The Skills Imperative 2035: Occupational Outlook – Long-run employment prospects for the UK

Working Paper 2 – Headline report

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Our co-investigators

Contents

Acknowledgements

Executive Summary

The Skills Imperative 2035: Essential skills for tomorrow's workforce

The global economy faces significant shifts in the coming decades. New technologies, coupled with major demographic and environmental change, are predicted to disrupt the economy and the labour market in various ways. This will have a significant impact in the next 10 to 15 years and beyond, both in terms of the *jobs* available and the *skills* needed to do them. Some commentators anticipate that skills such as creativity, critical thinking, teamwork, problem solving and resilience – skills which complement the new technologies and other changes taking place – will become increasingly important in the future.

The impact of these drivers of change on the economy and labour market is expected to be one of the pre-eminent strategic challenges that the UK and wider global economy face in the next 10 to 15 years and beyond. But the nature of the change in demand for jobs and skills in the future UK labour market is not currently well understood. Our research programme, *The Skills Imperative 2035: Essential skills for tomorrow's workforce*, aims to address this information gap.

In the first stage of this research programme, we seek to investigate the scale of the challenge that the UK faces in the next 15 years. We started out by undertaking a review of existing literature in this field, to lay the foundation upon which we will build in the rest of the research programme.

Next, the programme starts by exploring how the size and composition of the labour market might change by 2035, which is the step that is being reported on in this suite of reports.

In the second stage, we will assess what the potential supply of these essential employment skills will be in future. We also aim to predict where skills gaps are likely to arise, identify which groups are most at risk of lacking the essential employment skills needed, and consider what actions are needed to support such groups to transition to other opportunities.

In the third and final stage, we will investigate how the education system can support the development of the essential employment skills needed in future.

Megatrends and their implications for employment

In our earlier [literature review](#), we identified a number of megatrends and events which are expected to shape the world of work[1]. These include recent factors such as Brexit and the Covid-19 pandemic, as well as longer-term trends such as increasing adoption of technology in the labour market, and major demographic and environmental change. These are anticipated to change the role workers play in the labour market, both in terms of the jobs they do and the skills they need, with a greater demand for skills that complement new technologies.

Building on the findings from the literature review, we now move our focus to exploring what the implications of these megatrends and other structural changes that are taking place in the UK economy will have on the labour market and employment over the period to 2035. The Institute for Employment Research (IER) at the University of Warwick, working in collaboration with Cambridge Econometrics (CE), have produced such periodic assessments in their *Working Futures* series. As their most recent projections predated the pandemic and the UK's exit from the EU, NFER, who are leading *The Skills Imperative 2035* research programme, included an update of this assessment in the programme. The findings from this assessment are summarised in this *Headline report* and are presented in more depth in the more detailed reports which accompany it.

Due to the uncertainty inherent in predicting the future, IER and CE have produced projections for a range of scenarios. The *Baseline projections* assume existing technological trends and environmental transitions continue at a similar pace in the future. This represents a realistic assessment of what the labour market might look like in 2035 based on what we know now.

There are, however, other events which may become important in the future, but where the detail is not yet known. As one of the aims of this research programme is to explore a range of possible futures, we have produced some *Alternative scenarios* that build on the *Baseline projections*, but which consider other possible outcomes. These include factors such as a faster adoption of technology; a greater focus on the environment; and the provision of higher-quality education, improved healthcare provision, and better care services to support the ageing population.

As part of the Working Paper 2 suite, we have produced four reports:

Working Paper 2a: A detailed report which describes the *Baseline projections*.[2] These include an overview of macroeconomic and sectoral employment prospects as well as the implications for skills as measured by qualifications and occupations.

Working Paper 2b: A detailed report which presents the results for the *Alternative scenarios* that have been considered.[3] Together, the *Baseline projections* and *Alternative scenarios* provide a sound basis for discussions about skills provision in the future.

Working Paper 2c: A *Technical report* which presents details of the data sources and methods used to generate the results.[4]

Working Paper 2: This document, which is called the *Headline report*. This summarises the main findings from the *Baseline projections* and *Alternative scenarios* and brings together the scenarios to consider overall implications for occupations and skills.

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[1] Taylor *et al.*, 2022
[2] Wilson *et al.*, (2022a)

[3] Wilson *et al.*, (2022b)
[4] Wilson *et al.*, (2022c)

As it is inevitably impossible to predict the future with precision or certainty, we have produced a range of plausible scenarios of the future which provide a view of medium to longer-term trends for the UK economy and labour market (10-15 years ahead) and incorporate policy changes where these have been announced. Many of the trends presented are resilient and are not sensitive to even quite substantial unanticipated shocks. The results should be regarded as a robust benchmark for debate and further analysis.

Readers should note that the *Baseline projections* and *Alternative scenarios* were largely prepared before the recent events like the war in Ukraine and subsequent energy price crisis, as well as high inflation and increased interest rates, which have impacted on the cost of living. These factors will undoubtedly have a significant impact on the short-term prospects for the British economy and labour market, including an impact on the timing of investment and energy/net zero transition decisions. However, the focus of these projections is on long-term structural trends such as demographics, economic change and automation. The geopolitical events like the war in Ukraine and consequent macro effects are not expected to affect the overall prospects for structural change by sector and occupation significantly in the longer term.

Main findings

The economy is changing slowly, but steadily and inexorably in favour of the service sector. By 2035, the structure of the labour market will have changed substantially, as described below. This is true across the range of possible future labour market scenarios considered in this research programme. These projections imply significant changes in the skills required to succeed in the future labour market of 2035.

It is important to note when reading these findings that the direction of the changes identified is similar regardless of which scenario we choose to consider. In other words, the *Baseline projections* and the *Alternative scenarios* that have been considered all present a similar picture in terms of direction, although some of the impacts in the *Alternative scenarios* are more magnified. This indicates that the direction of change is robust under a number of *Alternative scenarios*. We would encourage users of this report to focus on the direction of changes more than actual numbers.

Brexit and the pandemic caused the economy to contract sharply, but it will recover in the medium term

Following exit from the EU and the outbreak of Covid-19 in 2020, the UK economy contracted sharply. Total output, as measured by gross value added (GVA), fell by almost 7 per cent in 2020, while there was a 1.1 per cent decrease in employment (workplace jobs).[5] However, the outlook for the economy has improved since then. In our *Baseline projections*, output is forecast to bounce back after the pandemic, with average annual growth of 2.6 per cent per annum (pa) in 2020-25, before slowing in the longer term. Likewise, employment is forecast to rise by 0.6 per cent pa in 2020-25 before slowing in the longer term.

Output is projected to grow modestly over the next 15 years, although growth will vary by sector

Total output in the *Baseline projections* is projected to grow by 1.8 per cent on average pa across 2020 to 2035. However, it is projected to increase faster in the two main *Alternative scenarios* considered. By

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[5] Note that wherever we refer to 'Output' in this report, this is based on the Gross Value Added (GVA) measure. See here for definition.

2025, output in the *Technological opportunities scenario* is forecast to be 7.5 per cent higher than the *Baseline projections,* while it is estimated to be 6.2 per cent higher in the *Human-centric scenario.* In the two main *Alternative scenarios*, higher output is primarily generated by productivity gains but job gains in some areas are offset by job losses arising from faster automation[6].

When looking at changes in output by the six broad sectors of the economy defined using the Standard Industrial Classification (SIC), the *Construction* (+2.4 per cent pa) and *Trade, accommodation and transport* (+2.1 per cent pa) sectors lead the way in the *Baseline projections*, mirroring the high growth seen prior to the pandemic.[7] Conversely, output in *Primary sector and utilities* is forecast to be unchanged from 2020 levels. *Manufacturing* output is projected to continue to grow in the next 15 years, although its share of total UK output is expected to decline. This is driven by increasing competition from overseas manufacturers as the UK continues to move even further towards being a services-oriented economy.

There are projected to be 2.6 million new jobs by 2035, the majority of which will be taken by women

In each of our main scenarios (*Baseline projections* and *Alternative scenarios)*, the number of jobs in the UK is projected to rise by around 0.5 per cent pa across the period 2020-35, which cumulatively will lead to a net increase of 2.6 million jobs. This comparatively modest increase is largely due to UK population growth slowing in next 15 years. Females are expected to take the lion's share of these new jobs (between 56 and 68 per cent of new jobs depending on scenario). This reflects the increasing participation of women in the labour

market. The projections also show that jobs most vulnerable to automation are currently mainly held by men.

The projections show major changes to the industrial structure of employment, which is increasingly dominated by services

Employment will generally reflect the trends observed in output. Sectors with the fastest output growth are projected to see the greatest employment increases, all else equal. The sectors with the strongest growth rates are in *Business and other services* (over a million net new jobs over 2020-35), and *Non-market services* (these services are dominated by health and education, which are mainly provided by the public sector – 835,000 net new jobs over the period). Conversely, *Manufacturing* employment is projected to decrease by 286,000 jobs between 2020-35, its share of total UK employment falling from 7.5 per cent in 2020 to 6.2 per cent in 2035, continuing the long-term downward trajectory. Given that output in *Manufacturing* is projected to continue to rise up to 2035, this means continued increases in productivity are expected in this sector.

While the adoption of new technologies will lead to some job losses, there will be many new opportunities too

One widely anticipated feature of greater use of technology in the labour market is job destruction. Our projections indicate that up to two million jobs could be replaced by technology. All sectors will experience job losses, but the *Business and other services* and *Trade, accommodation and transport* sectors will be most affected. However, the projections suggest there will also be plenty of new opportunities,

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[6] The intermediate *Automation scenario* focuses just on the negative employment aspects.

[7] *Primary sector and utilities*; *Manufacturing*; *Construction*; *Trade, accommodation and transport*; *Business and other services*; and *Non-market services* (which include public administration, education and health)

and it is assumed these will broadly offset the jobs being displaced.[8] The *Non-market services* sector in particular is expected to see large job increases due to a greater focus on the provision of higher-quality education, health and care services.

Employment in the *Health* industry is projected to increase the fastest in all scenarios

Drilling down and looking at the impact of sectoral employment in greater detail using the 2-digit SIC industries reveals greater change across the period 2020-35 compared to that seen when looking at the six broad sectors. The sectors with largest absolute employment growth in the *Baseline projections* at the 2-digit level SIC are mainly services. These include *Health* (+369,000) and *Food and beverage services* (+334,000). Conversely, the sectors with the largest projected employment declines in the *Baseline projections* are focused mainly in *Manufacturing*. These include *Metal products* (-41,000) and *Other transport equipment* (-22,000).

Most of the new jobs created by 2035 will be in *Professional* and *Associate professional* occupations

Professional and *Associate professional* occupations are expected to experience the highest net increases in employment, referred to as expansion demand (around +1.5 and +0.7 million respectively). Conversely, *Administrative and secretarial* and *Skilled trades occupations* are expected to experience a negative net change (about 150,000 and 60,000 job losses).

Drilling down into more detailed occupations, over 2020-35, *Science, Research, Engineering and Technology professionals* will experience

the largest net increase (+0.90 million job openings), followed by *Health and social care associate professionals* (+0.60 million). In contrast, *Elementary administration and service occupations* are expected to see the largest employment decline by 2035 (-0.52 million).

Replacement demand will significantly exceed expansion demand, even in occupations which are expected to decline

Replacement demands recognise the need to replace people who leave the workforce permanently or semi-permanently for various reasons including retirement, family formation, other caring roles and mortality. The projections show that replacement demand is much larger than net changes in occupations. The level of replacement demand, which is estimated to be 17.5 million jobs between 2020 and 2035, suggests that the future labour market will continue to be very dynamic, creating new employment opportunities even in declining sectors and occupations. To illustrate, *Administrative and secretarial occupations* is projected to see a decline in total employment of -0.15 million jobs between 2020 and 2035. But replacement demand will be nearly 1.9 million for these occupations over this period. This means that even though there is a decline in the total number jobs in these occupations, the fact that many people will be retiring from them or moving on for other reasons, means there will still be a healthy demand for workers with these skills.

Substantial changes are projected for the detailed occupational structure of employment by 2035

To assess demand for different kinds of employment skills in the next phase of this work, even more detailed projections for the 412 4-digit

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[8] In the medium to long term, it is assumed that the labour market will adjust to the loss of jobs due to automation as new jobs are created due to rising incomes and demand for other goods and services. This is it is based on CE/IER's assessment of the

previous evidence about how the economy and labour market adjust to technological shocks.

level SOC2020 Unit Groups have been produced. These results point to where the largest labour market opportunities and training requirements will arise in the period to 2035. They show that *Care workers and home carers*, *Programmers and software development professionals*, *Higher level teaching assistants*, and *Nursing auxiliaries and assistants* are projected to experience the largest growth in employment in absolute terms by 2035. In contrast, *Receptionists*, *Personal assistants and other secretaries*, *Warehouse operatives* and *Kitchen and catering assistants* will experience the largest declines in absolute terms.

The workforce is projected to become increasingly well qualified

Based on the detailed analysis of past patterns of behaviour, more young people are expected to continue their education and acquire more and higher-level qualifications, replacing those who are leaving the labour market and who generally have fewer formal qualifications.

By 2035, the number of economically active people with a postgraduate degree or equivalent (QCF level 7-8) is projected rise to about 8.3 million, compared to 4.7 million in 2020. At the same time, the number of people in the labour force without formal qualifications will continue to fall. In 2020, there were around 1.4 million of these workers, but this is forecast to fall to around 0.8 million in 2035.

In the next stage of the research programme, we will build on these findings and examine what skills will be needed to do the jobs that will be available in the future UK labour market**.**

Recommendations

1. Given the cross-cutting nature of the challenges presented by these projected labour market changes, we recommend that a cross-cutting body is established, which reports directly to the Cabinet Office. This body would be responsible for working effectively across Government departments, with employers and others, in order to ensure that appropriate strategies are developed to (i) understand the implications of these changes in more detail and (ii) set out how the Government, employers, training providers and the education system should respond, drawing on views and expertise from across and outside Government. These strategies must include giving specific attention to how best to support workers in sectors which are projected to be disproportionately affected by changes to the labour market. As some sectors will be declining in size, workers who are displaced may be unable to find new jobs in the same industry. Displaced workers will need help and support to either upskill or re-skill, so they are able to transition in another part of the labour market.

2. Industry leaders and representative bodies, working with regional and local partners including Mayoral Combined Authorities and local authorities, should assess what these projections mean for employment and output growth in their sectors/industries and/or for the business critical occupations they will need in future and start planning what actions they need to take. These projections indicate there will be an increase in employment opportunities for highly-skilled *Professionals* and *Associate professionals*. These will be significant growth occupations in the next 15 years. Unless plans are put in place and action is taken soon, there will be a shortage of skilled professionals available to fill many of these new opportunities.

1   Introduction

The global economy faces significant shifts in the coming decades. New technologies, coupled with major demographic and environmental change, are predicted to disrupt the economy and the labour market in various ways. This will have a significant impact in the next 10 to 15 years and beyond, both in terms of the *jobs* available and the *skills* needed to do them. Some commentators anticipate that skills such as creativity, critical thinking, teamwork, problem solving and resilience – skills which complement the new technologies and other changes taking place – will become increasingly important in the future.

In the first stage of this research programme, we seek to investigate the scale of the challenge that the UK faces in the next 15 years. After laying the foundation with an initial literature review, the programme starts by exploring how the size and composition of the labour market might change by 2035. Then we will go on to examine how the demand for skills will change during this period, based on these labour market projections, and seek to identify which employment skills will be most needed in the future.

In the second stage, we will assess what the potential supply of these essential employment skills will be in future. We also aim to predict where skills gaps are likely to arise, identify which groups are most at risk of lacking the essential employment skills needed, and consider what actions are needed to support such groups to transition to other opportunities. In the third and final stage, we will investigate how the education system can support the development of the essential employment skills needed in future.

This suite of reports is the second output from the research programme, *The Skills Imperative 2035: Essential skills for tomorrow's workforce,* which focuses on developing a comprehensive set of quantitative projections. The first report presented the results of a wide-ranging literature review on the essential skills most needed for work in the future.[9]

Development of labour market projections

While no one can be certain about the future, detailed quantitative projections, linked to a coherent view of the prospects for the economy, provide a sound foundation for thinking about how the labour market may need to respond to the underlying drivers of change in the patterns of demand and supply of skills.

Such assessments have been produced for many years by IER, in collaboration with CE, in their *Working Futures* series (see for example Wilson *et al.*, (2020)). As well as assessing the future size of the labour market, this series includes an analysis of patterns of employment by industry and occupation.

For *The Skills Imperative 2035* research programme, IER and CE used their established *Working Futures* methodology to produce updated projections of the future labour market in 2035. These incorporate the latest version of the Standard Occupational Classification (SOC2020), which the UK Office for National Statistics (ONS) introduced in 2021. SOC2020 will be the classification system used by Government and other stakeholders during the next decade, when there will be most focus on this strategic challenge. The research programme has

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[9] Taylor *et al.*, 2022

therefore reclassified the old *Working Futures* database on to the new SOC2020 system, producing detailed projections down to the 4-digit level (412 categories). This provides the level of granularity needed to develop the detailed analysis of essential employment skills that will be the focus of the next stage of this research programme.

Future labour market scenarios

Due to the inherent uncertainty involved with predicting the future, IER and CE have produced projections for a range of scenarios.

The **Baseline projections** take account of existing technological trends, assuming that innovation and automation, as well as energy and environmental transitions, will continue at a similar pace (as seen over the last decade or so) in the future. They also include the impact of other labour market factors, including demographic changes (such as population growth, migration and the demographic structure of the workforce), as well as the impact of Brexit and the pandemic. Further, they take account of any changes to the policy landscape which have already been made or announced. The *Baseline projections* present a realistic assessment of what the labour market might look like in 2035, based on what we know currently, which includes any new government policies which may affect the economy and labour market in future.

The *Baseline projections* do not, however, take into account any policy changes which may happen in the future but where the detail is not yet known (e.g. policies to meet the UK's 'net zero' commitment by 2050). Nor do they take into account changing trends or other factors which may happen in the future, as, by definition, there is a lack information about what form they may take. In this sense, the *Baseline projections* might be considered to be a set of projections based on a minimum rate of structural change.

As an aim of this research programme is to explore a range of possible futures, we have also produced one interim and two main *Alternative scenarios*, which consider other possible outcomes.

Automation scenario – This is an interim or partial scenario focussing on an assumed acceleration in take-up of related technologies, including Artificial Intelligence (AI). This scenario primarily focuses on the negative employment effects based on a review of jobs most at risk and does not assume any job creation, over and above what was included in the *Baseline projections*. Because of this, it provides an incomplete and unrealistic picture of the future labour market, and therefore is not discussed much in this report. The main purpose of developing the *Automation scenario* is to highlight areas where jobs are at risk of automation.

Technological opportunities scenario – This is one of the two main *Alternative scenarios*, which builds on the *Automation scenario* but recognises that technological developments will open up many opportunities and will create new jobs. In this scenario, investments are directed to capitalise on labour-augmenting technologies, support the net-zero transition, and provide better social services in the UK.

Human-centric scenario – This is the second main *Alternative scenarios*, which also builds on the *Automation scenario* but focuses on the demand for and provision of health and education services in future. It assumes investments are directed substantially towards improving the provision of social services and more modestly towards technological opportunities and environmental ambitions. The additional jobs created are expected to place greater emphasis on non-cognitive skills, which are less vulnerable to displacement, especially in the provision of better-quality education, health and care services.

As the future cannot be predicted with precision or certainty, the projections from these different scenarios are presented as a range of

possibilities. This range represents our best assessment of what the future labour market of 2035 might look like. The results should be regarded as indicative of general trends and orders of magnitude and are not intended to be prescriptive or inevitable.

Readers should note that the *Baseline projections* and *Alternative scenarios* were largely prepared before the Russian invasion of Ukraine, its subsequent economic effects and policy responses to these events. While these factors will undoubtedly have a significant impact on the short-term prospects for the British economy and labour market, they are not expected to affect the longer-term prospects for structural change. The focus of these projections is on long-term structural trends such as demographics, economic change and automation, rather than effects we currently consider will have shorter-term impacts on the labour market and future skills needs (e.g. the war in Ukraine). While these events and issues may have a short-term impact on the economy and labour market, we do not expect them to alter the longer-term prospects for employment structure by sector and occupation.

Accompanying reports

As part of the Working Paper 2 suite, we have produced four reports:

Working Paper 2a: A detailed report which describes the *Baseline projections.*[10] These include an overview of macroeconomic and sectoral employment prospects as well as the implications for skills as measured by qualifications and occupations.

Working Paper 2b: A detailed report which presents the results for the *Alternative scenarios* that have been considered.[11] Together, the *Baseline projections* and *Alternative scenarios* provide a sound basis for discussions about skills provision in the future.

Working Paper 2c: A *Technical report* which presents details of the data sources and methods used to generate the results.[12]

Working Paper 2: This report, which is called the *Headline report* hereafter. This summarises the main findings from the *Baseline projections* and *Alternative scenarios* and brings together the scenarios to consider overall implications for occupations and skills.

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[10] Wilson *et al.*, (2022a)
[11] Wilson *et al.*, (2022b)

[12] Wilson *et al.*, (2022c)

2   Modelling approach and key assumptions

In order to understand the labour market, it is necessary to understand the forces driving the economy. Our approach to modelling the labour market is a quantitative one, based on econometric methods. At its heart is a detailed multisectoral macroeconomic model. This is combined with a series of modules which focus on the changing patterns of employment within industries. These are based primarily on a detailed analysis of data from the Labour Force Survey.

The quantitative modelling is based on assumptions of a continuation of past patterns of behaviour and performance as represented by the estimated econometric relationships. Various factors are regarded as exogenous; that is, have an external cause or origin to what is going on in the economy. This includes what happens in the rest of the world, to government policy, technological change and demographics.

The *Baseline projections* is based on a set of assumptions about these key exogenous inputs. In the *Alternative scenarios* (i.e. the interim *Automation scenario* and the two main alternatives, the Technological opportunities and Human-centric scenarios), these are modified as well as making some additional interventions which supersede the parameters and trends built into the Baseline projections.

Full details of the models and the assumptions can be found in the accompanying reports on in the economy. This includes what happens in the rest of the world, to government policy, technological change and demographics.

3 Macroeconomic and general labour market context

A number of megatrends and shocks are expected to shape the future labour market

A number of universally acknowledged megatrends and shocks were identified in the literature review that will shape the world of work in the years leading up to 2035.[13] These include:

(a) The Covid-19 pandemic: The pandemic impacted on ways of living and working very abruptly. People were restricted from working as normal to avoid spreading the virus. Restrictions varied depending on the type of tasks and nature of work in each occupation. Specific sectors and occupations (e.g. hospitality) faced more restrictions as a considerable share of their activities were not compatible with remote working. The impact of the virus and lockdown measures brought in by the Government led to a sudden and sharp reduction in economic activity in nearly all sectors in Quarter 2 of 2020 and a fall in employment. The pandemic has accelerated some underlying trends in working practices, such as remote working, as well as impacting many other areas such as greater online retailing, which are likely to continue into the future.

(b) Trade: While uncertainty about the possibility of a 'no-deal Brexit' has been lifted, the effect of the EU-UK Trade and Cooperation Agreement (such as restrictions on immigration) are expected to have a considerable impact on the UK economy. We assume a long-term effect with a decline in UK exports to the world of about 13 per cent by 2035, allowing for the potential positive prospects from unilateral trade agreements with countries such as the US, Australia, Canada and New Zealand. This is similar to the assumptions adopted in other studies.[14]

(c) Technological developments: The introduction of new technological advancements (digitisation, automation and AI) will continue to displace certain types of jobs or parts of jobs which are more routine. At the same time, these technological advancements are also likely to create new job opportunities as the technologies offer the prospect of developing new products and services.

(d) Climate change and environmental issues: The global transition to a greener economy, with international pressures such as the 2015 Paris Agreement resulting in the government's ambitious target of reaching its 'net zero' carbon commitment by 2050, which is altering the occupational and skills composition of the UK labour market.

(e) Demographic: The composition of the population is an important driver of the labour market. The demographic composition in the labour market is changing considerably. The main drivers are the ageing population and an increasing percentage of females in work.

The projections produced incorporate these megatrends or key drivers of change in the economy in different ways. The main difference is that the *Baseline projections* assumes that technological change and environmental initiatives will continue through to 2035 at current historic rates of change, whereas the *Alternative scenarios* consider other possible outcomes including a more rapid adoption of technology, greater focus on the environment and the provision of better quality education, health and care services.

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[13] Taylor *et al.*, 2022

[14] E.g. OBR October 2021 Economic and fiscal outlook publication, Bank of England 2019 Report, or CEP 2019 modelling.

Brexit and the pandemic caused the economy to contract sharply, but it will recover in the medium term

In the decade prior to the Covid-19 pandemic (2010-19), UK output growth averaged 1.8 per cent pa, driven by strong household spending.[15] However, in 2020, the UK's withdrawal from the European Union dampened growth prospects, with the outbreak of the global Covid-19 pandemic then pushing the country into recession. As a result of these factors, UK output fell by over 7 per cent in 2020.

UK employment also fell during the pandemic, by 1.1 per cent (0.4 million jobs) in 2020. At the same time, claimant count unemployment almost doubled in 2020, reversing the trend of falling unemployment since 2011. While this was the first fall in employment since 2010, it was partly cushioned by government support schemes, such as the Covid-19 Job Retention Scheme (the furlough scheme), which was introduced by the Government during the pandemic to protect jobs.

However, the outlook for the economy has improved since 2020. In our *Baseline projections*, output is forecast to bounce back after the pandemic, with average annual growth of 2.6 per cent pa in 2020 to 2025, before slowing in the longer term to 1.4 per cent pa between 2025 and 2035.

Likewise, employment is forecast to recover mildly, but to lead to sustained jobs growth over the longer term. Total employment is projected to rise by 0.6 per cent pa in 2020 and 2025, which is equivalent to an extra 1.1 million jobs. Thereafter, this is forecast to slow in the longer term to 0.4 per cent pa between 2025 and 2035,

which is equivalent to 1.5 million new jobs. Alongside this, unemployment is projected to fall back to pre-pandemic levels.

Table 1 summarises a number of macroeconomic indicators between 2015 and 2035.[16]

Table 1: Macroeconomic indicators for the UK

	2015-19	2019-20	2020-25	2025-35
Output – GVA (% pa)	1.5	-8.4	2.6	1.4
Output – GDP (% pa)	1.4	-7.4	2.0	1.0
Household expenditure (% pa)	1.7	-12.1	2.7	1.9
Employment (% pa)		-1.1	0.6	0.4
	2019	**2020**	**2025**	**2035**
Employment (jobs, millions)	35.5	35.1	36.2	37.7
Unemployment (millions)	1.1	2.2	1.8	1.2

Source: Cambridge Econometrics, MDM revision 13547.
Notes: GDP = Gross Domestic Product
GVA = Gross Value Added
Household expenditure estimates are based on average weekly household expenditure collected by the ONS Living Costs and Food Survey (LCF).
Employment is total workplace employment (jobs) and includes HM Forces.
Employment estimates are based on the ONS quarterly Workforce Jobs series, from which the June (Q2) count seasonally unadjusted data are used.
Unemployment estimates are based on annual averages of the seasonally adjusted Claimant Count.

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[15] Note that wherever we refer to 'Output' in this report, this is based on the Gross Value Added (GVA) measure

[16] These projections were prepared before the Russian invasion of Ukraine and subsequent impacts on the world economy and policy responses to these events. However, our current assessment is that these impacts are short-term and are unlikely to have major structural consequences for the long-term UK labour market.

UK output is projected to grow modestly over the next 15 years, but this may be stronger if the adoption of technology in the labour market speeds up

Output is forecast to grow modestly between 2020 and 2035 in our *Baseline projections*. Overall, it is projected to grow by 1.8 per cent pa on average across 2020-35 as a whole. This is equivalent to an overall increase of around 31 per cent in output by 2035 compared to 2020. As shown in Figure 1, by value, output is projected to grow from £1,775bn in 2020 to £2,328bn in 2035 (£2018bn prices).[17]

As explained in Chapter 1, two main *Alternative scenarios* or futures have been considered alongside the *Baseline projections*. The key drivers of employment growth in the *Technological opportunities scenario* are the positive impact of technology adoption on productivity, which feeds into higher real wages, consumption, and investment. In the *Human-centric scenario* it is assumed that society invests more in human capital – in the form of health, education, and other support – which in turn increases both labour participation and productivity, driving greater demand and output growth in the long run. The productivity gains from introducing new technologies result in rising incomes that generate demand for other goods and services. The two main scenarios explore a range of possibilities about which sectors benefit most for this additional demand.

Total output growth is projected to grow more strongly in both the *Technological opportunities* and *Human-centric scenario*s. The former is expected to grow by 2.3 per cent pa over 2020-35. By value, output will increase from £1,775bn in 2020 to £2,503bn in 2035 (£2018bn prices). Total output is forecast to be 7.5 per cent higher or £175bn

larger in the *Technological opportunities scenario* compared to the *Baseline projections* by 2035.

Output growth in the *Human-centric scenario* also exceeds the *Baseline projections* but is slightly lower than in the *Technological opportunities scenario*. output is expected to grow by 2.2 per cent pa between 2020 and 2035 (or by value, increasing from £1,775bn to £2,473bn-£2018bn prices). By 2035, output is projected to be 6.2 per cent higher in the *Human-centric scenario* than the *Baseline projections* (£145bn higher in value).

Figure 1: UK Total Gross Value Added by scenario, 2010-35 (£2018bn)
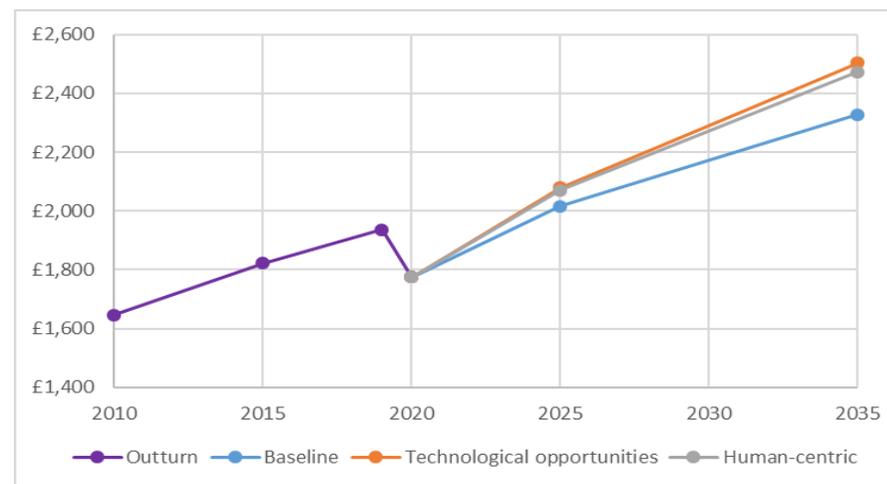
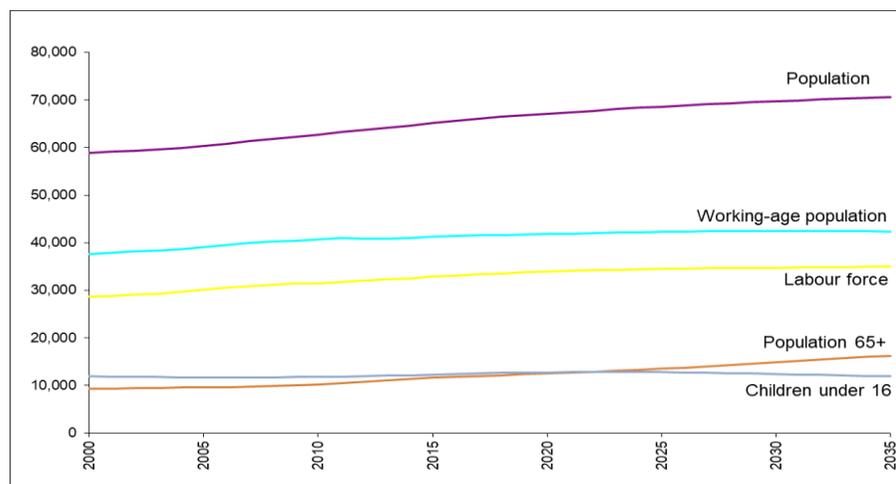*Source: Cambridge Econometrics, MDM revision 13547*

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[17] As with the *Baseline projections*, the *Alternative scenarios* were prepared before the Russian invasion of Ukraine and subsequent impacts on the world economy and policy responses to these events. However, our current assessment is that these impacts are short-term and are unlikely to have major structural consequences for the long-term UK labour market.

Total employment is forecast to rise modestly by 2.6 million additional jobs by 2035, in part driven by slower population growth

Population and labour force

The size and composition of the population is an important driver of the labour market. After a decade of substantial growth to 2020, when the population grew by 0.7 per cent pa, the UK population is expected to grow by just 0.3 per cent pa over the period 2020 to 2035. The number of people aged 65+ is expected to increase by 30 per cent between 2020 and 2035, reflecting the UK's ageing population. The labour force is projected to grow more modestly, by 0.2 per cent pa, between 2020 and 2035.

Figure 2: UK Population, labour force and unemployment profiles, 2000-35 (000s)

Source: Cambridge Econometrics, MDM revision 13547.

Total employment

UK labour supply is projected to expand more slowly between 2020 and 2035 than before the pandemic due to UK population growth slowing. Total employment in our *Baseline projections* is forecast to rise modestly by around 0.5 per cent pa in the next 15 years (equivalent to an extra 2.6 million jobs by 2035). We have developed an interim *Automation scenario* to identify the number of jobs at risk of displacement due to automation.[18] Compared to the *Baseline projections*, the *Automation scenario* suggests that the impact of technology adoption in the period 2020-35 will result in around two million jobs being displaced from the labour market. This is a key group who are likely to need re-skilling so they can find other jobs.

However, faster technological change and improving the provision of social services will also create more new job opportunities. Both main *Alternative scenarios* consider different ways in which the negative effects of technology might be offset by new opportunities.

Unemployment

Unemployment doubled in 2020 to 4.5 per cent due to the pandemic but is projected to fall back to 3.0 per cent by 2035 in the *Baseline projections.* By gender, the female unemployment rate is projected to be high in the *Baseline projections* (3.0%) in 2035 and lowest in the *Human centric scenario* (1.6%). This is the opposite for men, whose unemployment rate in 2035 is forecast to be highest in the *Human centric scenario* (4.7%) and lowest in the *Baseline projections* (2.9%).

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[18] The *Automation scenario* focuses purely on the negative employment effects of technology adoption and assumes no new jobs will be created by these megatrends.

By itself it is incomplete and is therefore not presented as one of the *Alternative scenarios* later in this report.

Most of the new jobs created in the labour market by 2035 are expected to be taken by women

Around 56 per cent of the 2.6 million new jobs in the *Baseline projections* are expected to be taken by female workers. This is driven by a 0.8 per cent pa growth in female full-time jobs over 2020-35, compared to 0.3 per cent pa growth in male full-time employment over the same period. However, growth in male part-time jobs is projected to be faster (0.7 per cent pa) than in female part-time jobs (0.2 per cent pa). These patterns are principally driven by the gender mix of industry sectors in which jobs are forecast to be created or displaced and may be different if there is greater flexibility in the range of jobs men and women do in future.[19]

Compared to the *Baseline projections*, the interim *Automation scenario* projects more than two million fewer jobs in 2035. The largest component is male full-time jobs (a decline of 827,000 jobs) followed by female full-time jobs (447,000 jobs). In terms of percentage differences, the decline in male employment is greater in all types (full-time, part-time and self-employment) than for female employment. Jobs which are most vulnerable to automation, such as assemblers and machine operators, are currently mainly held by men.

While total employment by 2035 is similar in the *Technological opportunities* and *Human-centric scenarios*, the breakdown by gender varies. The *Human-centric scenario* is predicated on greater investment in public services and other sectors that have historically employed more women. Female employment is therefore projected to increase more than in the *Baseline projections* and *Technological opportunities scenarios,* accounting for 68 per cent of the 2.6 million new jobs since 2020*.*

Figure 3: Breakdown of 2.6 million new jobs created between 2020 and 2035 by gender
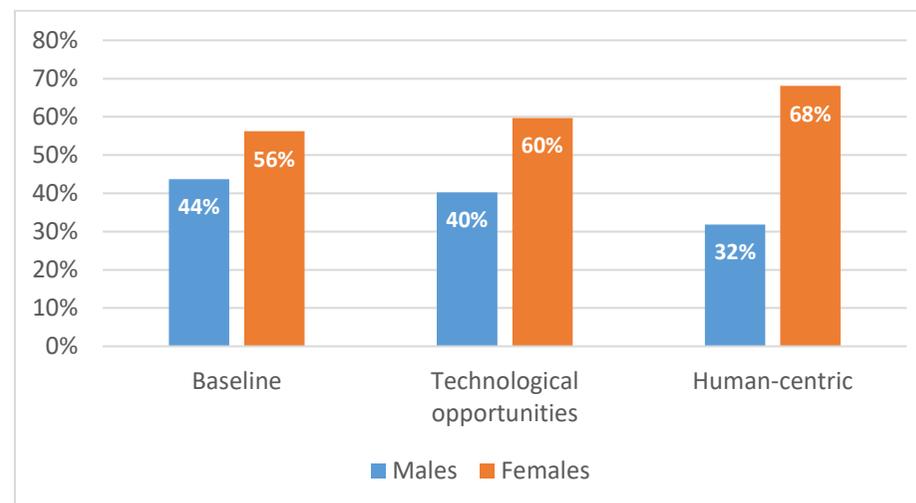
Source: Cambridge Econometrics, MDM-E3 revision 13571

In both scenarios, employment is projected to increase between 2020 and 2035 for both men and women. In broad terms, the gender gap in the employment rate remains relatively stable between 2020 and 2035 in the *Baseline projections* but closes somewhat in the two main *Alternative scenarios*. The *Human-centric scenario* projects the smallest eventual employment rate gap between male and female employment in 2035: a difference of just 1 percentage point (compared to a 2.6 percentage point gap in the *Baseline projections* and a 2.1 percentage point gap in the *Technological opportunities scenario*).

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[19] These projections for male and female employment are based on an analysis of historical shares and trends in the share of jobs taken by females in different sectors which have been extrapolated forward. They also reflect the increasing participation of women in the workforce. These trends may change in future.

4 Sectoral output and employment prospects

Construction sector output will grow fastest, but the *Manufacturing* sector's share will fall

This section presents the projections for sectoral output and employment focussing on six broad sectors, based on the SIC.[20]

As shown in Figure 4, all sectors apart from *Primary sector and utilities* are projected to grow over 2020-35 in the *Baseline projections*. *Construction* is forecast to see the strongest growth (2.4 per cent pa) as the economy recovers from the pandemic. *Trade, accommodation and transport*, which saw the largest fall in output of all sectors in 2020, is also expected to grow strongly, by 2.1 per cent pa between 2020-35. This is partly due to the recovery post the pandemic and to ongoing shifts in the structure of the economy in favour of the service sector.

Manufacturing's share of UK output is expected to continue to decline from 9.8 per cent of total output in 2019 to 9.4 per cent in 2035. This is driven by increasing competition from overseas manufacturers and as the UK continues to move towards a services-oriented economy. But *Manufacturing* output is still forecast to grow over 2020-35 (1.6 per cent pa), albeit at a slightly slower pace than the economy as a whole.

Output is projected to grow more strongly across all broad sectors in both Alternative *scenarios.* In aggregate, output growth over 2020-35 in the *Technological opportunities scenario* is projected to be the strongest across all broad sectors with the exception of of *Non-market services*, in which the *Human-centric scenario* sees somewhat stronger growth owing to its greater emphasis on such services.

Construction is the highest growing sector among the six broad sectors and is particularly strong in the *Technological opportunities scenario* (3.5 per cent pa over 2020-35) because of continued demand for housing to address UK-wide shortages for a population with growing incomes (who might be looking at leaving multigenerational family homes or equipping their homes with the latest energy saving solutions and technologies in the future) and anticipated demand for new decarbonisation infrastructure.

Figure 4: Average output growth by broad sector, 2020-35 (% pa)
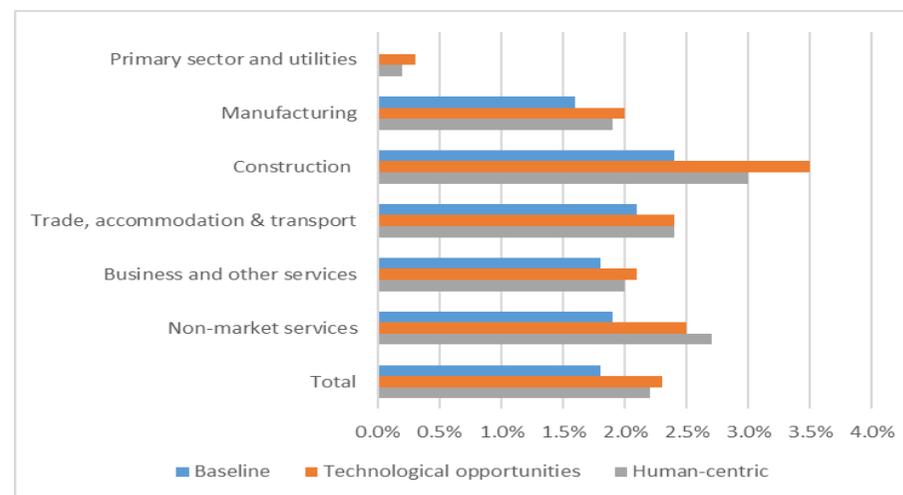
Source: Cambridge Econometrics, MDM-E3 revision 13571

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[20] *Primary sector and utilities*; *Manufacturing*; *Construction*; *Trade, accommodation and transport*; *Business and other services*; and *Non-market services.* The services in the *Non-market sector* are predominantly provided by the public sector and other non-market producers. They are dominated by health and education, which are mainly provided by the public sector.

While employment is projected to grow in most sectors, jobs in *Manufacturing* will contract

Employment change by broad sector in the *Baseline projections* will generally reflect the trends observed in output, with the strongest growth rates in *Business and other services* and *Non-market services* (over a million and 835,000 net new jobs over 2020-35, respectively). *Trade, accommodation and transport* is also projected to grow by 675,000 jobs over this period.

However, employment in *Manufacturing* is projected to decrease by 286,000 jobs over the period 2020-35, which is nearly 11 per cent lower than in 2020. *Manufacturing's* share of total employment in the economy is projected to fall from 7.5 per cent in 2020 to 6.2 per cent in 2035, continuing the long-term downward trajectory. Although output in *Manufacturing* is projected to continue to rise (see previous section on output), continued increases in productivity are projected to lead to a steady decline in employment in this sector.

As shown in Figure 5, there are some significant differences between the *Baseline projections* and the two main *Alternative scenarios* in terms of impact on employment. In both scenarios the productivity gains from introducing new technologies result in rising incomes that generate demand for other goods and services. They differ in which sectors are expected to benefit most from these positive effects. Relative to the *Baseline projections*, the *Technological opportunities scenario* projects stronger employment growth in *Non-market services*, (due to increased provision of 'population-serving' services, augmented by automation and a somewhat stronger emphasis on human-specific skills), and *Primary sector and utilities* (mainly driven by investment in renewable technologies for electricity generation), as well as a slightly slower decline in *Manufacturing* employment. Employment in *Non-market services* is projected to grow by 1.0 per cent pa (1.4m jobs) over 2020-35, while employment in *Primary sector and utilities* is projected to grow by 0.4 per cent pa (50,000 jobs).

Conversely, in the *Human-centric scenario,* employment growth is projected to be stronger in only the *Non-market services* sector compared to the *Baseline projections,* but this sector accounts for nearly 1 million more jobs by 2035. Employment in the *Non-market services* sector will grow by 1.2 per cent pa over 2020-35 (1.8m jobs). This reflects the greater emphasis on high-quality provision of education, healthcare, and residential and social care services in this scenario.

Figure 5: UK employment growth by broad sector, 2020-35 (% pa)
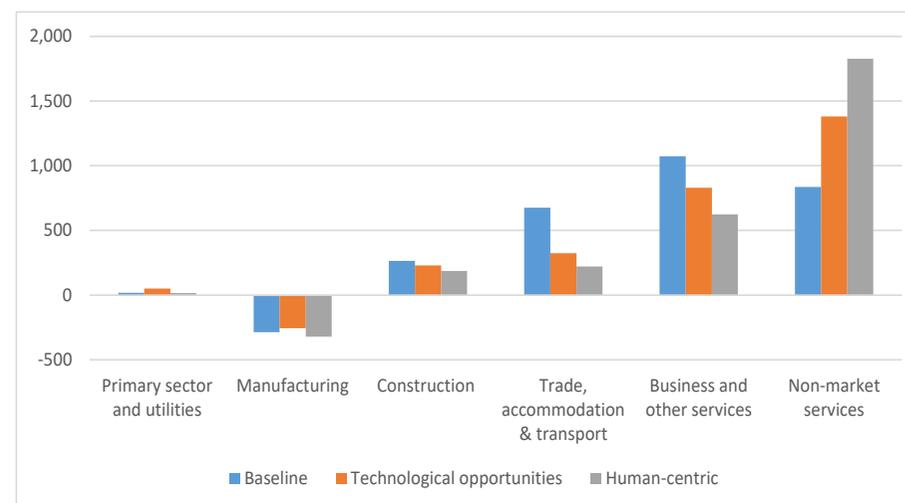
Source: Cambridge Econometrics, MDM-E3 revision 13571.

Employment growth in all sectors in the *Technological opportunities* and *Human-centric scenarios* is projected to be stronger (more positive / less negative) in the short term (2020-25) than in the longer term (2025-35). In line with this, the decline in employment in *Manufacturing* is also projected to be slower over 2020-25 than 2025-35.

Although technology adoption will lead to some job losses, there will also be new opportunities

The *Alternative scenarios* produced enable an analysis of the impact of different rates of adoption of technology in the labour market. They reveal a significant amount of churn within sectors.

The *Technological opportunities* and *Human-centric scenarios* project declines in some types of jobs due to automation (relative to the *Baseline*), with these falls offset by employment increases elsewhere. Figure 6 presents, for both scenarios, the distribution of projected automation-driven decline in employment by 2035 (blue bars) and the concomitant growth in employment that offsets these losses by broad sector (orange and grey bars).

The jobs lost to the labour market are estimated in the *Automation scenario,* which focuses on the negative employment effects based on a review of jobs most at risk and does not assume any job creation. As shown in Figure 6, while all sectors will experience job loss due to technology adoption, some sectors are more affected than others. The sectors most impacted are *Business and other services* (-890,000 jobs compared to the *Baseline projections*) and *Trade, accommodation and transport* (-650,000 jobs). Some 2 million jobs are estimated to be lost to the labour market due to adoption of technology in total.

Figure 6 also shows the sectoral breakdown of jobs projected to be created in the *Technological opportunities* and *Human-centric scenario*s. Most job creation in the *Technological opportunities scenario* is forecast to happen in the *Non-market services* (+669,000 new jobs*)* and *Business and other services* (+651,000 jobs) broad sectors. For the *Human-centric scenario,* more than half of the new jobs will come in the *Non-market services* sector (+1.1 million), followed by *Business and other services* (+445,000). The

Technological opportunities scenario projects net job losses, primarily due to technology adoption in the labour market, in the *Construction, Trade, accommodation and transport*, and *Business and other services* sectors. These job losses are offset by net gains in the *Primary sector and utilities*, *Manufacturing*, and *Non-market services* sectors. The *Human-centric scenario* projects a net loss of jobs in all sectors except *Non-market services*, which offsets the losses in all of the other sectors combined.

Figure 6: Forecast automation-driven job declines and increases by sector in 2035 compared to the *Baseline projections* (000s)
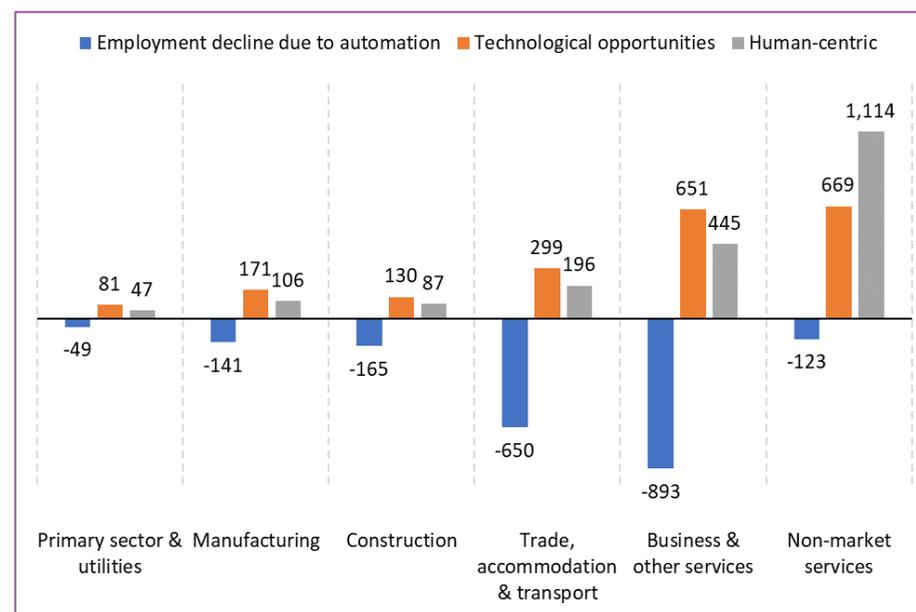
Source: Cambridge Econometrics, MDM-E3 revision 13571

Employment in the health sector is projected to increase the fastest in all scenarios

Looking at the impact of sectoral employment in greater detail using the 2-digit SIC industries, this shows greater change across the period 2020-35.

Table 2: Sectors with greatest employment growth and decline by detailed sector, 2020-35 (000s)

Sectors with greatest employment decline	Baseline projections	Technological opportunities	Human-centric
Retail trade [47]	18.3	-268.0	-269.6
Other transport equipment [30]	-22.3	-28.8	-29.0
Wholesale trade [46]	21.4	-27.3	-34.7
Metal products [25]	-40.6	-25.1	-34.2
Textiles [13]	-16.6	-23.1	-22.6
Machinery n.e.c. [28]	-19.8	-22.7	-26.3
Sectors with greatest employment growth	**Baseline projections**	**Technological opportunities**	**Human-centric**
Health [86]	368.7	580.7	845.4
Food and beverage services [56]	333.8	331.5	334.1
Education [85]	144.3	308.9	425.7
Social work [88]	151.3	198.5	270.9
Land transport, etc. [49]	75.2	185.1	115.6
Residential care [87]	136.4	174.4	232.1

Source: Cambridge Econometrics, MDM-E3 revision 13571
Note: SIC 2007 codes are listed in square brackets after each sector.

As shown in Table 2, the 2-digit sectors with the largest projected employment declines in the *Baseline projections* are focused mainly in *Manufacturing*. These include *Metal products* (-41,000) and *Other transport equipment* (-22,000). In contrast, the sectors with largest absolute employment growth in the *Baseline projections* at the 2-digit level SIC are mainly services. These include *Health* (+369,000) and *Food and beverage services* (+334,000).

Table 2 also lists the detailed sectors with the largest projected increases and decreases in employment between 2020 and 2035 for both the two main *Alternative scenario*s. The sectors with the largest declines in employment across the two scenarios are *Retail trade* and *Wholesale trade* in which jobs are at higher risk of automation. *Retail trade*, in particular, has large projected declines in employment in both scenarios (losses of nearly 270,000 jobs between 2020 and 2035). This compares to a modest increase (18,300 jobs) in the *Baseline projections*. This difference in outcomes results from *Retail trade* taking full advantage of automation technologies, reducing the demand for employees; for example, with automated payment systems that require fewer workers to maintain and operate.

The sectors with some of the largest increases in employment are *Food and beverage services* and *Land transport*. Other sectors with large increases in employment fall under *Non-market services*. These are *Health*, *Education*, *Social work*, and *Residential care*. These sectors benefit from employment growth driven by demographic changes (a growing and ageing population) and increased investment, especially in the *Human-centric scenario*.

5 Occupational employment prospects

Most new jobs created by 2035 will be in *Professional* and *Associate professional* occupations

Occupational employment patterns are to a large extent driven by the changing industrial structure of employment.[21] It is difficult to discern changes in the occupational trends at the 1-digit level as due to the level of disaggregation, these groups tend to change slowly.

A reassertion of long-term trends in occupational employment is expected in the *Baseline projections* following recovery from the pandemic. Comparing the number of jobs pre-pandemic (2019) to the future (2035), the main trends for SOC major groups are expected to continue to favour highly-skilled, white collar, non-manual jobs.[22] *Professional* and *Associate professional* occupations are projected to see the fastest growth in the *Baseline projections* (+1.94 million and +0.94 million jobs from 2019 to 2035, respectively), mainly due to a considerable rise for *Health and social care associate professionals*.

Net changes in jobs by occupation are referred to as expansion demands (which can be negative as well as positive). Figure 7 shows that *Professional* and *Associate professionals* are expected to experience the highest increases in expansion demand (around +1.5 and +0.7 million respectively). Conversely, *Administrative and secretarial* and *Skilled trades occupations* are forecast to experience a negative net change (about -0.15 million and -0.06 million job losses).

The *Alternative scenarios* amplify these changes.

Figure 7: Changes in occupational employment structure (000s) in the *Baseline projections* between 2020 and 2035
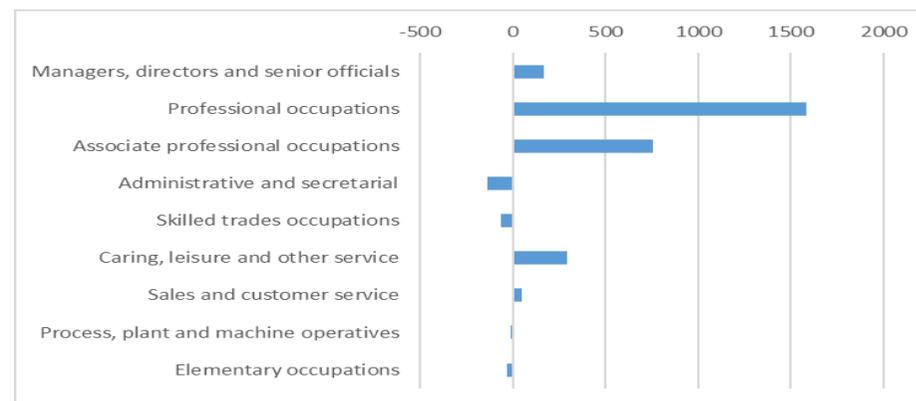
Source: IER estimates

The number of jobs created due to economic growth (net change or expansion demand) to 2035 will be mainly concentrated in high-skilled jobs. Looking at the 2-digit SOC level, *Science, research, engineering and technology professionals* will experience the largest net increase (+0.90 million job openings) between 2020-35, followed by *Health and social care associate professionals* (+0.60 million). In contrast, *Elementary administration and service occupations* are expected to see the largest employment decline by 2035 (-0.52 million).

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[21] Occupations have been classified using the new UK Standard Occupational Classification (SOC2020) system. This is a hierarchical classification system. At the highest level, ('1-digit level'), there are nine major occupational groups. These groups are further sub-divided into 26 sub-major groups ('2-digit level'). The lowest level is the unit level ('4-digit level'), which identifies 412 separate occupational groups.

[22] Most of the comparisons in this report use 2020 as the base year for the projections when making comparisons to 2035. However, as 2020 is affected by the pandemic and by responses to it, in a small number of cases – for example, where we want to explore how the number of jobs change across the projections period, we have used 2019 as the base year.

Replacement demand will significantly exceed expansion demand, even in occupations which are expected to decline in net terms

To assess future labour market prospects, we focus on the total number of job openings that will need to be filled in the economy between 2020 and 2035. This is referred to as *Total requirements*. It is composed of two different elements:

- Net change/expansion demands: the overall change in employment level between 2020-35. This indicates the number of jobs created or destroyed due to economic growth/decline. This is used to identify the expansion or decline of certain sectors or occupational groups.

- Replacement demands: this reflects the need to replace people who will leave the workforce between 2020-35 for various reasons including retirement from/leaving the workforce due to ageing, health, family formation, mortality, as well as people's mobility between sectors and occupations, and net geographical mobility.

Replacement demands will mean that there will continue to be significant job openings within occupations, even among those which are projected to decline. Among the 1 digit SOC groups, *Professional* and *Associate professional* occupations are the categories with the highest replacement demand (+4.2 and +2.4 million respectively) between 2020-35, whilst *Process, plant and machine operatives* show the smallest replacement demands (0.9 million).

At the 2-digit SOC level, looking at the occupations experiencing the greatest decline in expansion demand between 2020-35, all have replacement demands well in excess of the number of jobs lost. For example, *Elementary administration and service occupations* (expansion demand -515,000 jobs lost, replacement demand +1.36 million job openings), *Secretarial and related occupations* (-195,000, +310,000) and *Sales occupations* (-100,000, +994,000).

Figure 8: Total Requirements by SOC Sub-major Group, 2020-35
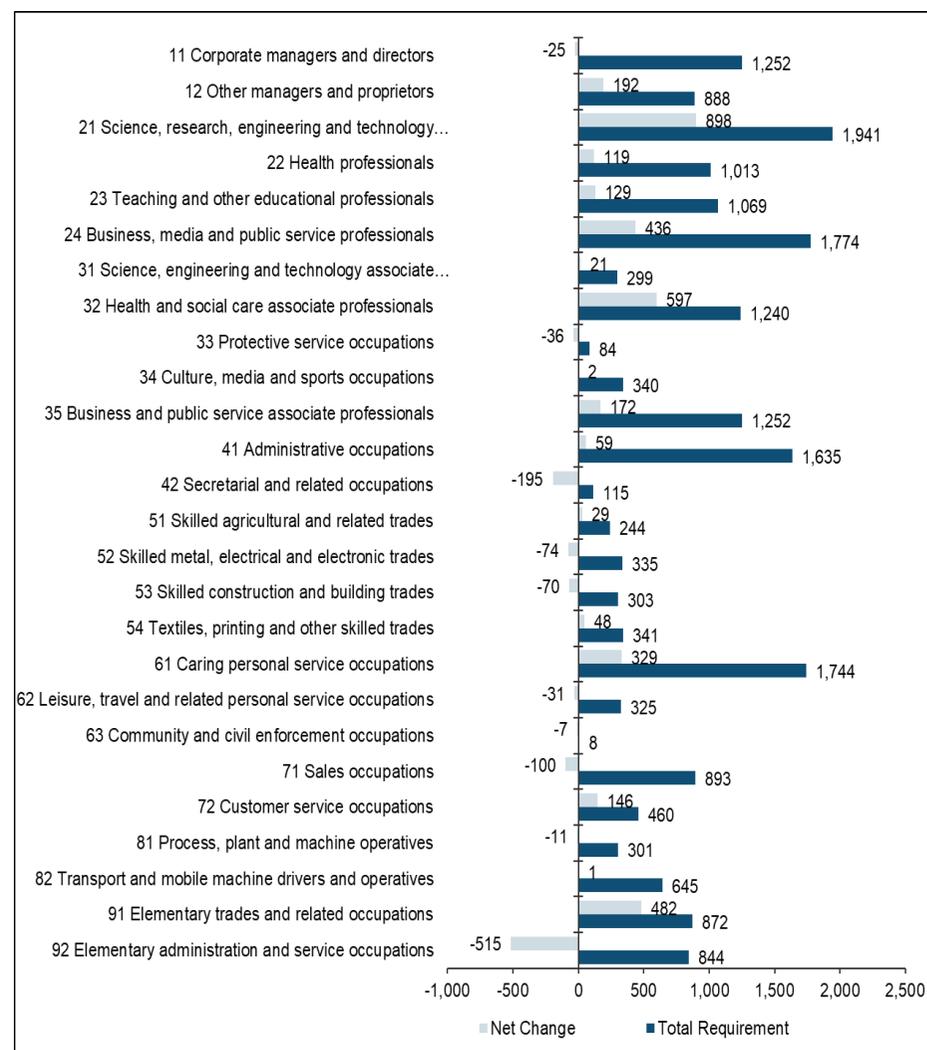
Source: IER estimates

Substantial changes are projected for the occupational structure of employment by 2035

To assess demand for different kinds of employment skills, even more detailed projections for the 412 4-digit level SOC2020 Unit Groups are needed. These results will drive the analysis in the next phase of the research programme, which will link these results to implications for skills as measured in the US O*NET database and other related information.

These projections point to where the largest labour market opportunities and training requirements will arise in the period to 2035. They show that *Care workers and home carers*, *Programmers and software development professionals*, *Higher level teaching assistants*, and *Nursing auxiliaries and assistants occupations* are projected to experience the largest growth in employment in absolute terms by 2035. In contrast, *Receptionists*, *Personal assistants and other secretaries*, *Warehouse operatives* and *Kitchen and catering assistants* will experience the largest declines in absolute terms.

Table 3 presents the occupations with the highest projected employment growth and declines in relative terms (i.e. percentage rates of change). These rankings are not affected by the scale of employment in 2021. This shows that health services related occupations such as *Health associate professionals n.e.c.* and *Pharmaceutical technicians* are expected to experience some of the highest positive growth rates by 2035. Similarly, it also reflects a higher demand for green-related occupations such as *Conservation professionals*. Conversely, skilled trades such as those used in the *Construction* sector are projected to experience some of the fastest rates of decline.

Table 3: Occupations experiencing greatest rates of change

Top 20 (fastest growing occupations, %)	Employment				Change 2021-2035	
Occupation Code (412) and Name	2021	rank	2035	rank	000s	rank
3231 Higher level teaching assistants	296,344	21	378,893	14	82,550	1
3240 Veterinary nurses	22,750	323	29,087	298	6,337	2
3232 Early education and childcare practitioners	85,597	116	109,442	102	23,844	3
3221 Youth and community workers	74,184	136	94,849	115	20,665	4
3222 Child and early years officers	65,109	154	83,246	129	18,137	5
3229 Welfare and housing associate professionals n.e.c.	197,485	40	252,497	30	55,012	6
3213 Medical and dental technicians	52,832	189	67,549	165	14,717	7
3219 Health associate professionals n.e.c.	25,808	301	32,997	277	7,189	8
3224 Counsellors	38,343	245	49,024	210	10,681	9
3214 Complementary health associate professionals	32,373	271	41,390	245	9,018	10
3212 Pharmaceutical technicians	37,779	247	48,302	213	10,524	11
3223 Housing officers	63,603	156	81,320	136	17,717	12
3211 Dispensing opticians	8,479	396	10,841	384	2,362	13
2162 Other researchers, unspecified discipline	67,629	152	82,290	131	14,661	14
2113 Biochemists and biomedical scientists	54,387	183	66,177	170	11,790	15
2115 Social and humanities scientists	38,535	241	46,889	219	8,354	16
2112 Biological scientists	48,663	201	59,213	183	10,550	17
2119 Natural and social science professionals n.e.c.	28,163	290	34,268	266	6,105	18
2114 Physical scientists	41,452	229	50,439	204	8,986	19
2151 Conservation professionals	24,917	307	30,319	293	5,402	20

| Bottom 20 (occupations with fastest rates of decline, %)	Employment				Change 2021-2035	
Occupation Code (412) and Name	2021	rank	2035	rank	000s	rank
9233 Exam invigilators	26,110	300	23,745	320	-2,365	393
5322 Floorers and wall tilers	34,546	260	31,226	289	-3,320	394
5315 Plumbers & heating and ventilating installers and repairers	142,205	72	128,540	86	-13,665	395
5314 Roofers, roof tilers and slaters	34,623	258	31,296	288	-3,327	396
5321 Plasterers	52,186	192	47,171	217	-5,015	397
5323 Painters and decorators	84,423	120	76,310	144	-8,113	398
5312 Stonemasons and related trades	10,909	381	9,861	390	-1,048	399
5319 Construction and building trades n.e.c.	203,190	39	183,665	52	-19,526	400
5316 Carpenters and joiners	189,873	44	171,627	59	-18,246	401
5313 Bricklayers	51,563	195	46,608	222	-4,955	402
5317 Glaziers, window fabricators and fitters	62,014	162	56,055	190	-5,959	403
5330 Construction and building trades supervisors	53,804	184	48,634	211	-5,170	404
5311 Steel erectors	4,796	409	4,335	410	-461	405
4216 Receptionists	235,917	31	168,310	61	-67,607	406
4211 Medical secretaries	80,058	125	57,116	188	-22,942	407
4213 School secretaries	98,736	99	70,441	156	-28,295	408
4217 Typists and related keyboard occupations	5,498	406	3,923	411	-1,576	409
4215 Personal assistants and other secretaries	181,531	49	129,510	85	-52,021	410
4214 Company secretaries and administrators	24,233	311	17,288	348	-6,944	411
4212 Legal secretaries	46,246	211	32,993	278	-13,253	412

Source – IER estimates, Baseline projections

6 Projections for qualifications

The workforce is forecast to become increasingly well-qualified

The supply of skills is measured by the number of people categorised by the highest formal qualification they hold (see box). This has been rising rapidly over the past decade with more young people in particular staying on in education longer and acquiring more higher-level qualifications than their predecessors.

Figure 9 shows the share of people who are economically active in the UK by level of qualifications for different time periods.[23] This shows the share of people with formal qualifications will continue to increase between 2020-35, especially at the highest level (QCF 7-8).

Figure 9: Qualifications within the labour force (16+, % of total)
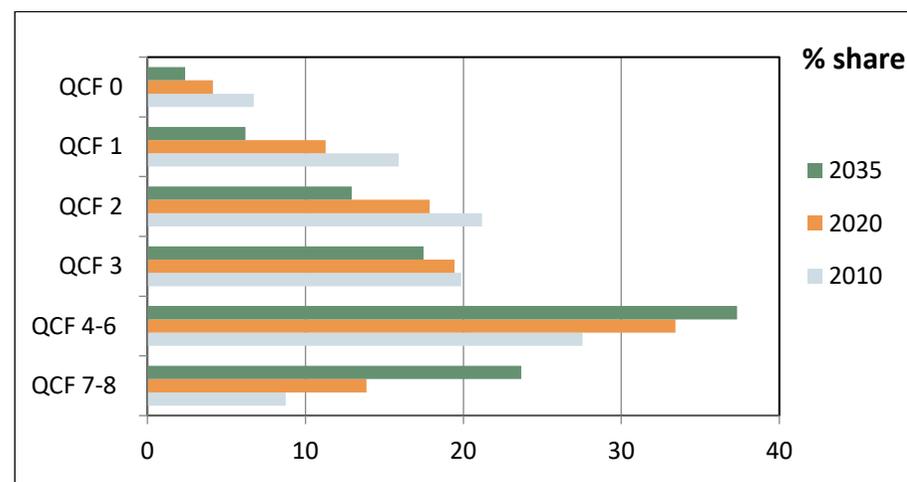
Source: IER estimates

Qualifications are classified using the Regulated Qualifications Framework (RQF) which superseded the Qualifications and Credit Framework (QCF).

QCF/RQF0:	Entry level qualifications below level 1
QCF/RQF1:	Low level (grade 3 and under) and equivalent
QCF/RQF2:	High grade GCSE (grade 4 and above)
QCF/RQF3:	A level and equivalent
QCF/RQF4-6:	Degree at undergraduate level and equivalent
QCF/RQF7-8:	Postgraduate degree level and equivalent.

At the same time, the share of people who are economically active in the UK who are unqualified (QCF 0) has been falling. In 2010, around 6.7 per cent of the total workforce were unqualified, but by 2020 this had fallen to around 4.1 per cent. This is expected to represent only a small minority of the workforce by 2035 (<2½ per cent).

This modelling of supply and demand does not allow us to draw any firm conclusions about the likelihood of increasing or decreasing skills gaps in the future. The next stage of this research programme will go into this in more detail, focussing on the skills needed for employment rather than formal qualifications. However, this analysis suggests that demand and supply are at least moving in the same direction, with demand continuing to shift towards occupations which typically hold higher qualifications, while the numbers achieving higher level qualifications are projected to continue rising.

Of course, it is not just about formal qualification levels but rather the skills that people have acquired, including the existing workforce, who are unlikely to return to school/education between 2020-35.

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[23] QCF 0 is the lowest level and QCF 7-8 is the highest level of qualification. These estimates are based on detailed analysis and modelling of past patterns of behaviour.

7   Conclusions and recommendations

In this research programme, we seek to investigate how the nature of jobs and the demand for skills will change over the next 15 years, and to identify which employment skills will be most needed in future. In this report, we have examined the impact of the drivers of change on the future size and composition of the labour market. What these projections show is that while the economy is changing slowly, it is nonetheless changing steadily and inexorably. By 2035, the structure of the labour market and employment will have changed substantially, with different rates and direction of change in different sectors and occupations. We have produced a range of projections based on different possible future labour market scenarios to test this central finding and we find that it holds true for all of them, albeit that some amplify the changes more than others.

The projections also assess the outlook for output growth and employment in the period 2020 to 2035, broken down by sector and industry. This shows that output is expected to grow by 1.8 per cent on average per annum over 2020 and 2035, but growth will be faster in some sectors such as *Construction* and *Trade, accommodation and transport* than others like *Manufacturing* and *Primary sector and utilities*. The projections also show major changes to the industrial structure of employment, which will continue to be increasingly dominated by jobs in services. The *Non-market services* sector in particular is expected to see large job increases due to a greater focus on the provision of better-quality education, health and care services, especially in the *Alternative scenarios*.

We have also considered the impact of the drivers of change and other factors on occupations. The projections all show that there will be a reassertion of long-term occupational trends following the pandemic, with a continued growth in the number of jobs for *Professional* and

Associate professional occupations, which will account for 90 per cent of the 2.6 million additional jobs in the labour market by 2035. At the same time, many other occupational groups such as *Administrative and secretarial* and *Skilled trades occupations* are expected to experience a negative net change in jobs between 2020 and 2035.

The projections also show that the extent of churn in the labour market (driven by replacement demand) will be much larger than any overall growth or contraction observed in occupations. The level of replacement demand, which is estimated to be 17.5 million jobs between 2020 and 2035, suggests that the future labour market will continue to be very dynamic, creating employment opportunities for people entering the labour market or changing careers, even in declining sectors.

In developing the range of *Alternative scenarios*, we have examined the impact of new technologies on jobs. The adoption of new technologies in the labour market will lead to the loss of some jobs. Our projections show that this could perhaps be as much as two million jobs in the next 15 years. However, many new job opportunities will be created as well, particularly in developing and implementing new technologies and maintaining these once they are put in place, which may be similar in volume to the jobs lost as a result of the adoption of new technologies. The important point for *The Skills Imperative 2035* research programme is that workers displaced as a result of automation may need very different skills in order to do the new jobs created by technological innovation.

In summary, these projections show that the future labour market of 2035 is likely to be markedly different to the one today. Some unit group occupations such as Care workers and home carers, *Programmers and software development professionals*, *Higher level*

teaching assistants, and *Nursing auxiliaries and assistants* occupations will experience the largest growth in employment in absolute terms by 2035. In contrast, *Receptionists*, *Personal assistants and other secretaries*, *Warehouse operatives* and *Kitchen and catering assistants* will experience the largest declines in absolute terms. The occupations with the greatest projected growth highlight where the largest labour market opportunities and training requirements will arise in the period to 2035.

The changes identified by the research programme imply significant changes in the skills required to succeed in the future labour market of 2035. We will go on to examine this in detail in the next stage of this research programme, building on this work to identify which employment skills will be most needed in future. Our modelling of the supply of people with formal qualifications suggests that the labour force will continue to acquire more and higher level qualifications. Whether or not that will meet the needs of the economy and the labour market by 2035 will be considered in the next phase of work in this research programme.

In terms of this current phase of work, however, our recommendations are as follows:

Recommendations

1. Given the cross-cutting nature of the challenges presented by these projected labour market changes, we recommend that a cross-cutting body is established, which reports directly to the Cabinet Office. This body would be responsible for working effectively across Government departments, with employers and others, in order to ensure that appropriate strategies are developed to (i) understand the implications of these changes in more detail and (ii) set out how the Government, employers, training providers and the education system should respond, drawing on views and expertise from across and outside Government. These strategies must include giving specific attention to how best to support workers in sectors which are projected to be disproportionately affected by changes to the labour market. As some sectors will be declining in size, workers who are displaced may be unable to find new jobs in the same industry. Displaced workers will need help and support to either upskill or re-skill, so they are able to transition in another part of the labour market.

2. Industry leaders and representative bodies, working with regional and local partners including Mayoral Combined Authorities and local authorities, should assess what these projections mean for employment and output growth in their sectors/industries and/or for the business critical occupations they will need in future and start planning what actions they need to take. These projections indicate there will be an increase in employment opportunities for highly-skilled *Professionals* and *Associate professionals*. These will be significant growth occupations in the next 15 years. Unless plans are put in place and action is taken soon, there will be a shortage of skilled professionals available to fill many of these new opportunities.

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