Written evidence from the Work Foundation [PCW0046]

Summary

Evidence suggests that the Fourth Industrial Revolution is not as far advanced in the UK as in other OECD countries or in the European Union. However, that trajectory could be set to change. Over recent years, the UK Government has introduced considerable investment in this area, from the AI Sector Deal[1] to the Made Smarter Programme[2] enhancing use of new technologies in manufacturing and the establishment of a new Robotics Growth Partnership[3]

As part of the Fourth Industrial Revolution, the automation of physical tasks alongside the development of algorithms that can monitor, learn and in some cases decide on a course of action, is expected to increase. This is likely to have a differential impact within the labour market, where lower skilled jobs in some sectors are displaced, while higher skilled jobs in other sectors are enhanced. This will likely play out differently across different places, depending on their sectoral base, leaving some workers facing higher risks of unemployment.

These changes in the use of technology come at a time when a series of factors have been affecting our working lives. Comparatively short-term but significant economic shocks including leaving the European Union and COVID-19 are set to affect the sectors facing the greatest challenges through the Fourth Industrial Revolution. Alongside this, heightened job insecurity faced by some groups of workers over recent years will mean there is a need for proactive and targeted support to mitigate the risks of displacement and support workers to manage periods of transition.

Recommendations

- The National Retraining Partnership should identify and support individuals at greatest risk of job displacement through automation, and be extended to support individuals who are unemployed.
- Universal Credit should be adapted to provide the types of support individuals transitioning between periods of work are likely to need in the future, not only in response to the comparatively short-term pressures of Covid-19, but also longer-term shifts in the economy.
- In particular, DWP should review whether the continued use of requirements and deductions in Universal Credit is appropriate, given the disruption likely to be caused by the Fourth Industrial Revolution.

[1] https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal-one-year-on
[2] https://www.madesmarter.uk/
[3] https://www.gov.uk/government/speeches/chris-skidmore-sets-out-the-first-steps-to-establish-the-robotics-growth-partnership

About the Work Foundation

The Work Foundation is the leading think tank for improving work in the UK. We have been an authoritative, independent source of ideas and analysis on the labour market and the wider economy for over a hundred years. As the pace of economic change continues to disrupt the ways we work and do business, our mission is to support everyone in the UK to access rewarding and high-quality work and enable businesses to realise the potential of their teams.

To do this, we engage directly with practitioners, businesses and workers, producing rigorous applied research that allows us to develop practical solutions and policy recommendations to tackle the challenges facing the world of work. We are part of Lancaster University's Management School, and work with a range of partners and organisations across our research programmes.

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What are the main challenges that DWP faces as a result of the "Fourth Industrial Revolution"? What do we know about the likely impact on the labour market?

1. Introduction

1.1 Recent years have seen a growing focus on the potential disruption that new technological advances could create across the economy. In particular, those interested in what is often termed the 'Fourth Industrial Revolution', have focussed on innovations that increasingly connect physical activities and digital technologies to drive enhanced productivity. For example, through the development of things like 3-D printing, which can lead to personalised mass-production, or advances in biotech that lead to better targeted medicine for fast-mutating viruses, such as through CRISPR gene editing[4].

1.2 Such technological advances are anticipated to bring a range of benefits to the UK economy, including boosting growth and productivity[5]. But they will also have huge implications for the future of work as a whole – in terms of the kinds of jobs that will be available in the future, the skills that will be required to undertake them and the nature of workplaces themselves.[6]

[4] BEIS (Department for Business, Energy and Industrial Strategy) (2019) Policy Paper: Regulation for the Fourth Industrial Revolution. https://www.gov.uk/government/publications/regulation-for-the-fourth-industrial-revolution/regulation-for-the-fourth-industrial-revolution

[5] BEIS Committee (18 September 2019) Automation and the future of work.

[6] Work Foundation & City and Guilds Group (2018) Constructing the future: How the skills needed for success in the workplace are changing. https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lums/work-foundation/CG_Constructingthefuture_A4_32pp_LR_nocrops(1).pdf

1.3 However, while other countries have significantly increased the use of automated processes, AI and digital technology, progress in the UK has been relatively slow[7]. The UK lags behind EU countries, with an average of 91 robots installed per 10,000 employees, compared with 106 robots on average in the EU, and over 360 in Germany[8] . The proportion of jobs at high risk of automation in the UK has decreased slightly over the last decade; from 8.1% to 7.4%, whereas the number of jobs at low or medium risk of automation has increased[9].

1.4 There are several potential explanations for this. Countries such as France and Germany are thought to be better prepared for technological change in terms of skills, infrastructure and the ability to share information between different functional areas within an organisation[10]. Over 90% of all UK businesses are SMEs, many of which require additional support to invest in and adopt advanced technologies given the human and monetary resource constraints they face. Even in Germany, the frontrunner of Industry 4.0 in Europe, SMEs have proven to be a bottleneck in supply chains[11]. In addition, the BEIS Committee reported that government support and investment in automation has been limited, calling for tax incentives and a Robotics Strategy to stimulate investment[12].

1.5 However, that trajectory could be set to change. Over recent years, the UK Government has introduced considerable investment in this area, from the AI Sector Deal[13] to the Made Smarter Programme[14] enhancing use of new technologies in manufacturing and the establishment of a new Robotics Growth Partnership[15].

1.6 The current crisis surrounding COVID-19, together with the impact of Brexit, will both have significant implications for the sectors where the need for technological development and increased productivity is greatest.

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[7] BEIS Committee (18 September 2019) Automation and the future of work.; International Federation of Robotics (2019) World Robotics 2019 edition. https://ifr.org/free-downloads/

[8] International Federation of Robotics (2019) World Robotics 2019 edition. https://ifr.org/free-downloads/

[9] ONS (2019) Which occupations are at highest risk of being automated? https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichoccupationsareathighestriskofbeingautomated/2019-03-25

[10] BEIS (Department for Business, Energy and Industrial Strategy) (2017) Made Smarter Review. ; Boston Consulting Group (2017) Is UK industry ready for the Fourth Industrial Revolution? https://media-publications.bcg.com/Is-UK-Industry-Ready-for-the-Fourth-Industrial-Revolution.pdf; Eurostat (2019) Integration of internal processes. Available from: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_bde15dip&lang=en

[11] Muller, J.M., Buliga, O., Voigt, K-O. (2018), Fortune favors the prepared: How SMEs approach business model innovations in Industry 4.0. Technological forecasting and social change, 132, pp. 2-17.

[12] BEIS Committee (18 September 2019) Automation and the future of work. https://www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industrial-strategy/news-parliament-2017/automation-and-future-of-work-report-published-17-19/

[13] https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal-one-year-on

[14] https://www.madesmarter.uk/

[15] https://www.gov.uk/government/speeches/chris-skidmore-sets-out-the-first-steps-to-establish-the-robotics-growth-partnership

2 Impact on the labour market – job displacement and job enhancement

2.1 A significant element of the Fourth Industrial Revolution is an increase in the automation of physical tasks alongside the development of algorithms that can monitor, learn and in some cases decide on a course of action.

2.2 There are varying ways in which automation could impact jobs across sectors. Early evidence suggests that some sectors will be more significantly impacted, in particular:

- Transportation[16]
- Financial services[17]
- Manufacturing
- Retail and logistics, driven by changing consumer behaviour, i.e., expansion of e-commerce[18].

2.3 For instance, in transportation and logistics, we see increasing use of blockchain, self-driving vehicles and drones[19], which increase efficiency, but at the same time decreases the sector's reliance on human labour, which can eventually lead to job displacement. Conversely, in the medical sector, we often see more labour enhancing solutions. For example, collaborative medical robots can support surgeons during difficult procedures, increasing safety and enhancing both the patient and the worker experience[20].

2.4 Overall, as with industrial transitions of the past, those jobs that have a high degree of routine and easily standardisable tasks are likely to be the most vulnerable to displacement by automation. For example, just as we saw a significant loss of many low-skilled and middle-skilled occupations in the manufacturing sectors across the EU and UK since the 1980s[21], research suggests that the North West and the East Midlands, both home to a large number of manufacturing businesses[22], are particularly vulnerable to job displacement. This is supported by recent analysis from

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[16] Government Office for Science (2019) Future of Mobility: Foresight. https://www.gov.uk/government/publications/future-of-mobility

[17] Stefanuk, A. (11 February 2020) Industry 4.0 and its impact on the financial services. Fintech Weekly online. https://www.fintechweekly.com/magazine/articles/industry-4-0-and-its-impact-on-the-financial-services

[18] Frey, C. & Chen, C. (2017) Technology at work v.3.0: Automating e-commerce from click to pick to door. Oxford Martin School and Citi. Available at: https://www.oxfordmartin.ox.ac.uk/publications/technology-at-work-v3-0-automating-e-commerce-from-click-to-pick-to-door/

[19] DHL (2018) Self-driving vehicles in logistics. https://www.dhl.com/global-en/home/insights-and-innovation/thought-leadership/trend-reports/self-driving-vehicles.html

[20] Spring, M. (June 2020) Future of the PS firm, Next Gen PSF – blog. Available from https://sites.google.com/sheffield.ac.uk/nextgenpsf/newsblog; Svoboda, E. (25 September 2019) Your robot surgeon will see you now. Nature online. https://www.nature.com/articles/d41586-019-02874-0

[21] Autor, D.H. (2015) Why are there still so many jobs? The history and future of workplace automation. Journal of economic perspectives, 29(3), pp. 3-30; BMAS (Bundesministerium für Arbeit und Soziales) (2015), Re-imagining work: Green paper, work 4.0, Federal Ministery of Labour and Social Affairs, Germany.

[22] Make UK (2020) Annual Make UK/BDO Regional Manufacturing Outlook https://www.makeuk.org/news-and-events/news/make-ukbdo-report-industry-warns-of-damaging-double-whammy-hit-to-regions-from-no-deal

the ONS, which highlights areas including Boston, Rutland and West Lancashire as being at particular risk of automation[23].

2.5 This means job displacement will very likely play out differently between places depending on their sectoral base, leading to particular local employment challenges. Sectors form strong regional or local clusters and as such make up an important part of the overall local economic ecosystem. When sectors and jobs are disrupted, some places will struggle more than others to support a given number of unemployed or displaced workers[24]. In addition, restructuring in one sector will likely see knock on effects on other sectors in the same locality, for example through changes in consumer spending. Those who become unemployed or feel uncertain about their financial future are more likely to engage in precautionary saving and delay the acquisition of durable and non-durable goods[25].

2.6 In addition, evidence from Germany suggests that the Fourth Industrial Revolution could increase insecurity for those in low skilled jobs in non-standard employment, such as part-time, agency work, and zero-hour contracts[26]. This could further increase the barriers that many engaged in such roles face to entering secure, standard forms of employment in the future. This is particularly true for lower skilled workers, who are already losing out in terms of access to career progression and training at work[27].

2.7 Notably, there are a range of personal, labour market and situational factors which together compound and increase the job and income insecurity that workers are likely to be exposed to[28]. For example, analysis from the ONS has found that part-time workers, younger workers and women are at greatest risk of being displaced through automation[29] .

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[23] ONS (2019) Which occupations are at highest risk of being automated? https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichoccupationsareathighestriskofbeingautomated/2019-03-25

[24] ONS (2019) Dataset: The probability of automation in England – 2011-2017. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/probabilityofautomationinengland

[25] Benito, A. (2004) Does job insecurity affect household consumption? Structural Economic Analysis Division, Bank of England. Working Paper no. 220. https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2004/does-job-insecurity-affect-household-consumption.pdf

[26] BMAS (Bundesministerium für Arbeit und Soziales) (2015), Re-imagining work: Green paper, work 4.0, Federal Ministry of Labour and Social Affairs, Germany.

[27] Social Mobility Commission (2019) The adult skills gap: Is falling investment in UK adults stalling social mobility? https://www.gov.uk/government/publications/low-skilled-adults-are-missing-out-on-training-the-skills-gap

[28] Florisson, R., Gable, O., Wilkes, M. (June 2020) Standing together? Covid-19 and worker insecurity in 2020 and beyond. https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lums/work-foundation/InsecurityBriefing-June20final.pdf

[29] ONS (2019) Which occupations are at highest risk of being automated? https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichoccupationsareathighestriskofbeingautomated/2019-03-25

2.8 Alongside the displacement of many jobs, it is important to recognise that others could be enhanced by increased automation, with more routine aspects becoming automated, which in turn could free up resource for greater strategic or value enhancing activities. While researchers believe higher skilled jobs are too creative or cognitive to disappear[30], others note that increasing capacity for pattern recognition and problem solving through algorithms may change types of work that people in higher skilled roles do[31].

2.9 For example, evidence suggests that modernisation in professional services firms, such as law and accountancy, will increasingly see administrative and other tasks relegated to technological solutions[32]. As tasks change, there will be an increasing need for interdisciplinary collaboration across teams and across an increasingly interconnected supply chain, highlighting the need for social and communication skills[33] . In this context, there will be a particular need to invest in re- or upskilling and providing lifelong learning for current workers[34].

2.10 The Fourth Industrial Revolution presents new opportunities for the UK economy, with new jobs being created and some workers experiencing enhanced working conditions as a result. However, for others, the risk of job displacement is growing, and the skills needed to deliver work in the future may be very different from the training and development opportunities currently available to them. This suggests the need for strategic planning from the DWP to identify individuals at risk and support them to manage this transition period.

3 Possible implications of the COVID-19 crisis

3.1 Although it remains fraught with uncertainty, the COVID-19 crisis may accelerate the uptake of Fourth Industrial Revolution technologies[35]. For example, the lockdown in March and April significantly boosted online sales[36], as its share of all retail sales grew from 19% to 33% between January and May this year[37], which may accelerate the

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[30] Frey, C. & Osborne, M. (2013). The future of employment: How susceptible are jobs to computerisation?

[31] Brynjolfsson, E. & McAfee, A. (2014). The second machine age. Work, progress and prosperity in a time of brilliant technologies. New York: W.W. Norton & Company; Ford, M. (2009), The lights in the tunnel. USA: Acculant Publishing.

[32] Spring, M. (June 2020) Future of the PS firm, Next Gen PSF – blog. Available from https://sites.google.com/sheffield.ac.uk/nextgenpsf/newsblog

[33] Eurofound (2018) Game changing technologies: Exploring the impact on production processes and work. https://www.eurofound.europa.eu/publications/report/2018/game-changing-technologies-in-european-manufacturing; Bakhshi, H., Downing, J., Osborne, M. and Schneider, P. (2017) The future of skills: Employment in 2030. London: Pearson and Nesta

[34] Work Foundation (2018) Constructing the future: how the skills needed for success in the workplace are changing. https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lums/work-foundation/CG_Constructingthefuture_A4_32pp_LR_nocrops(1).pdf

[35] Bloom, D. & Prettner, K. (25 June 2020) The macroeconomic effects of automation and the role of COVID-19 in reinforcing their dynamics. VOX CEPR Policy online. https://voxeu.org/article/covid-19-and-macroeconomic-effects-automation

[36] Global Data (May 2020) Covid-19 impact on e-commerce. https://store.globaldata.com/report/gdtmt-tr-r267--covid-19-impact-on-ecommerce-thematic-research/

[37] ONS (2020) Shopping may never be the same again https://blog.ons.gov.uk/2020/06/29/shopping-may-never-be-the-same-again/

further uptake of technology in retail. Sectors where a greater proportion of processes are already automated may prove to be more resilient to the current crisis, both better prepared to manage unpredicted surges in demand, and more able to manage the risk of infection among staff.

3.2 Previous Work Foundation research also found that increased use of digital technology among businesses would facilitate more effective work organisation processes, and more scope for flexible and remote working, both of which have become increasingly important since the outbreak of COVID-19[38].

3.3 At this early stage, forecasts about the scale and nature of the economic recession we are entering vary widely; early predictions of a v-shaped recovery are now being challenged, and the Bank of England predicts that we will soon face the worst crisis for 300 years. While the economy is gradually re-opening, the possibility of localised lockdowns in future may yet have further economic impacts at a regional and national level.

3.4 This context of heightened economic volatility will shape the degree to which businesses feel able to engage with the Fourth Industrial Revolution over the months ahead. The imperative facing many businesses to improve their productivity and streamline their operations in order to ease cashflow challenges has grown substantially. Businesses may feel that their only way of surviving the crisis is to fundamentally restructure their operations, pursuing automated solutions wherever possible.

3.5 Conversely, it is possible that faced with an uncertain post-COVID market, businesses will choose to delay potentially costly innovation and restructuring, particularly as there is reason to believe they will be able to draw on surplus workers from struggling sectors which will be shedding labour.

3.6 Considering the scale and long-lasting nature of the disruption caused by COVID-19, the Department should closely monitor shifts in behaviour and investment across sectors over the months ahead, and consider how it can better forecast changes in take-up of new technology within different sectors, and the potential resulting impacts on jobs.

4 Main implications for DWP

4.1 Although the scale and timeframe of the impacts of the Fourth Industrial Revolution on the labour market are hard to predict, we expect it will:

[38] Work Foundation (2018) Productivity, technology and working anywhere. https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/lums/work-foundation/423_TechnologyProductivityWorkingAnywhere-updated-2-MO(1).pdf

- Bring a growing risk of job displacement[39], particularly for individuals within vulnerable sectors, alongside opportunities for job enhancement for others.
- Have greater impacts in specific sectors and parts of the country. These should be considered alongside other trends, including increasing job insecurity for some groups of workers.

4.2 Last year, in their report on automation and the future of work, the Business Energy and Industrial Strategy Committee stated that "the lack of planning and action in this area is worrying" and recommended that the Government develops targeted support for individuals at risk of job loss through automation[40]. As the Department responsible for employment support programmes and Universal Credit, and a member of the National Retraining Partnership, the DWP should be at the forefront of this, developing employment support programmes and a social security system designed to support people to transition through a period of heightened economic uncertainty and facilitate progress towards the Government's ambitions of making the UK a global leader in technology[41] .

4.3 Given these factors, we recommend:

- The National Retraining Partnership[42] should identify and support individuals at greatest risk of job displacement through automation. The partnership should collaborate to take a proactive approach in identifying groups of workers facing particular risks through automation, COVID-19 or Brexit to enable them to provide information and support to workers, potentially through the Get Help to Retrain Scheme. This could involve:
    - using DWP vacancy data to map changes in recruitment over time, and to forecast potential changes in job supply within sectors or regions
    - working with local Growth Hubs to capture insights about trends in technology use at a local level
    - liaising with the Redundancy Pay Service to collect data on the reason for businesses to implement large scale redundancies

- As the Get Help to Retrain Scheme is scaled up this year, the National Retraining Partnership should extend support to individuals who are unemployed. While the programme was initially designed to support

[39] UKCES (2014) Future of work: Jobs and skills in 2030. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/303335/the_future_of_work_key_findings_edit.pdf

[40] House of Commons (BEIS Committee) (2019) Automation and the future of work. https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1093/1093.pdf

[41] HM Government (2018) Industrial Strategy https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

[42] National retraining partnership (Government Website, 2019) https://www.gov.uk/government/publications/national-retraining-scheme/national-retraining-scheme#national-retraining-partnership

individuals in work to transition into better jobs, the economic upheaval sparked by COVID-19 along with the potential for accelerated automation over the months and years ahead indicate that there may be a growing pool of individuals who have recently fallen out of work who would stand to benefit from this degree of targeted information and support.

- As the DWP continues to develop Universal Credit, it should ensure it is adapted to provide the types of support individuals transitioning between periods of work are likely to need in the future. The Department has used an agile approach to developing Universal Credit, with the aim of being able to 'test and learn' through rollout of the new benefit. The uncertain economic landscape we now face is very different from when Universal Credit was first introduced, during the days of full employment and incremental changes in the labour market resulting from changes in technology use. The light touch engagement with work coaches UC currently entails, centred on supporting those already unemployed or on low incomes to identify CV workshops and complete job applications, is unlikely to be sufficient to meet the challenges presented by the fourth industrial revolution. For individuals at risk of displacement through automation, highly tailored support delivered at the earliest possible stage will be essential. This would involve building on the DWP's pre-existing engagement relationships with business, by liaising with employers, local government and trade union representatives to develop tailored and local reskilling and upskilling strategies.

- Alongside this, the Department should review whether continued use of requirements and deductions is appropriate given the shifts in the social and economic context. The threat of a deduction being taken as a result of failure to apply for a role is intended to incentivise individuals to look for work. But evidence suggests that large cohorts of workers are at risk of job displacement through automation, a global trend beyond their control. Given the sharp decline in vacancies this spring[43], these workers are likely to face significant challenges finding new employment, making the value of continued use of conditionality unclear.

[43] ONS (June 2020) Dataset: A01: Summary of labour market statistics. https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/june2020/relateddata