in-operations

[33] Chui, M. and Mischke, J. (2019) Op Cit.

[34] Nedelkoska, L. and Quintini, G. (2018) *Automation, skills use and training*. [online] Paris: OECD. Available at: www.oecd-ilibrary.org/employment/automation-skills-use-and-training_2e2f4eea-en

[35] Lockey, A. and Wallace-Stephens, F. (2020). *A blueprint for good work: Eight ideas for a new social contract.* [pdf] London: RSA. Available at: www.thersa.org/globalassets/reports/2020/a-new-blueprint-for-good-work.pdf

Digital badges are micro credentials that provide a new way to recognise and validate skills, including those developed through on-the-job or informal learning. A growing number of organisations are also using digital badges to track and manage internal talent. In these instances, digital badges can reveal opportunities to close internal skills gaps through targeted development and create more transparent career pathways. Credly supports the IBM Open Badge Program, which has issued digital badges to more than 400,000 individuals and enabled corporate leaders to create a virtual heat map of the skills possessed by workers in 195 countries.[36]

Technology is also being used to provide workers at risk of automation with personalised labour market information and coaching that can help them transition into the jobs of the future. For example, FutureFit AI describes itself as "the GPS (Global Positioning Device)" for career transitions. Based on an assessment of a worker's skills and data from online jobs vacancies, it uses AI to provide workers with career path recommendations, highlighting gaps in their skills and recommended training. FutureFit AI also aims to support employers in training workers at risk of redundancy for new roles inside or outside of the company.

This insights paper follows the launch of the RSA's good work guild, a new endeavour to bring together a global community of practice to amplify good work principles. Over the next year we will bring together social innovators alongside employers and institutional actors, such as policy makers and investors, to explore opportunities for learning, shared sense-making, collective action and advocacy. If you are interested in participating, please get in touch with Alexa.Clay@thersa.org

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[36] Ibid.

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