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for Education

Skills needs in selected occupations over the next 5-10 years

Research report

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Summary

The Department for Education (DfE) and the Skills and Productivity Board (SPB) commissioned RAND Europe and the Institute for Employment Research (IER), University of Warwick, to undertake qualitative research looking into changing skills needs. This research draws on 28 expert interviews and four workshops to answer the question how skills needs will change in the four priority areas (i.e. health, science and technology, managers, and skilled trades) over the next 5-10 years.

This study finds that skills related to **knowledge and effective use of relevant technologies** are required and will continue to be in the next 5-10 years. **Digital literacy** is already an essential (if basic) requirement, with varying degrees of digital skills required in different sectors and different occupations. However, across roles, skills around **understanding and use of data** will only increase in importance in future as responsibilities for data handling and data security are shared across organisations.

Some **specific technical skills** are (and will be) needed in health and skilled trades such as those related to the ability to adapt clinical skills to developments in health and care, knowledge of the technical or scientific basis of work and understanding of relevant standards and legislation.

Expected changes in the selected occupations and emerging skills point to: (i) skills needs in **using specific new hardware and software**; (ii) **data science** skills; (iii) the need to **apply, or adapt, skills to future-related goals** such as combatting climate change. Participants suggested that the promotion of **multiple routes** into occupations, along with **clear definitions** of skills and qualifications, should be improved.

People and communication skills are and will continue to be needed, including to complement the use of digital and technical skills and communicate about these to colleagues and the public. **Teamwork skills** are and will be key in addressing complex needs in coordinated way. Skills around planning and communicating long-term strategy and goals, exploiting opportunities and managing risks were seen as especially important for managers and health professionals.

The importance of skills related to **awareness of equality, diversity and inclusion** was emphasised. However, the need to move from awareness to action was also thought to require certain skills in **driving change in organisational culture**. This issue was also highlighted as a potential area for policy intervention and collective industry effort.

The **teaching of teamwork skills** was also highlighted as a key area for potential policy intervention. From care homes to construction sites, to corporate organisations, more creative and focused training is required on the skills needed to work together, whether

this training is delivered in **educational institutions** or through **continuous professional development**.

The study concludes that alternative and non-traditional routes (such as cross-skilling, horizontal movement) are likely to help with recruitment in the areas and occupations of interests and highlights the role of continuous professional development in workforce adaptation, upskilling and reskilling.

1. Introduction

1.1. Context

The Department for Education (DfE) and the Skills and Productivity Board (SPB) commissioned RAND Europe and the Institute for Employment Research (IER), University of Warwick, to undertake qualitative research looking into changing skills needs over the next 5-10 years.

The SPB wished to better understand how the tasks within four priority areas identified by the Board (i.e., health, science and technology, managers, and skilled trades) are expected to change over time and how this will impact skill demand. More specifically, the SPB aimed to explore the use of qualitative methods to complement existing research that applies different methodologies. These include quantitative projections for the labour market using econometric models¹ or mapping skill importance² onto UK Standard Occupational Classification (SOC) codes³ or generating foresight using futures methodologies⁴ or employer surveys.⁵

1.2. Terminology, research question and scope of the study

The key terms used in this report and their interpretations adopted for the purpose of the study are outlined below:

- Occupation: (also referred to as a job) is defined as a set of tasks or duties to be carried out by one person⁶ and are characterised by a high degree of similarity;⁷

¹ For example: Wilson, R., Barnes, S.A., May-Gillings, M., Patel, S. & Bui, H. (2020). *Working Futures 2017-2027: Long-run labour market and skills projections for the UK*. Department for Education.

² For example: Dickerson, A. & Morris, D. (2010). *The Changing Demand for Skills in the UK*. Research Discussion Paper 020. London: Centre for Vocational Education Research London School of Economics & Political Science.

³ <https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassification/soc>

⁴ For example: Dunkerley, F., Bruckmayer, M., Flemons, L., Virdee, M., Hofman, J., Wright, S. & Hogarth, T. (2022). *Labour market & skills demand horizon scanning and future scenarios*. Department for Education.

⁵ For example: Winterbotham, M., Kik, G., Selner, S., Menys, R., Stroud, S. & Whittaker, S. (2020). *Employer Skills Survey 2019*. Research report. London: Department for Education.

⁶ ONS (2020). SOC 2020 Volume 1: structure and descriptions of unit groups. As of 23/05/2022: <https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassification/soc/soc2020/soc2020volume1structureanddescriptionsofunitgroups>

⁷ ILO (2008). *ISCO-08, International Standard Classification of Occupations*. Geneva: International Labour Office.

- Skill: the ability to carry out the tasks and duties of a given job;⁸ skill has become an umbrella term⁹ and it is sometimes associated with occupational classification of the jobs (such as SOC – which is an imperfect measure of skills¹⁰) or confused with qualifications (which are usually obtained prior to labour market entry – and are different than skills¹¹); This report focuses on a few specific groups of skills – working definitions of these are outlined below:
 - Digital skill: the ability to use digital devices, communications applications and networks to carry out tasks such as accessing and managing information¹², communicating and accessing services either in daily life or the workplace¹³;
 - Technical skill: the ability to carry out practical tasks using specific and expert knowledge and particular tools, While O*NET specifies that technical skills are used in relation to machines or technological systems¹⁴, in a broader sense, both artists and engineers, for example, can be understood to hold different technical skills;
 - People and/or communications skill: the ability to have positive and productive interpersonal and social relations with others and/or to communicate successfully with others so as to jointly carry out tasks¹⁵; these relations and communications could be with colleagues, other professionals or public audiences such as customers or patients.

These categories were selected on the basis of the DfE's internal analysis of skills and skills groupings. The combination of digital, technical, people and communication skills encompasses over half of the skills which the DfE identified. Additionally, digital and technical skills have already been identified by the DfE and other government departments as key areas for development.¹⁶ The inclusion of people and communication

⁸ ILO (2022). Home. Resources. Concepts and definitions. International Standard Classification of Occupations (ISCO). As of 06/04/2022: <https://ilostat ilo.org/resources/concepts-and-definitions/classification-occupation/>

⁹ Grugulis, I. (2006). *Skills, training and human resource development: a critical text*. Macmillan International Higher Education.

¹⁰ Dickerson & Morris (2010).

¹¹ Dickerson & Morris (2010).

¹² Feijao, C, Flanagan, I., van Stolk, C., Gunashekar, S., (2021). 'The Global Skills Gap: Current Trends and Future Directions', Santa Monica, CA: RAND Corporation; UNESCO, (2018). 'Digital Skills Critical for Jobs and Social Inclusion', Available: [here](#).

¹³ UK Parliament, (2021). 'POSTnote Number 643: Developing essential digital skills', Westminster: The Parliamentary Office of Science and Technology, Available: [here](#).

¹⁴ O*NET, See: <https://www.onetonline.org/find/descriptor/browse/2.B/2.B.3>.

¹⁵ O*NET, See: <https://www.onetonline.org/find/descriptor/browse/2.B/2.B.1>.

¹⁶ Department for Education, (2021). 'The Education Hub: Five ways Institutes of Technology are revolutionising technical education', Available: [here](#), Department for Education, (2021). 'Press release: Thousands more adults set to benefit from new technical skills', Available: [here](#)., Department for Business, Innovation & Skills and Department for Culture, Media & Sport, (2016). 'Digital Skills for the UK Economy', Available: [here](#).

skills, then, provides a holistic approach to skills needs, especially given that these skills are often understood as complementary to the effective use of digital and technical skills. This balance has often been framed as one between ‘soft skills’ and ‘hard skills’.¹⁷

We differentiate skills from abilities, understood as attributes of an individual that influence capacity to perform a task and the quality of that performance,¹⁸ and knowledge, understood as familiarity with and understanding of sets of principles and facts.¹⁹

This key research question which this study focuses on asks **how skills needs will change in the priority areas over the next 5-10 years.**

The research focuses on four priority areas and 12 specific occupations within these (see Annex A for the sampling approach and the list of selected occupations for this research).

1.3. Qualitative data collection

This research used both semi-structured interviews and validation workshops for data collection. A full outline of the methodological approach to this study is given in Annex B. Table 1-1 provides details on the number of study participants in both the interview and workshop phases, divided by the four priority areas.

Table 1-1: Number of study participants per area

Key areas	No. of interviews*	No. of workshop participants**
Health	6	7
Managers	6	7
Science and technology	7	7
Skilled trades	9	7
Total	28	28

Note: *Some interviews were conducted with multiple individuals (dyadic or triad interviews); there were 30 interviewees in total. **External participants only (i.e., the numbers exclude representatives from the DfE, SPB and RAND Europe).

Source: RAND Europe

¹⁷ I CAN, (2016). ‘Skills for Work, skills for life’, Available: [here](#).

¹⁸ O*NET. See: <https://www.onetonline.org/find/descriptor/browse/1.A>, See also: LMI for All & Department for Education, (2019), ‘Skills, knowledge, abilities and interests’, Available: [here](#).

¹⁹ O*NET, See: <https://www.onetonline.org/find/descriptor/browse/2.C>, See also: LMI for All & Department for Education, (2019), ‘Skills, knowledge, abilities and interests’, Available: [here](#).

2. Technical and digital skills

Key findings

- The key skills that are, and will continue to be, required are the **knowledge and effective use of relevant technologies**
- **Digital literacy** is already an essential (if basic) requirement, while **understanding and use of data** will only increase in importance in future
- Some **specific technical skills** are (and will be) needed in health and skilled trades (e.g., ability to adapt clinical skills to developments in health and care, knowledge of the technical or scientific basis of work, understanding of relevant standards and legislation)
- Expected changes in the selected occupations and emerging skills point to: (i) skills needs in **using specific new hardware and software**; (ii) **data science** skills; (iii) the need to **apply, or adapt, skills to future-related goals** such as combatting climate change
- Participants suggested that the promotion of **multiple routes** into these professions, along with **clear definitions** of skills and qualifications and the **funding of continuous professional development**, should be improved.

2.1. Skills needed now and in the next 5-10 years

2.1.1. There is and will be a need for skills related to knowledge of and effective use of relevant technologies

Technological developments and a shift towards digitalisation accelerated by the COVID-19 pandemic have brought about important changes to skills needed in all selected occupations across the four priority areas.

Many interviewees mentioned the need for integrating technology in all selected occupations in health,²⁰ science and technology,²¹ managers²² and skilled trades.²³ This need was considered to be important now and to increase in significance in future, given the pace of technological progress, digitalisation and automation, even if the latter is expected to affect selected occupations to different extent (Figure 2-1).

While the kinds of technologies vary across the four areas and amongst the selected occupations, examples include online appointment booking, telehealth, telecare,

²⁰ H01, H02, H03, H04, H05, H06.

²¹ T01, T02, T03, T04, T05, T06, T07.

²² M01, M02, M03, M04, M05, M06.

²³ S01, S03, S04, S08.

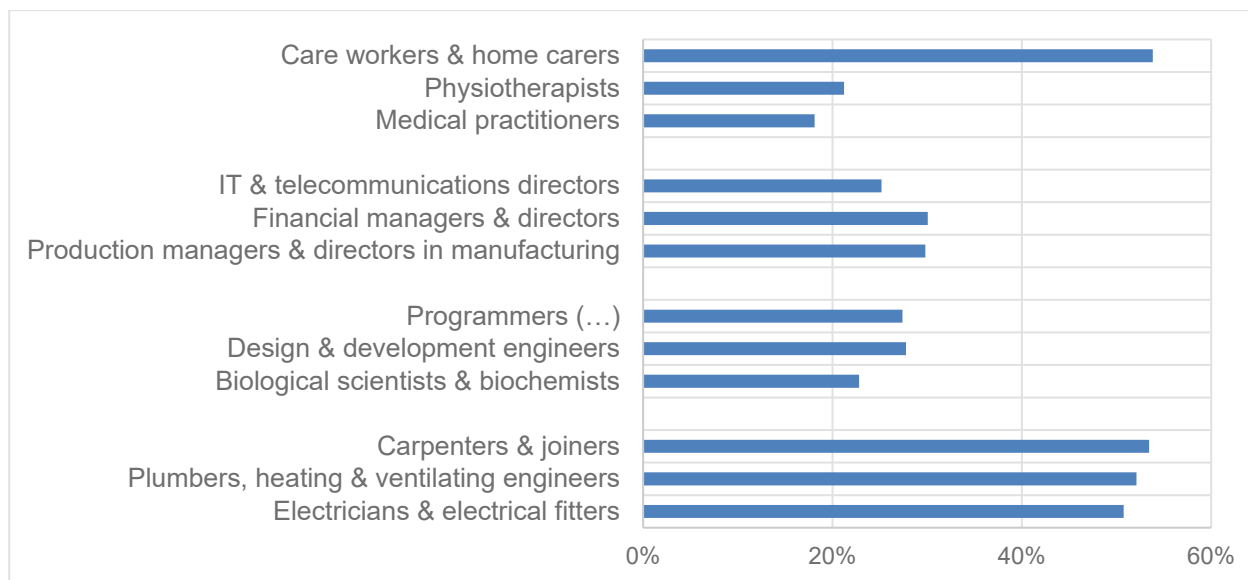
telemedicine, tele-coaching, robotic surgery, Artificial Intelligence (AI), automation of processes, 3D printing, cloud-based computing, Internet of Things (IoT), information technology and communications systems, biotechnology and more.

While some interviewees expressed confidence about the increased distribution of technology and relevant upskilling across their sector, others were more cautious and identified complementary **skills around judging access to technology and appropriate use** as equally important.

You'll hear [...] "industry 4.0", that phrase quite often and that is [...] not just having a little bit of equipment that can help boost efficiency and productivity but it becoming the norm in how you work [...] it's almost a quarter of businesses who say they're at the revolution phase of industry 4.0 which means that they're reaping the benefits from adopted new technology – Interviewee (M02)

So, there's obviously the sort of exciting cutting-edge stuff [...] around AI and genomics, but there's also the day-to-day lived experiences of patients in terms of what their access to technology is like [...] so being aware of where it's appropriate to suggest a particular [...] use of technology like] virtual or remote consultation [...] and where it might not be appropriate – Interviewee (H05)

Figure 2-1: Probability of automation in selected occupations in England



Note: Programmers (...) refers to programmers and software development professionals.

Source: ONS (2019)²⁴

These differences were also reflected in how occupations in the four priority areas were expected to engage with relevant technologies now and in the next 5-10 years:

²⁴ ONS (2019). Home. Employment and labour market. People in work. Employment and employee types. Which occupations are at highest risk of being automated? As of 10/04/2022: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/whichoccupationsareathighestriskofbeingautomated/2019-03-25>

- **In health**, some interviewees noted that the shift towards digitalisation already requires skills ranging from digital record-keeping²⁵ to digital communication with patients over email, text messaging, telephone or video calls.²⁶ Conducting assessments of or consultations with patients remotely requires a specific set of skills and the increase in the use of virtual appointments was expected to create more demand for this relatively new skill.²⁷ Healthcare delivery is, and will be, enhanced through the adoption of wearable devices and applications and learning facilitated by podcasts or other online platforms.²⁸
- **Amongst managers**, there was a focus on understanding how technologies used in the business work together, and how they can (better) support the function of the business: this understanding was viewed as critical now and in the future.²⁹ Looking ahead, Virtual Reality (VR), AI, Customer Relationship Management (CRM)³⁰ and other types of automation were named as key new technologies which managers may not need to understand now, but which will need to build knowledge around in the future.³¹ In addition, the ability to implement and manage technological changes and innovations in businesses was critical.³²
- **In science and technology**, the emphasis was placed on the willingness and ability to learn and adapt to new technologies (both software and hardware), given the level of innovation in the science and technology sector.³³ Some specific examples mentioned included coding languages, software packages,³⁴ Computer Aided Design,³⁵ IoT and robotics.³⁶ Likewise, the understanding of new technologies was seen as vital amongst the selected occupations.³⁷ These skills were considered in demand now and that they will continue to be needed in the next 5-10 years.
- **Amongst skilled trades**, the focus was placed on operational knowledge of (new) technologies and tools, including how they are manufactured, installed or used.³⁸ Many interviewees linked these with digitalisation and a shift towards

²⁵ H05, H06.

²⁶ H01, H02, H05.

²⁷ H01, H05.

²⁸ H02.

²⁹ M01, M02, M05, M06.

³⁰ CRM refers to software which allows for management of interactions with customers or potential customers, and which facilitates insight into these interactions. Salesforce, Zoho and Insightly are well-known examples.

³¹ M01, M05, M06.

³² M02

³³ T01, T02, T03, T04, T05, T06, T07.

³⁴ T01, T05, T04.

³⁵ T08.

³⁶ T05.

³⁷ T01, T04, T05, T06.

³⁸ S01, S03, S04, S08.

environmental sustainability that affects tasks required in the examined occupations calling for new ways of working.³⁹ The ability to adapt to new technologies or equipment was viewed as important – examples provided included low carbon heating, electrification of transport, smart building,⁴⁰ machines using Computer Numerical Control.⁴¹ As these emerging technologies become more commonplace, skills needed to work with these will be increasingly required.⁴²

2.1.2. Digital literacy is already an essential (if basic) requirement

Digital literacy covers a wide array of competencies, knowledge, and skills⁴³ and have been underlined as key for the future of post-pandemic work.^{44, 45} Digital literacy is becoming a basic skill requirement for the majority of occupations across all sectors in the UK labour market, including productivity software tools such as spreadsheets and word processing programmes.⁴⁶ OECD PISA analysis has also shown that educational access to technology and subsequent building of digital literacy is increasingly important across the globe, leading to better academic performance and competence.⁴⁷

Basic digital literacy skills are considered to be those needed to carry out tasks such as communication via digital applications and internet searches or navigation.⁴⁸ Eurostat data shows that the percentage of individuals who have above basic overall skills in the UK rose from 40 per cent in 2015 to 49 per cent in 2019.⁴⁹

Digital skills for the general workforce will include these cross-cutting skills, as applied to the responsibilities of a profession as well as the processing of information relevant to the sector.⁵⁰ Digital skills for ICT professions are viewed separately as these will required

³⁹ S01, S02, S03, S07, S08.

⁴⁰ S01, S03, S04, S08.

⁴¹ S08. Note: CNC machines allow for automated use based on coded programmed instructions, including numbers such as measurements, in manufacturing, for example.

⁴² S01, S03, S04, S08.

⁴³ Nania, J., Bonella, H., Restuccia, D., & Taska, B. (2019). *No Longer Optional: Employer Demand for Digital Skills*. Department for Education.

⁴⁴ OECD (2020). *Digital Transformation in the Age of COVID-19: Building Resilience and Bridging Divides*, Digital Economy Outlook 2020 Supplement.

⁴⁵ Feijao et al. (2021).

⁴⁶ Nania et al. (2019).

⁴⁷ OECD, (2021). 'PISA 21st Century Readers: Developing literacy skills in a Digital World', Paris: OECD Publishing.

⁴⁸ Kispeter, E., (2018). 'Digital Skills and Inclusion Research Working Group Evidence Brief: "What digital skills do adults need to success in the workplace now and in the next 10 years?"', London: Department of Culture, Media and Sport, p.12.

⁴⁹ Eurostat (2022). 'Data explorer: Individuals' level of digital skills (until 2019)', Available: [here](#). Note: Data is not available beyond 2019 due to the UK's departure from the European Union.

⁵⁰ Kispeter, E., (2018). 'Digital Skills and Inclusion Research Working Group Evidence Brief: "What digital skills do adults need to success in the workplace now and in the next 10 years?"', London: Department of Culture, Media and Sport, p.13.

more advanced knowledge and skills, including in the development of new technologies, products and services.⁵¹

Some interviewees emphasised the importance of digital literacy while acknowledging the previous and existing struggles to standardise the level of digital skills across workforces.⁵²

[We] see digital skills as an overarching requirement for the industry going forward and it's an area that needs improvement because it hasn't been a strength of the [skilled trades] industry, overall, up till now – Interviewee (S03)

I think that the pandemic has sped things up [...] and there's a real opportunity here for us to move increasingly to digital spaces but I think there [are] also some real challenges – Interviewee (T07)

Digital literacy in the workplace was a recurring theme of the existing and future skill need in a number of interviews, especially in relation to managers,⁵³ but to a lesser extent also among health occupations⁵⁴ and skilled trades.⁵⁵

- **Managers:** some interviewees felt that digital literacy will be needed even more in future at the managerial positions across different sectors and emphasised the importance of understanding the need for and ability of managers to recruit (and retain) workers with digital skills.⁵⁶

For managers that's important because [...] you're going to need people who just have a basic level of digital fluency and then increasingly the ability to code at that more advanced level. Do you need that as a manager or a leader specifically? Maybe not. But [...] you need to be aware that that requirement and the demand for those skills is only just going to keep increasing. So, when you're going out and thinking about who is right for my business, I think more managers and leaders will have to widen their talent pool – Interviewee (M02)

An additional aspect raised in relation to managerial professions and digital skills related to cyber security: IT and telecommunication directors in particular had to have a good understanding of those issues.⁵⁷

- **Health:** the scope of digitalisation in health was found to be extensive already, and many tasks could be carried out using mobile phone applications.⁵⁸ However, if digital literacy (and automation like form-filling types of examination) increased more broadly in the sector, it would free up professionals' time for (more)

⁵¹ Ibid.

⁵² S03, S07.

⁵³ M01, M02, M05, M06.

⁵⁴ H03.

⁵⁵ S05, S09.

⁵⁶ M01, M02, M05.

⁵⁷ M01, M06.

⁵⁸ H03.

specialised work and change the expectations of what skills will be used in these occupations in working day.⁵⁹

- **Skilled trades:** ability to use technological aids (mobile phones, tablets) on site for tasks such as communicating with customers and clients, bookkeeping and accounting, or looking up product specifications before purchasing require some digital literacy across all occupations already.⁶⁰

2.1.3. Understanding and use of data will only increase in importance in future

Many interviewees emphasised the existing need to understand and ability to **work with large amount of data**, particularly amongst science professionals⁶¹ and managers⁶² but also in skilled trades⁶³ and health professions.⁶⁴ Given that new technologies offer an efficient way to process large amount of data the use of Big Data, AI, machine learning and cloud-based computing will change the skills required in the next 5-10 years.

Some interviewees felt that more people with skills in big data analytics and machine learning were needed in the workforce⁶⁵ which reflects the findings of quantitative research on the growing demand for analytics and data science (Table 2-1).⁶⁶

Table 2-1: The top 5 skills listed in data science and advanced analytics job adverts (2017/18)

Skill	Percentage of Data Scientists and Advanced Analysts job adverts requiring this skill	
	2013	2017 – 18
Data science	9%	44%
Python	8%	43%
SQL	13%	27%
Machine learning	4%	26%
Big data	7%	25%

Note: There were a total of 682 skills included in this analysis.

Source: The Royal Society (2019)⁶⁷

The demand for data analytics was stronger in relation to managers and science professionals:

⁵⁹ H03.

⁶⁰ S05, S09.

⁶¹ T02, T04, T03, T05, T06.

⁶² M01, M02, M05, M06.

⁶³ S02, S03.

⁶⁴ H03.

⁶⁵ T02, T03.

⁶⁶ The Royal Society (2019). Dynamics of data science skills: How can all sectors benefit from data science talent? ISBN: 978-1-78252-395-6.

⁶⁷ The Royal Society (2019).

- **Science and technology:** a lack of understanding of data science and statistics was noted as an existing concern⁶⁸ and ability to analyse data was viewed as a necessity in carrying out roles within the sector in the years to come.⁶⁹
- **Managers:** some interviewees noted that ability to collect, process, interpret and communicate data on performance (including through digital means) will be needed more in future at managerial positions across different sectors⁷⁰ to improve productivity.⁷¹

Yet, some interviewees noted that utilising data was also critical in the remaining areas:

- **Skilled trades:** the increasing use of data and modelling was expected to impact on how carpenters, joiners, plumbers and electricians work, specifically on tasks required from them, such as collating, interpreting and acting on data.⁷²

At the moment, most construction [...] makes very little use of [digital] technology, even having a smart phone and a Wi-Fi connection or a laptop and a Wi-Fi connection is considered quite advanced for a lot of construction projects, so the sort of technology that we'd be looking at[...] will increasingly make use of data, data modelling, digital twins of existing buildings [...] That's missing at the moment for all trades. [...] So, it's [...] interpreting data: [asking] 'what does it mean for me, what does it mean for other people on site and what is that going to mean for future projects?' [that will be needed more and more] – Interviewee (S02)

- **Health:** there was also scope for data science to be better incorporated into the work of medical practitioners by developing app interfaces to facilitate access to reliable and interactive data that could be used by healthcare professionals as well as patients.⁷³

2.1.4. Some specific technical knowledge, skills or abilities are (and will be) needed in health and skilled trades

In the health sector, some interviewees emphasised that professionals already need to have the ability to adapt clinical skills (for diagnosis, treatment, and care) to developments in health and care.⁷⁴ As developments will continue, if not emerge more rapidly, these skills will also be needed in the future. Specific examples of adapting clinical skills are given below:

- **Surgical skills** requiring detailed and constantly evolving clinical knowledge.

⁶⁸ T03.

⁶⁹ T05.

⁷⁰ M01, M02, M05, M06.

⁷¹ M01, M05.

⁷² S02, S03.

⁷³ H03.

⁷⁴ H01, H02, H03, H04, H05, H06.

- In physiotherapy, using hands-on manipulation for musculoskeletal disorders may become less important than **skills in teaching exercises or identifying behaviour** that hinders recovery.
- Care workers already need more clinical skills to step in and make up for shortages of NHS staff, such as district nurses.⁷⁵

For skilled traders, the following technical knowledge and associated technical skills are crucial and will continue to be needed:

- Knowledge of the technical or scientific basis of work including **understanding of basic scientific laws** around issues such as energy efficiency, moisture and material properties, knowledge of mathematics and geometry.⁷⁶
- Understanding of **relevant industry standards and legislation**, as it determines what can and cannot be installed.⁷⁷ Some interviewees asserted that this has always been a requirement so that workers in these occupations can operate safely and legally. But they also observed a notable shift towards an increased amount of regulation and a specific focus on safety (following the Grenfell⁷⁸ fire)⁷⁹ and environmental impact (given net-zero goals).⁸⁰

2.2. Expected changes in the selected occupations and emerging skills

The interview findings presented above were also discussed in validation workshops to test their relevance among participants (see Section 1.3). While the majority of findings were confirmed during these discussions, some were built upon further with additional points about future developments and policy implications were also raised.

The following section focuses on areas of change suggested by workshop participants and, additionally, in some cases, supported by the interview findings. While many participants were experts and versed in the workings of their own industries, the topics discussed below have not been cross-referenced with other evidence.

⁷⁵ H01, H02, H03, H04, H05, H06.

⁷⁶ S08, S09.

⁷⁷ S02, S05, S06, S07, S08, S09.

⁷⁸ The fire at Grenfell Tower broke out in the night of 14 June 2017. See:

<https://www.grenfelltowerinquiry.org.uk/>

⁷⁹ S08, S09.

⁸⁰ S02, S09.

2.2.1. Skills in using specific new hardware and software will be required

While **adapting to new technology** was identified as a skill which is already required across these sectors, the skills needed to operate specific new hardware and software will still need to be developed as future technologies emerge and become integrated into different occupations. The following examples of upcoming technology will require developing the appropriate skills for users in the workplace:

- **Science and technology:** digital systems, robotics and AI in aerospace⁸¹; new laboratory and technician procedures for experiments⁸²; new software for analysing scientific data⁸³; new coding languages or other programming software.⁸⁴
- **Managers:** data analytics software⁸⁵; new and increasingly complex data storage solutions.⁸⁶
- **Skilled trades:** heat pumps⁸⁷; electric vehicle charging⁸⁸; smart homes⁸⁹; green power products and infrastructure⁹⁰; modern methods of construction⁹¹; including with timber.⁹²
- **Health:** AI hardware and software⁹³; new surgical and diagnostic tools⁹⁴; software for analysis of big data or genomic medicine research;⁹⁵ tele-healthcare hardware and software.⁹⁶

Much of the interview and workshop data suggests that, given the nature and unpredictable speed of technological change, continuous adaptation to new technologies could be a more useful skill to track, rather than identifying specific hardware and software which could even become redundant during policy work.⁹⁷ However, a lack of specificity also limits the utility of evaluating current training and curtails successful planning for future skills requirements. More comprehensive research on each

⁸¹ Science & Technology Workshop.

⁸² Science & Technology Workshop, T06.

⁸³ Science & Technology Workshop, T03.

⁸⁴ Science & Technology Workshop, T01, T04, T05, T06.

⁸⁵ Managers Workshop, M01, M05, M06.

⁸⁶ Managers Workshop.

⁸⁷ Skilled Trades Workshop, S01, S02, S03, S04.

⁸⁸ Skilled Trades Workshop, S01, S04.

⁸⁹ Skilled Trades Workshop, S02.

⁹⁰ Skilled Trades Workshop, S04.

⁹¹ Skilled Trades Workshop, S02, S09.

⁹² Skilled Trades Workshop.

⁹³ Health Workshop, H03, H05, H06.

⁹⁴ Health Workshop, H03.

⁹⁵ Health Workshop, H03, H05

⁹⁶ Health Workshop, H01, H02, H03, H05.

⁹⁷ Managers Workshop, Science and Technology Workshop.

occupation could better illuminate the current and future relevance of individual hardware and software for each role.

2.2.2. Data science skills will be desirable across sectors and occupations in future

Ever-growing availability of data and ever-increasing risk of misuse or cyber security threats raise expectations that data science skills, for varying purposes, will be held by workers across sectors regardless of their role. In some sectors, **skills around handling, collecting, storing, and interpreting data** are already expected and required due to the scientific or technical nature of the key roles.⁹⁸ Legislative requirements, such as UK GDPR, will also require a growing increase in the roles which involve responsibilities for data management and security, to some extent.⁹⁹

There are also specific implications of increased access and use of data science for particular sectors. In health and the skilled trades sectors, for example, the implications of utilising data analytics insights for efficiency and improved outcomes will likely incentivise workers and employers to invest in data science skills across roles.¹⁰⁰ However, the implications of increased use of data science in modern methods of construction and or in the use of health data-collecting wearables may be staggered and vary by location or role.¹⁰¹

Further sector-specific examples are outlined below:

- **Science and technology:** utilising skills in handling data to prioritise the production of scientifically valid outcomes and insights and minimise public confusion or misinformation.¹⁰²
- **Managers:** skills in storing, securing and strategic use of data¹⁰³ to maximise benefit to an organisation while guarding against including security breaches, legal storage challenges and misinformation.¹⁰⁴
- **Skilled trades:** using data science skills to tighter tolerances to ensure efficiency and sustainability; collecting and interpreting data from digital and ‘smart’ systems to carry out correct installation and maintenance.¹⁰⁵

⁹⁸ Science and Technology Workshop, Health Workshop, H03, T03.

⁹⁹ See: <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/>

¹⁰⁰ Health Workshop, Skilled Trades Workshop, H03, H05, S02.

¹⁰¹ Health Workshop, Skilled Trades Workshop, H05.

¹⁰² Science and Technology Workshop, T03, T05.

¹⁰³ Managers Workshop, M01, M05.

¹⁰⁴ Managers Workshop.

¹⁰⁵ Skilled Trades Workshop, S02, S03.

- **Health:** interpreting and responsibly communicating about data to patients and the wider public¹⁰⁶; using technical and clinical skills to investigate population health using large data sets with the aim of informing professional judgements on patient and policy levels.¹⁰⁷

Overall, participants across workshops seemed to agree that technical skills in **handling data and correctly communicating about its insights** would soon be expected from workers in almost all roles rather than being seen as bonus skills.¹⁰⁸ The same view was expressed about **skills in data storage and security**, given awareness of upcoming legal complexity and evolving cyber-security threats.¹⁰⁹ These changes to working environments and role responsibilities would be the factors in shaping new skills demands.

2.2.3. Skills will need to be applied, or adapted, to future-related goals such as combatting climate change

In focusing on change, the application of existing or emerging skills to future-related challenges will be a novel aspect of skills-related policy and training. In some cases, it may be that these skills are adapted to these new contexts. Specifying the exact adaptation of skills may not be possible, given that change can be unprecedented or occur at unexpected speed.

Sofroniou and Anderson draw on the UK Labour Force Survey to suggest future changes on 'green jobs' and suggest that an inclusive definition captures the broader impact of 'greening' jobs.¹¹⁰ They also align with the O*NET categorisation from Dierdorff et al of the three possible occupational impacts of 'greening': new and emerging green occupations, green enhanced skills occupations and green increased demand occupations.¹¹¹ The second category requires those in existing occupations to learn new skills or adjust existing ones to changing contexts and necessities (such as regulation). The third category involves little to no change to the tasks of an occupation; instead demand for the occupation would increase due to its use in the growing process of 'greening'.

¹⁰⁶ Health Workshop.

¹⁰⁷ Health Workshop, H03.

¹⁰⁸ Health Workshop, Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

¹⁰⁹ Managers Workshop, Science and Technology Workshop.

¹¹⁰ Sofroniou, N. & Anderson, P. (2021). The green factor: Unpacking green job growth. *International Labour Review*, 160(1), 21-41.

¹¹¹ Dierdorff, E.C., Norton, J.J., Drewes, D.W., Kroustalis, C.M., Rivkin, D. & Lewis, P. (2009). *Greening of the World of Work: Implications for O*NET@SOC and New and Emerging Occupations*. Raleigh, NC: National Center for O*NET Development.

This section mostly focuses on the second category and identifies the skills that workshop participants noted would be of particular importance, if and when they are applied to these future-related challenges, or even adapted to them.

Across the sectors, combatting climate change and improving sustainability was the most prominent example of a shared goal with future implications that requires the mobilisation of skill sets in all roles.¹¹² Another challenge raised was the growing threat of misinformation and cyber-security breaches, relevant across all four areas.¹¹³

In the health sector, global and national health trends were also identified as upcoming issues to be addressed and to which skills will need to be adjusted.¹¹⁴ For managers, responsibilities for **long-term planning and strategy** will require a particular application of technical knowledge around economics, finance and technology.¹¹⁵ As an example of the impact of change, respondents across interviews and the workshop referred consistently to the need to **adapt to using new communications technology** due to the sudden increase in remote or hybrid working due to the COVID-19 pandemic.¹¹⁶

Further sector-specific examples are given below:

- **Science and technology:** applying existing skills in producing valid scientific data in relation to climate change and sustainability work¹¹⁷; adapting skills to the technical and communicative challenges of identifying and addressing misinformation and supporting public understanding of (big) data.¹¹⁸
- **Managers:** applying existing technical skills in forecasting and planning around upcoming technologies, financial performance and employment trends¹¹⁹; adapting these skills to new ways of working and the implications of sustainability goals and climate change for the organisation.¹²⁰
- **Skilled trades:** applying technical skills to maximise sustainability¹²¹ and the achievement of net-zero goals¹²² in new and existing buildings and infrastructure; transferring existing skills in oil and gas to green power industries;¹²³ adapting

¹¹² Health Workshop, Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop, H03, H05, M04, M05, S02, S08, T07.

¹¹³ Health Workshop, Managers Workshop, Science and Technology Workshop, S02 S09.

¹¹⁴ Health Workshop, H03, H05, H06.

¹¹⁵ Managers Workshop, M01, M04, M06

¹¹⁶ Managers Workshop, M02, M03, M04, M05, M06.

¹¹⁷ Science and Technology Workshop, T06.

¹¹⁸ Science and Technology Workshop, Managers Workshop, T04, T06.

¹¹⁹ Managers Workshop, M01, M04, M06.

¹²⁰ M02, M04, M05.

¹²¹ Skilled Trades Workshop, S02, S08

¹²² Skilled Trades Workshop, S02

¹²³ Skilled Trades Workshop, S01, S03, S04, T04.

existing skills quickly to changes in industry operation and the different technologies or new roles and responsibilities that come with such changes.¹²⁴

- **Health:** both applying existing skills and adapting these skills appropriately to respond to increased co-morbidities¹²⁵, trends in health inequalities¹²⁶, the impact of climate change on population health (e.g., pollution-related diseases or future pandemics)¹²⁷ and the need to improve the sustainability of everyday healthcare practices.¹²⁸

As explored above, the separation of skills already required or emerging and those required in the future is particularly challenging when many of these future-focused issues are already identified and relevant today. Additionally, it is more than likely that new and unpredictable future changes will emerge, disrupting expectations of how skills will need to be applied and adapted. Nonetheless, where topics are predicted to grow in importance, perhaps exponentially or with unpredictable consequences, it is likely that their increased relevance across sectors and roles will change the demands on skills and their application, compared to the current moment.

2.3. Policy implications for changes in skills needs

This section presents relevant policy implications and suggestions discussed at the validation workshops and some limited insights from the interviews. The following does not, therefore, contain recommendations formulated by the researchers on the basis of analysis. It is likely that any suggested implications or solutions will require further follow-up and investigation.

The cross-cutting topics raised across the workshops focus on three main areas of interest: alternative routes into roles in the four priority areas, the opportunities and challenges of facilitating continuous professional development (CPD), and a need for greater clarity and collaboration in categorising and assessing skills.

2.3.1. Multiple routes into occupations should be facilitated

Some interviewees and workshop participants suggested that it was important to offer multiple routes into occupations, both to improve overall access to training and careers and to encourage different types of learning and skill-building.¹²⁹ Apprenticeships could be an important tool for policy makers across the health, science and technology, and skilled trades sectors. The upcoming medical degree apprenticeships could provide a

¹²⁴ Skilled Trades Workshop.

¹²⁵ Health Workshop, H02, H05, H06.

¹²⁶ Health Workshop, H02, H03, H05.

¹²⁷ Health Workshop, H02, H05.

¹²⁸ Health Workshop, H05.

¹²⁹ Health Workshop, Science and Technology Workshop, Skilled Trades Workshop, S01, S04, T02, T06

more accessible route into medical practitioner roles while keeping skills requirements to the necessary level.¹³⁰ A blended learning programme in Scotland has similarly facilitated re-training for nurses and pharmacists looking to qualify as doctors while continuing to work in their current roles.¹³¹ This could manifest similarly to previous professionalisation schemes for ‘allied health professionals’ over the last ten years.¹³²

There were reports of challenges around apprenticeships for skilled trades and a need to better connect the immediate needs of employers to the landscape of national skills and jobseekers.¹³³ In science and technology, participants reflected on whether a greater emphasis on experience over qualification might lead to more effective recruitment into roles such as programmers or technicians.¹³⁴

There were also suggestions that employers were using apprenticeships to re-train existing workforce despite the intended use of apprenticeship as an entrance into the workforce.¹³⁵ This practice may require further investigation to establish its prevalence. It would be helpful to investigate whether this phenomenon then points to a lack of resources for continuous professional development for scientists in industry. From a more general perspective, but with particular relevance to skilled trades, Hogarth’s research (forthcoming) points to historical and contemporary problems with apprenticeships as a policy response.¹³⁶ He argues that there has been a trade-off between the quantity and the quality of skills imparted to apprentices.¹³⁷ He suggests that employers must be appropriately incentivised by the productivity and cost-effectiveness of apprenticeships, in order to increase their availability and up-take by young people.¹³⁸

A need to recognise and facilitate ‘horizontal’ skilling as opposed to ‘upskilling’ was identified. This can provide alternative or non-traditional routes into new professions, especially vocational ones, for workers in other industries. Amongst skilled trades, this was discussed in the context of creating a pathway for those currently working with oil and gas to transition into jobs in low-carbon technologies or green power industries.¹³⁹

The advantages and disadvantages of emergency skilling versus long-term skills development were also considered.¹⁴⁰ While ‘skills bootcamps’ and other short-term training solutions have served as policy tools to immediately address skills gaps,

¹³⁰ Health Workshop.

¹³¹ Health Workshop.

¹³² Anderson, P. and Warhurst, C. (2019) ‘Newly Professionalised Physiotherapists: Symbolic or Substantive Change?’ *Employee Relations*, 42(2): 300-314

¹³³ Skilled Trades Workshop, S01, S04.

¹³⁴ Science and Technology Workshop.

¹³⁵ Science and Technology Workshop.

¹³⁶ Hogarth, T., (2022). How to address skills shortages at the intermediate skills level, ReWAGE, Universities of Warwick and Cardiff, <https://warwick.ac.uk/fac/soc/ier/rewage/>.

¹³⁷ Hogarth (2022).

¹³⁸ Hogarth (2022).

¹³⁹ Skilled Trades Workshop.

¹⁴⁰ Skilled Trades Workshop.

participants were wary of the long-term problems that ‘emergency skilling’ may create for industry. This was particularly relevant to skilled trades – mostly in reference to heat pump engineers and smart meter installers – but also in the science and technology and health sectors for roles requiring coding¹⁴¹ and care work¹⁴² respectively.

2.3.2. Continuous professional development (CPD) and training should be promoted and funded

Participants expressed support for both public and employer-provided funding for modular or ‘real-life’ learning opportunities throughout careers.¹⁴³ An increase in variable and flexible pathways to learning and professional development alongside work would make ‘upskilling’ more accessible, especially for those already in roles, with little financial flexibility or with additional commitments such as childcare. Examples given included flexible postgraduate courses without time-limits on completion¹⁴⁴ and increased support for managers in researching, signposting and encouraging CPD among their staff.¹⁴⁵

‘Accidental managers’ was a term raised by participants in one workshop but the concept has cross-cutting applicability.¹⁴⁶ This refers to workers who have moved into management roles and received no management training, perhaps never having aimed for a manager position. In fact, across a number of roles (largely excluding medical practitioners), career trajectories are increasingly non-linear, without long-term vocational training or clear pipelines to specific roles.

Policy so far has perhaps overlooked the need to address skills gaps which may be created by this type of ‘accidental’ career development or horizontal movement. Research has suggested that employer-provided training has declined over time.¹⁴⁷ Increased facilitation of CPD, targeted at management and senior levels, could address this issue.¹⁴⁸¹⁴⁹ A model based on ‘individual learning accounts’ has been suggested by the OECD as a potential solution.¹⁵⁰

Skills deficiencies [...] are not just at entrance level [...] we have this at senior exec level too [...] we all get stuck in our ways to some extent, but we have to continuously be trying to [adapt], otherwise we're not going to cope with managing

¹⁴¹ T05.

¹⁴² Health Workshop, H04, H06.

¹⁴³ Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

¹⁴⁴ Science and Technology Workshop.

¹⁴⁵ Managers Workshop.

¹⁴⁶ Managers Workshop.

¹⁴⁷ Luchinskaya, D. & Dickinson, P. (2019). The Adult Skills Gap: Is Falling Investment in UK Adults Stalling Social Mobility? Social Mobility Commission.

¹⁴⁸ Managers Workshop.

¹⁴⁹ Felstead, A. (2016). Tracing the connections: short-termism, training and recession. *International Journal of Human Resource Management* 29 (4), 664-682.

¹⁵⁰ OECD (2019). Individual Learning Accounts: Panacea or Pandora's Box? Paris: OECD.

[people...] both in work [...] and in the university sector [...] people just don't adapt, and our systems don't adapt because of that – Managers Workshop participant

Concern was also expressed around national levels of numeracy and digital literacy, suggesting that intervention on technical and digital skills early in educational timelines would have long-term benefits for entry into these sectors.¹⁵¹ There were contending views on the utility of early introduction to more advanced concepts in physical and data science.¹⁵² This issue can also be linked to problems identified in existing research with mapping skills included in university curriculums to skills actually possessed by graduates.¹⁵³ Overall, it seems that intervention is required to re-balance which basic skills are taught in either educational settings or the workplace and to update expectations around average levels in these skills.¹⁵⁴

2.3.3. Clarity and consensus on categories and levels of technical and digital skills would be helpful to trainers and recruiters

There are ongoing industry debates over regulation and registration in both the health and skilled trades sectors. This concerns care workers¹⁵⁵, electricians and some heating and ventilation engineers¹⁵⁶, respectively. Workshop participants drew attention to the numerous different employers, skill levels and roles distributed across the care workforce, reflecting on the different implication that policy has in contexts with minimal regulation and registration. In particular, the variety of types of training across different providers for care workers can mean working on qualifications which are not recognised by some employers while employers struggle to distinguish different skill levels when recruiting.¹⁵⁷

Similarly, in the skilled trades sector, concerns were expressed about 'micro-qualifications' which risk offering fast-track credentials without comprehensive training or sustainable job prospects.¹⁵⁸

Regulation of competence is pretty loose, particularly in the domestic market [and] there remains the question as to whether [...] the default [will be] some short course training, maybe with qualifications that have been approved by Ofqual, despite the fact that that they actually undermine the occupational standard – Skilled trades workshop participant

¹⁵¹ Science and Technology Workshop. OECD 2013 Survey of Adult Skills confirmed that a large proportion of adults in England and Northern Ireland have poor numeracy skills – see OECD, (2013). 'Survey of Adult Skills First Results: Country Note: England & Northern Ireland (UK), Paris: OECD Publishing.

¹⁵² Managers Workshop, Science and Technology Workshop.

¹⁵³ James, S., Warhurst, C., Tholen, G. & Commander, J. (2013). 'What We Know and What We Need to Know About Graduate Skills', Work, Employment and Society, 27(6): 952-963.

¹⁵⁴ Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

¹⁵⁵ Health Workshop, H04, H06.

¹⁵⁶ Skilled Trades Workshop, S04.

¹⁵⁷ Health Workshop, H06.

¹⁵⁸ Skilled Trades Workshop.

Aligned with a desire in the science and technology sector to connect education and training to employer needs¹⁵⁹, participants speaking on skilled trades seemed keen for a strategy on training and skills levels to be collaborative and coordinated¹⁶⁰. With these issues in mind, an increase in self-employment rates was not seen as desirable without increased intervention on regulation to counter further fragmentation of roles and skill sets.¹⁶¹

Regarding managers, frustrations were expressing around the duplication or fragmentation of policy initiatives and campaigns focused on skills.¹⁶² Similarly, in relation to the health sector, participants suggested that some policy work did not fully address issues with balancing learning alongside work in some newer routes into healthcare roles.¹⁶³ The Scottish blended learning programme mentioned above was given as an example of competing priorities, while participants anticipated similar issues will arise from the upcoming apprenticeship route to a medical degree.¹⁶⁴

While positive developments such as the Data Skills Task Force¹⁶⁵ and the Green Apprenticeships Advisory Panel¹⁶⁶ were identified, there was an emphasis on missed opportunities to integrate skills policy into other related strategies such as those on net-zero¹⁶⁷, electric vehicles¹⁶⁸ or digitalisation.¹⁶⁹

¹⁵⁹ Science and Technology Workshop, T04, T06.

¹⁶⁰ Skilled Trades Workshop, S04.

¹⁶¹ Skilled Trades Workshop.

¹⁶² Managers Workshop.

¹⁶³ Health Workshop.

¹⁶⁴ Health Workshop.

¹⁶⁵ Managers Workshop.

¹⁶⁶ Skilled Trades Workshop.

¹⁶⁷ Managers Workshop.

¹⁶⁸ Skilled Trades Workshop.

¹⁶⁹ Managers Workshop.

3. Communication and people skills

Key findings

- People and communication skills are and will likely remain critical in future with the ability to **work in a team** being key in addressing complex needs in coordinated way
- The ability to provide **long-term vision, exploit opportunities and manage risks** was identified as most important for managers and health professions while awareness of **equality, diversity and inclusion** emerged strongly across examined occupations, both with a view to current and future skills needs
- Areas of change and adaptation focused on skills required for **modern ways of working** as well as communicating and working collaboratively to address **climate change, improve sustainability** and meet expectations for increased efforts on equality, diversity and inclusion
- **Teamwork skills** were also highlighted as a **key area for intervention** with current teaching and training not seen to impart these skills sufficiently at present.
- It was also noted that **policy intervention on culture change** was key to generating the necessary people and communication skills for the above goals but also a long-term process requiring **open minds from all stakeholders**

3.1. Skills needed now and in the next 5-10 years

3.1.1. People and communication skills are and will likely remain critical in future

The ability to communicate with others – whether orally or in writing, remotely or in person – was frequently mentioned by many interviewees across all areas.¹⁷⁰ This included **caring skills, empathy and good listening** emphasised in particular in relation to healthcare professions¹⁷¹ and managers.¹⁷²

In science and technology and skilled trades, what seems more prominent is the ability to **explain scientific or technological products or processes** to colleagues, clients or the general public.¹⁷³ Communication with other professionals, whether on commercial or domestic sites or in factory settings, is a crucial skill currently required but it is only likely

¹⁷⁰ H01, H02, H03, H04, H05, H06, M01, M02, M04, M05, M06.

¹⁷¹ H02, H04, H05, H06.

¹⁷² M04, M06.

¹⁷³ T06, S01, S02, S03, S05, S06, S07, S08, S09.

to increase, due to both technological changes in the processes of home-building and upcoming regulations on safety and environmental impact.¹⁷⁴

People working [in] customer facing [professions] obviously are always going to need [people and communication skills] more. And I guess if you follow the logic of systems becoming more technologically complex, that [also] means they're going to have to explain them and sell them – Interviewee (S04)

In statements such as the above, interviewees referred to one aspect of a double-faceted understanding of people and communication skills in businesses; this view encompasses both external (customer) and internal (colleague) communication skills.^{175 176} While external communication might be emphasised more in some contexts, with a business's success or reputation in mind, internal communication was still understood as crucial for organisational functionality, as is discussed in the following section.

3.1.2. The ability to work in a team is and will be key in addressing complex needs in coordinated way

Closely linked to communication, many interviewees identified **working well within a team** as a necessary and important skill for workers in the health sector,¹⁷⁷ among managers,¹⁷⁸ science and technology professionals¹⁷⁹ and skilled trades.¹⁸⁰

The core skills which mentioned in this context include **giving and receiving feedback** and constructive criticism¹⁸¹, **taking collective responsibility** for a project¹⁸², **understanding other disciplines** and working between them¹⁸³, explaining and **demonstrating the logic of decisions**¹⁸⁴ and **having confidence communicating** in groups of varying sizes.¹⁸⁵

The **ability to bring people together**, create trust and a safe environment (and communicate effectively with others) was noted in particular for healthcare professionals¹⁸⁶ and managers¹⁸⁷ – see the opinions cited below, due to growing

¹⁷⁴ S02, S05, S07, S08, S09.

¹⁷⁵ Moss, P. & Tilly, C. (2001). *Stories Employers Tell*. New York: Russell Sage Foundation.

¹⁷⁶ Warhurst, C., Tilly, C. & Gatta, M. (2017). 'A New Social Construction of Skill' in C. Warhurst, K. Mayhew, D. Finegold and J. Buchanan (eds) *Oxford Handbook of Skills and Training*, Oxford: Oxford University Press.

¹⁷⁷ H01, H02, H03, H04, H05, H06.

¹⁷⁸ M01, M02, M05.

¹⁷⁹ T01, T02, T03, T04, T05, T06, T07.

¹⁸⁰ S02, S07.

¹⁸¹ T01, T03.

¹⁸² M05, T02, T05.

¹⁸³ T03, T04.

¹⁸⁴ T03.

¹⁸⁵ T06, T07.

¹⁸⁶ H01, H03, H05.

¹⁸⁷ M01, M02, M04, M05.

interdisciplinarity, increased use of technology across organisations¹⁸⁸ and agility in the ways of working.¹⁸⁹

There's also a range of sort of new roles that have developed over the last decade or so, so things like medical associate professional such as physician associates or anaesthesia associates or surgical care practitioners [...] roles that are undertaking medical tasks and working to a medical model but they don't have the same training and background as the doctors. I think how medical practitioners sort of understand what these roles are and understand how they best interact with them and communicate with them, I think, is really crucial and is going to only become more and more important – Interviewee (H05)

A lot of these skills were already really important for managers, there's never been a time when communication and empathy and understanding haven't been really important for managers, but I think some of the changes that are happening just make those even more crucial – Interviewee (M04)

Some differences were noted in relation to skilled trades professions in that they may be employed or contracted individually and may not cross their paths in person on site.¹⁹⁰ Yet, regardless of contractual arrangements, some of these occupations require interacting with many actors on site: architects, surveyors, materials suppliers, factories, clients, other tradespersons, site managers and more.¹⁹¹ Also the sequence in which different professionals are on a building site determines the extent of responsibility they have for subsequent work or for understanding what has occurred before them.¹⁹²

This ability to **see the big picture, make connections and coordinate with others**¹⁹³ (not necessarily working in the same team) was mentioned not only in relation to skilled trades, but also for science and technology professions.¹⁹⁴ The requirements for increased teamwork and cross-team working mentioned above would also require **increased knowledge of the processes of an entire organisation**, rather than a siloed department or project approach, as well as **awareness of organisational or client goals** or expectations.¹⁹⁵

3.1.3. The ability to provide long-term vision, exploit opportunities and manage risks came out most strongly for managers and health professions

Some interviewees named **strategic thinking about long-term risks and opportunities** as an important leadership skill for managers.¹⁹⁶ Long-term perspectives

¹⁸⁸ T03, T05.

¹⁸⁹ T05.

¹⁹⁰ S05, S08.

¹⁹¹ S05, S08, S09.

¹⁹² S05

¹⁹³ Please see *Section 4: Limitations of the research* for discussion of categorisation of skills.

¹⁹⁴ T01, T03, T04, T05, T06, T07

¹⁹⁵ T03

¹⁹⁶ M04, M05, M06

also include **planning for and adjusting to change**. While some interviewees suggested that this was a skill that has been continuously in demand, it is evidently a future-focused skill and one all the more applicable as the pace of change (in technology and other areas) increases.¹⁹⁷

The ability to cope with uncertainty and react calmly to unexpected events was also noted among health professions¹⁹⁸, as explained by one interviewee:

I'm not sure [...] if the education system enables young people to [...] deal with uncertainty [...] so when they are then facing a situation where they don't have the answers [...] they can really struggle, don't know what to do, they'll get stressed [...] you might make a mistake and I suppose it's thinking about, well, [...] OK identify what the problem is or what resources you might have or who are your stakeholders [...] sometimes I think students, because they don't have always that instant answer they feel there's something wrong with them, or they feel there's something wrong with what they've been taught – Interviewee (H02)

As education and training can only prepare to some extent to these situations, health and care workers must supplement this by gaining experience how to act appropriately when answers are not apparent.¹⁹⁹ This means not only **tolerating uncertainty and reacting calmly** to unexpected events, but also understanding what steps should be taken next.²⁰⁰

3.1.4. Awareness of equality, diversity and inclusion emerged strongly across examined occupations, both with a view to current and future skills needs

Many interviewees in the area of health,²⁰¹ among managers,²⁰² science and technology²⁰³ and skilled trades²⁰⁴ raised the topics of inequalities and a lack of diversity in the workforce. While many interviewees acknowledged that skills related to these issues have been required in the past, the persistent lack of diversity in some sectors combined with a growing demand for qualified workers makes the need to diversify recruitment and promote an inclusive working environment all the more pressing.²⁰⁵

Many interviewees understood the task of **making a workplace more inclusive** as part of a managers' responsibilities.²⁰⁶ This involves being aware and sensitive to a "diverse range of needs and issues that [the] workforce is facing".²⁰⁷

¹⁹⁷ M01, M04, M05

¹⁹⁸ H02, H03, H04, H06

¹⁹⁹ H02.

²⁰⁰ H02.

²⁰¹ H02, H03, H05.

²⁰² M01, M02, M03, M04, M05, M06.

²⁰³ T01, T04.

²⁰⁴ S02, S09.

²⁰⁵ H02, H03, H05, S02, S09.

²⁰⁶ M01, M02, M03, M04.

²⁰⁷ M03.

Examples of such issues included caring and childcare responsibilities²⁰⁸, chronic or recurring illness²⁰⁹, mental health needs²¹⁰ as well as the type of experiences of sexism and racism highlighted by the MeToo²¹¹ and Black Lives Matter²¹² movements.²¹³ Some interviewees also suggested that **welcoming talent from a diverse range of backgrounds**, and working on retaining these employees, is crucial to building a team with wide-ranging experience and problem-solving capacities.²¹⁴

3.2. Expected changes in the selected occupations and emerging skills

The interview findings synthesised above were also presented at and discussed in validation workshops (see Section 1.3). While discussion was more limited than that on technical and digital skills, participants did make further suggestions on required people and communication skills while reflecting on future shifts and potential policy interventions. Some were developed further with additional insights into future developments and potential policy implications.

The section below outlines the areas of change indicated by workshop participants and, where relevant, supported by the interview findings. While many participants were experts and versed in the workings of their own industries, the distinction between skills currently required and those expected to be in demand in 5-10 years was sometimes difficult to sustain in data collection. Therefore, this section aims to identify areas of change which are thought to have a continuous and changing impact on the people and communication skills required and the contexts in which they are needed.

3.2.1. Modern ways of working will require continuous adaptation to changing communications methods

The term ‘modern ways of working’ is used to refer to growing trends in remote and/or flexible working.²¹⁵ While remote office work is the most prominent example, the phrase can also encapsulate changes in specific industries such as ‘modern methods of construction’ in skilled trades.²¹⁶ As an overarching concept, modern ways of working can refer to remote working, flexible hours, automation, digitalisation and manufacture or

²⁰⁸ M04.

²⁰⁹ M04.

²¹⁰ M02, M04.

²¹¹ MeToo is a social movement against sexual abuse and sexual harassment, in which people come forward with their experiences of sexual abuse or sexual harassment.

²¹² Black Lives Matter (BLM) is a social movement against racism, discrimination, and inequality experienced by black people.

²¹³ M02, M05.

²¹⁴ M01, M02, M05.

²¹⁵ M01, M02, M03, M04, M05, M06.

²¹⁶ S07, S09.

other tasks occurring off-site. These changes can be understood as the combined effect of technological developments and shifting norms around working patterns.

Responding to these changes, already underway but forecast to increase in importance, may increase demand for certain emerging people and communications skills or the adaptation of existing ones. Across the four areas, one can expect a growing need to **adapt communication skills to the context of remote working** and the required technological and digital platforms.²¹⁷

For managers, skills in **intentional communication and team direction** will be required to adapt to a lack of in-person opportunities to observe and intervene.²¹⁸ This will require conscious effort in guarding against unintentional exclusion of some team members from development or networking opportunities.²¹⁹ However, this requirement will likely also be relevant to those in the other three sectors who are working remotely or flexibly and who have colleagues working the same manner.

Additionally, where automation, digitalisation or other developments cause shifts in operational working across industries, skills will have to be adapted to these new communication pathways and alternative mappings of responsibilities and collegial connections.²²⁰ In the skilled trades, for instance, upcoming changes to the order of construction phases or tasks may necessitate different interactions with workers in other trades as well as new requirements to harmonise with different aspects of a project.²²¹ Similarly, health and care professionals will need to **adapt communication skills in demonstrating sensitivity and empathy** to the increasingly common setting of a remote patient interaction.²²²

It is also important to consider the **skills required to navigate one's own choices around working patterns** and styles and those of colleagues.²²³ These might involve skills in **deliberate self-reflection and self-assessment of productivity** as well as skills in communicating on this topic with others for optimal coordination. This was most relevant to the discussions in one workshop but is applicable across the sectors.

²¹⁷ H01, H05, M04, M05, M06, S02, S03, S09, T01, Health Workshop, Managers Workshop.

²¹⁸ Managers Workshop, M04, M05.

²¹⁹ Managers Workshop.

²²⁰ Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

²²¹ Skilled Trades Workshop, S01, S02, S06, S07, S09.

²²² Health Workshop.

²²³ Managers Workshop.

3.2.2. Communication and teamwork will be needed to combat climate change and improve sustainability

The scale of the challenge of combatting climate change was recognised, as well as its predominance among future-focused concerns across all sectors.²²⁴ The collective effort against climate change will require coordination between colleagues, organisations and across borders and therefore skills in **communicating persuasively and pragmatically while working collectively** will be important in any relevant role.

Participants suggested that a great deal of work will be required in both the skilled trades and science and technology sector on **communication with the public on climate change** and any 'solutions' or sustainable practices recommended.²²⁵

For managers, who might work in a variety of industries, it will be necessary to **communicate organisational goals** around combatting climate change and improving sustainability to their teams.²²⁶ They will also need to **oversee and delegate** while implementing environment-focused changes in the workplace or in business operation.²²⁷ These both constitute adaptation of existing skills to the specific, perhaps unique, collective challenge of moving to more sustainable ways of living and working.

In interviews and the workshop, participants representing skilled trades emphasised that different trades will need to be much more **integrated and aware of each other's work** in to achieve the sophistication and harmony required to maximise energy efficiency in buildings and green infrastructure.²²⁸ In an industry characterised as 'siloes'²²⁹, this remains a future challenge in developing people and communications skills which emphasise pro-active coordination with skilled trades beyond their own discipline and, likely, outside their organisation or employer.²³⁰

While the impact for healthcare was thought to be less direct, **joint problem-solving on sustainability in everyday practices** was still seen as necessary.²³¹ Additionally, participants mentioned the importance of communication and teamwork to **facilitate research, public health policy and care** focused on the growth of climate-related illness such as pollution-related disease and future pandemics.²³²

²²⁴ Health Workshop, Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

²²⁵ S02, S04, S09, T06.

²²⁶ Managers Workshop, M02, M04, M05.

²²⁷ M02, M04, M05.

²²⁸ Skilled Trades Workshop, S02, S07.

²²⁹ S08.

²³⁰ Skilled Trades Workshop, S01, S02, S03, S05, S06, S07, S08, S09.

²³¹ Health Workshop.

²³² Health Workshop, H05.

3.2.3. An increase in work on equality, diversity and inclusion in workplaces will be expected

Participants appeared to agree that norms would continue to shift around equality, diversity and inclusion, following existing trends of increased awareness of related issues in the workplace.²³³ The workshop discussion demonstrated a willingness to facilitate necessary improvements and to address previous and ongoing industry failures to ensure equality, promote diversity of personnel and build inclusive work environments.²³⁴

Some debate occurred on whether motivations for working on equality, diversity and inclusion should be considered ethical or business-related.²³⁵ From either perspective, skills in navigating these topics and identifying meaningful improvements with colleagues will be desirable for workers across different sectors. Furthermore, interviewees observed a growing tendency for employees to choose organisations which demonstrate alignment with their values on issues such as these.²³⁶

Building on the skills discussed in Section 3.1, workshop participants emphasised that awareness of equality, diversity and inclusion issues was not sufficient.²³⁷ Instead, developing **skills for the creation and use of procedures for raising concerns** around these topics, or even about malpractice²³⁸, would be crucial.²³⁹

In addition, communication skills for discussing unacceptable or unethical behaviour with other colleagues and wider teams are likely to be increasingly valuable.²⁴⁰ This may also require **strong interpersonal skills** for the discussion of sensitive topics such as inherent bias and necessary adaptation of language and behaviour in the workplace.²⁴¹ These skills could include **active listening, mediation skills** and perhaps also **conflict management**.

As mentioned in Section 2.2, considerations of health inequalities may require healthcare professionals to build skills in **recognising variation in patients' needs, experiences and situations**.²⁴² Vocally addressing stereotypes and judging the accessibility of any new technology will not only require technical and clinical expertise but also strong communication and listening skills on these sensitive topics.²⁴³

²³³ Health Workshop, Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

²³⁴ Managers Workshop, Skilled Trades Workshop.

²³⁵ Managers Workshop.

²³⁶ M02, M06.

²³⁷ Managers Workshop.

²³⁸ Health Workshop.

²³⁹ Managers Workshop, Science and Technology Workshop.

²⁴⁰ Managers Workshop, Science and Technology Workshop.

²⁴¹ Managers Workshop.

²⁴² Health Workshop, H05.

²⁴³ Health Workshop, H02, H03, H05.

In the skilled trades, there will likely be greater expectations for proficiency in the manufacture and construction of accessible and inclusive designs. Beyond technical skills, this will require a **willingness and proactivity in learning** about a diverse range of requirements and communicating around these with clients and customers.²⁴⁴

Overall, current and upcoming integration of technology into workplaces and operations will provide both challenges and opportunities for the development and adaptation of people and communications skills. Meanwhile, skills in **sensitive communication and empathetic listening** in both remote and in-person settings will likely be increasingly applied to questions of change and learning around sustainability and equality, diversity and inclusion.

3.3. Policy implications for changes in skills needs

This section outlines relevant policy implications proposed at the validation workshops but it does not present recommendations prepared by the research team on the basis of the research and analysis conducted. Given the limited evidence base, any suggested implications or solutions will require further examination.

In regard to policy opportunities and implications, two areas emerged as most pressing: the challenges and rewards of teaching teamwork skills and the efforts required in equality, diversity and inclusion work.

3.3.1. Improvement is needed in how teamwork skills are taught across educational and professional settings

Workshop participants identified weaknesses in the previous and current development of teamwork skills in schools, universities and workplaces.²⁴⁵ It was suggested that engaging university students with teamwork learning can be very challenging.²⁴⁶ Some speculated on individualised versus collaborative pathways to academic achievement, comparing BTEC and A-Level students' different attitudes to teamwork.²⁴⁷ It may be that assessment structures with less focus on individual attainment allow for increased development of collaborative and creative skills in young people.²⁴⁸

A continuation of isolated roles and working patterns in employment can further entrench this issue. In programming and the wider technology industry, notions around 'lone

²⁴⁴ Skilled Trades Workshop, S09.

²⁴⁵ Managers Workshop, Science and Technology Workshop.

²⁴⁶ Science and Technology Workshop.

²⁴⁷ Science and Technology Workshop.

²⁴⁸ Science and Technology Workshop.

geniuses' or 'bedroom coders' may need to be countered through employer initiatives which put greater emphasis on people and communications skills at an earlier stage.²⁴⁹

In health and skilled trades, communication barriers or role hierarchies might require a concerted effort to break down.²⁵⁰ Additionally, in some settings, such as care homes or construction sites, the organisation of staff and employment by different contractors can keep workers isolated from each other.²⁵¹ But policy benefits could include a healthier safety culture in skilled trades, as observation and feedback becomes more common,²⁵² and a more efficient healthcare service as health professionals put greater value on teamwork with support staff such as porters and clerical staff.²⁵³

For leaders, both among managers and in the other sectors, skills in effective and sensitive facilitation of teamwork between those they supervise are crucial.²⁵⁴ Policy initiatives may be needed to equip those in senior roles to respond to new challenges such as coordinating hybrid teamwork²⁵⁵ or helping a team adjust to partial automation.²⁵⁶ It may be that adaptation so far has been ad-hoc, in response to the COVID-19 pandemic or rapid technological advances, without sufficient planning for upskilling.

3.3.2. Culture change on equality, diversity and inclusion takes time and requires open-minded initiatives

Given that culture shifts take time and are difficult to measure,²⁵⁷ formulating targeting policy work can be challenging, making a 'long-view' necessary. As mentioned above, participants were divided on whether to approach equality, diversity and inclusion from an ethical or moral stance, as opposed to a business or pragmatic approach.²⁵⁸ This could shape the type of campaign or initiative aiming to build skills relevant to this issue within workforces. Some participants suggested that policy interventions focused on the financial benefit for businesses of including diverse experiences and perspectives would be more successful than those focusing on ethical, moral or legal obligations.²⁵⁹

One interviewee described an element of complacency in the science and technology sector on this point. In the following quotation, this interviewee suggests that skills in

²⁴⁹ Science and Technology Workshop, T01, T03, T05.

²⁵⁰ Health Workshop, Skilled Trades Workshop, H03, H05, S01, S03, S05, S07.

²⁵¹ H04, H06, Skilled Trades Workshop.

²⁵² Skilled Trades Workshop.

²⁵³ Health Workshop, H05.

²⁵⁴ Managers Workshop, Skilled Trades Workshop, H01, H05.

²⁵⁵ Managers Workshop, Science and Technology Workshop, M04, M06.

²⁵⁶ Skilled Trades Workshop, M05, T07.

²⁵⁷ Managers Workshop, Skilled Trades Workshop, S07.

²⁵⁸ Managers Workshop.

²⁵⁹ Managers Workshop.

designing and promoting equality, diversity and inclusion initiatives need to be further developed:

I think this industry expects a more diverse pool of entrants to gravitate towards it without having to do anything proactive to make it happen, and that's not the case. I don't yet get the sense that there's a general willingness to recognise that you actually have to put work into making different people to [those] who would normally apply, want to come and work. I think that's probably the big issue – Interviewee (T04)

Participants linked this topic to a view that expectations of leadership have shifted to include a greater need to inspire colleagues and engage with them in an emotionally intelligent fashion.²⁶⁰ Given the phenomenon of 'accidental managers' referenced above, it may be that specific training in motivational leadership and empathetic interpersonal skills should be prioritised in any upskilling initiatives for senior and management staff across the sectors and applied to this area of concern.

Continuous professional development might be identified as an opportunity to consistently introduce and build on these skills for successful work on equality, diversity and inclusion. Indeed, Grugulis's research on upskilling and reskilling recommends in-work qualifications for both technical competence and the training and development of other colleagues.²⁶¹ The research conclusions also warn against exacerbating inequality by concentrating training on employees who are already highly-skilled or highly qualified.²⁶²

Important topics which employees could be better equipped to engage with include health inequalities²⁶³, bias in science and technology²⁶⁴, workplace equality and inclusion²⁶⁵ and accessible design.²⁶⁶ This type of training may not be as familiar to employees as technical upskilling and efforts may meet with resistance to change due to the status quo bias mentioned by participants across the sectors, especially in skilled trades and management.²⁶⁷

²⁶⁰ Managers Workshop.

²⁶¹ Grugulis, I. (2022). Upskilling and Reskilling Adult Workers: The Problem of Employer Demand, ReWage, Universities of Warwick & Cardiff, <https://warwick.ac.uk/fac/soc/ier/rewage/>

²⁶² Grugulis (2022).

²⁶³ Health Workshop.

²⁶⁴ Science and Technology Workshop.

²⁶⁵ Managers Workshop.

²⁶⁶ Skilled Trades Workshop.

²⁶⁷ Health Workshop, Managers Workshop, Science and Technology Workshop, Skilled Trades Workshop.

4. Limitations of the research

The findings outlined in this report are based on a limited number of interviews per occupation and key areas of interest; they are not intended to offer a representative or exhaustive picture of the views on future skills demand. If a skill is not mentioned in relation to a specific occupation or area this does not necessarily mean it is not relevant to that context, only that it was not a skill independently raised by interviewees.

Although a range of interviewees were recruited from across industry organisations, the study does not incorporate perspectives of some other relevant groups, most notably labour market and skills researchers, policy decision-makers, education and training providers or trade union representatives. While input from these groups these would have added useful perspectives, their inclusion was beyond the scope of this study. The research also does not account for different characteristics of interviewees, such as gender or age, ethnicity, or religion.

This research also only focused on a small number of occupations within the areas of interest and therefore makes no claims on the applicability of interviewee and workshop participants' observations for other occupations. Some interviewees were able, due to their position or experience, to provide insights on multiple occupations and thus observe similarities, differences and sector-wide connections. Others were only able to speak about one occupation. In some cases, such as in the area of health, this limitation can be attributed to the organisation and division of representative organisations.

During the study, the research team were also challenged by the restricted availability of interviewees, largely either due to timing or lack of capacity from industry organisations, representative bodies and other organisations to nominate an interviewee. Requests were sent out to 43 organisations, over the course of 10 weeks, with multiple potential interviewees contacted at each of these.

During the interviews, despite the topic guide's focus on current and future skills needs, many responses did not maintain a clear distinction between these two needs. As this pattern emerged during interview analysis, focusing strongly on change factors and predictions for future skills needs became a priority for the validation workshop. Additionally, participants sometimes responded on the question of 'people and communication' skills with broader interpretations of this category than our original definition.

We have taken an inclusive approach, acknowledging the subjective nature of categorising these 'soft' skills and reporting the participants' arguments for skills such as strategic planning and awareness of (commercial) context being relevant to

communication.²⁶⁸ Finally, interview data are not comprehensively triangulated against other sources (such as existing literature or quantitative projections) to validate, clarify, or add further detail on the points discussed. Some citations of existing literature are given in this report to add context to the terms or phenomena described by interviewees and workshop participants.

²⁶⁸ Mounier, A. (2001). The Three Logics of Skill, ACIRRT Working Paper No.66, ACIRR: Sydney.

5. Conclusion

This research highlights the skills that are already in demand are those likely to be (even more) needed in future, namely: ability to adapt to new technologies (including the specific technical skills unique to each sector and occupation) and basic skills (such as numeracy, literacy, digital literacy, interpersonal skills) that are needed as a foundation for any new or more specialised and advanced skills. Another skill rooted both in the present and future is the ability to work in a team, make connections and collaborate with others. There will be a growing emphasis on flexibility and more inter-disciplinary and collaborative approaches to work in all four priority areas.

Among the key changes that can be expected in the future across most roles are data handling, and knowledge on data storage and data security. Major changes are likely to affect the number of roles and skills required: from climate change and 'greening' of the occupations through to technological developments, the future of workplaces and working patterns. Perhaps most clearly, the evidence points to the shifting culture on equality, diversity, and inclusion with the need to move from awareness-raising to action.

While the evidence base is limited, some considerations for policy making and practice can be cautiously formulated. Firstly, looking at recruitment, the findings point to the role of alternative and non-traditional routes into employment in the areas and occupations of interests, rather than only formal education and training, including apprenticeships, cross-skilling, horizontal movement, etc. Secondly, when considering adaptation, upskilling and reskilling of the existing (and future) workforce, this research highlights the role of continuous professional development. There is a need for long-term plans both in terms of skills management at the company level, and career prospects and progression for individual workers.

Finally, some methodological considerations that need to be considered in future research on skills demand. The importance of interpersonal skills in this research is reflective of two factors. First, these skills are common and transferable across most occupations (while technical skills are more unique for each sector and even more so for each occupation). Second, the approach to this qualitative research determined the focus on both technical and digital skills on the one hand, and on people and communication skills on the other. The *a priori* emphasis on two sets of skills allowed to make some comparisons across the areas and occupations of interest. However, it is conceivable that dropping this focus or using unstructured interviews to allow interviewees lead the conversations would generate different (and a broader range of) findings compared to those included in this report.

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Annex A. Sampling occupations for the study

Across the four priority areas (health, science and technology, managers, skilled trades) there were 79 occupations of interest. We narrowed this number down by working in collaboration with the DfE and SPB. We used purposeful sampling to select three occupations in each of the priority areas (Table A.1).

The criteria used centred on:

- high shares of employment (based on the most recent ONS data)
- high demand for a given occupation indicated in the government sources.

Table A.1: Shortlisted and selected occupations

Area	Occupation	Employment ²⁶⁹	Selected	Justification
Health	Care workers and home carers	762,300	Yes	Highest share of employment
	Medical practitioners	320,300	Yes	Critical (high demand) ²⁷⁰
	Pharmacists	71,100	Yes	Critical (high demand)
	Physiotherapists	68,000	No	
	Occupational therapists	45,300	No	
	Psychologists	37,400	No	
	Medical radiographers	34,500	No	
	Paramedics	33,800	No	
Managers	Financial managers and directors	329,500	Yes	Highest share of employment
	Production managers and directors in manufacturing	286,300	Yes	Critical (high demand) ²⁷¹
	Managers and directors in retail and wholesale	297,000	No	
	Production managers and directors in construction	166,200	No	
	Information technology and telecommunications directors	134,400	Yes	Critical (high demand)
	Managers and directors in transport and distribution	94,500	No	

²⁶⁹ ONS (2021). As of 02/11/2021: <https://www.ons.gov.uk/employmentandlabourmarket>

²⁷⁰ Shortage occupations for health listed on the government website. As of 04/11/2022: <https://www.gov.uk/government/publications/skilled-worker-visa-shortage-occupations-for-health-and-education/skilled-worker-visa-shortage-occupations-for-healthcare-and-education>

²⁷¹ Manufacturing named critical in the Building Back Better – Plan for growth. As of 04/11/2022: <https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth>

Area	Occupation	Employment ²⁶⁹	Selected	Justification
Science and technology	Programmers and software development professionals	449,000	Yes	Highest share of employment
	Biological scientists and biochemists	101,400	Yes	Critical (high demand) ²⁷²
	Laboratory technicians	94,500	No	
	Design and development engineers	90,400	Yes	Critical (high demand)
	Mechanical engineers	86,800	No	
	Engineering technicians	85,200	No	
	Research and development managers	67,300	No	
	Environment professionals	48,100	No	
	Skilled trades	Electricians and electrical fitters	229,500	Yes
Carpenters and joiners		196,600	Yes	High share of employment
Plumbers and heating and ventilating engineers		140,800	Yes	Critical (high demand) ²⁷³
Painters and decorators		90,600	No	
Glaziers, window fabricators and fitters		45,100	No	

Table A.2: Selected occupations per priority area

Health	Managers	Science and technology	Skilled trades
Care workers and home carers	Financial managers and directors	Programmers and software development professionals	Electricians and electrical fitters
Medical practitioners	Production managers and directors in manufacturing	Biological scientists and biochemists	Carpenters and joiners
Physiotherapists	IT and telecommunications directors	Design and development engineers	Plumbers and heating and ventilating engineers

²⁷² Life sciences named in the sectoral deals Industrial Strategy. As of 04/11/2022: <https://www.gov.uk/government/publications/industrial-strategy-sector-deals/introduction-to-sector-deals>

²⁷³ Net-zero named in the Building Back Better – Plan for growth. As of 04/11/2022: <https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth>

Annex B. Methodology

The qualitative study involved interviews and validation workshops. We conducted 28 semi-structured interviews with 30 industry experts (Table 1-1). These experts were largely nominated by representative industry organisations such as trade bodies, councils and chartered societies. Some interviewees were experts in skills, while others held more general roles in these organisations which gave them insight into their industry's labour market. The interviews followed a topic guide that explored current and future skills needs in the selected occupations focussing on technical and digital skills, and communication and people skills. The full topic guide is presented below.

The interviews were conducted via MS Teams and were recorded and transcribed. Feedback from interviewees was fully anonymised and presented at an aggregate level. The data were coded by multiple researchers and then analysed using a thematic approach to identify recurring themes, relationships, granularity of views and any conflicting opinions.

We convened four validation workshops with the SPB, DfE, and 28 participants from each of the priority areas (Table 1-1). The list of workshop participants was agreed with the SPB and DfE and drew on the long list of potential interviewees, as well as representatives from academia. The purpose of these workshops was to discuss and validate the interview findings and to generate additional evidence through group discussion on the implications for skill demand and possible policy responses.

This report summarises and synthesises findings from the interviews and workshops with industry experts and academics in the four priority areas.²⁷⁴ The focus on industry representation allows us to gain insights on skills needs in the next 5-10 years from those who work in the selected sectors and have direct contact with the employers, workforce, or their representatives.

Topic guide

PART 1: Introductions

1. Can you please tell me briefly about your organisation and your role?
2. Can you outline how - if at all - your role relates to understanding skills needs among [*occupation*]?

²⁷⁴ Please note: quotations or citations from interviewees use a code to represent the sector of the interviewee and the number (e.g., H01 – Health interview no.1). Quotations or citations from the validation workshops are not referenced in a way that identifies individuals. Instead, only the category of the workshop and the date are specified (e.g., Health workshop – 29/03/2022).

PART 2: Key factors that influence the skills needed in the priority areas in the next 5-10 years

3. In your opinion, what are the key factors that influence the skills needed from [occupation] in the next 5-10 years?

PART 3: Current and future skills needs in the selected occupations

4. What - in your view - are the most important skills needed currently among [occupation]?
5. What are the top skills needed currently among [occupation]?
6. What (if any) technical & digital skills are currently needed among [occupation]?
7. What (if any) people & communication skills are currently needed among [occupation]?

PART 4: Key tasks and expected changes

8. How do you think this occupation is going to change going forward?
9. Which of the tasks required from [occupation] currently are likely to change in the next 5-10 years and how?

PART 5: Implications for skills

10. What new or different skills will be needed to respond to the changes?
11. Which of the technical & digital skills we discussed will continue to be needed to the same extent and which ones will be needed more or less?
12. Which of the people & communication skills we discussed will continue to be needed to the same extent and which ones will be needed more or less?



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