Skills England: Sector skills needs assessments

Digital and Technologies

June 2025

Contents

Summary

Advances in digital and technologies are transforming the economy and the skills needed across the labour market. The skills required for the digital and technologies sector are relevant across many occupations as the technologies are integral to many sectors and roles.[1] In this briefing, we focus on the occupations and skills that underpin key parts of the digital and technologies sector and focus on two important areas of future growth: AI and quantum. This will not capture the workforce who work in the digital and technologies sector but in non-digitally focused roles such as Human Resources (HR).

At the time of writing, definitions of the eight Industrial Strategy growth-driving sectors are still in development. Our analysis uses the best available definitions and evidence, setting out what we already know and where further work is needed to understand the skills landscape within these sectors. The forthcoming Industrial Strategy Sector Plans will set out analysis of the highest growth potential subsectors.

Priority jobs and skills

In June 2024, employment across occupations defined as being of relevance to the digital and technologies sector was around 4 million and projections indicate an increase of around 380,000 workers by 2035 (10%).[2] The top 5 occupations across the digital and technologies sector are very similar for all the digital and tech industries used in this briefing. In addition, these occupations are also increasingly critical to all 8 growth-driving sectors within the Industrial Strategy. Despite the strength of the sector, there are indications that the demand for skills is outpacing supply, particularly in specialised sectors. Occupations across digital and technologies industries identified for this briefing reported high skill-shortage vacancies including telecommunications engineers (75%), design and development engineers (58%), routine inspectors and testers (54%), electrical engineers (54%), and engineering professionals not elsewhere classified (52%).[3] Research by Tech Nation reveals that founders of UK startups and scaleups find engineering and development skills the hardest to recruit.[4]

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[1] The digital and technologies sector covers digital and computing (inc. cyber); space and the 5 critical technologies: AI, engineering biology, quantum technologies, future telecommunications and semiconductors. Definitions include occupations identified as being most relevant to these industries. These occupations (except for Space) were identified by relevant taskforces for the DfE jobs and skills dashboard. For Space, Skills England worked with DSIT colleagues to identify occupations most relevant to space related roles: 2126; 5234; 2113; 2112; 3549; 3544; 3133; 5249; 3112; 2123; 2124; 2129; 2127; 3113; 2139; 2133; 2132; 3131; 2131; 3111; 2122; 2114; 2125; 1121; 2134; 3119. Occupations are likely to change for Industrial Strategy Sector plans for digital and technologies.

[2] These figures use the baseline scenario of Skills Imperative but updates the employment figures for 2024 using APS and forecasts employment from 2024 to 2035. These will differ to the economic estimates published on workforce by DSIT which uses SIC to define the digital sector.

[3] A skill shortage vacancy is a job that is difficult to fill because applicants lack the required skills, qualifications, or experience. Source: Employer Skills Survey: Vacancy Measures by Occupational Group, DfE (2024); Jobs and Skills dashboard, DfE (2024)

[4] UK Tech in the age of AI, Tech Nation (2024)

With around 7.3 million employed adults without essential digital skills for the workplace, basic digital skills are set to become the UK's largest skills gap by 2030.[5] This gap has already been highlighted as part of the UK Government's work to support digital inclusion.[6] Alongside a growing demand for digital skills across the economy, Skills England's engagement [7] with the sector highlighted a critical shortage in machine learning, user experience design, bio-medical and big data expertise, as well as for data architect roles not covered by current apprenticeships.[8]

New digital and technologies roles will also emerge across the economy. For example, leadership roles will be required which hold senior responsibility for governing the introduction of emerging technologies, including AI.[9] The small pool of skilled employees is likely to mean that those offering a better salary or conditions will be more likely to recruit the valuable staff.

Skills shortages in the sector are exacerbated by unequal access to employment:

- Within the 44 occupations relevant to the digital and technologies sector, only 25% of the workforce are female, and in critical technology roles, this drops to 23% compared to around a half across all occupations.[10] Research shows half of women in tech leave by the age of 35 and 1 in 3 currently plan to leave their jobs.[11] There was significant support from stakeholders to increase the critical mass and gender diversity of those leaving school with both the core digital skills and enthusiasm for employment or further education within the tech sector.
- The Digital Sector Economic Estimates on employment highlight that in the period Jan 2023 to Dec 2023 18% of the digital sector were from ethnic minority backgrounds compared to 16%[12] across the UK workforce aged 16+. Only 9% of tech employees are reported to be from lower social economic backgrounds, compared with 39% of the UK population. [13]

[5] 2024 Consumer Digital Index, Lloyds Bank (2024);Digital exclusion, UK Parliament (2023)

[6] Digital Inclusion Action Plan: First Steps, Gov.UK (2025)

[7] During this engagement process and the drafting of this publication, Skills England was set up in shadow form within the Department for Education (DfE). Skills England - GOV.UK

[8] Driving growth and widening opportunities, DfE (2024)

[9] AI Skills for Business Competency Framework, Innovate UK (2024)

[10] Annual Population Survey Jul 2023-Jun 2024, ONS (2024)

[11] Recommendations: hiring, retaining and progressing Women in Tech, Code First Girls (2023);Diversity in Tech report 2024, Tech Talent Charter (2024)

[12] Annual Population Survey Jul 2023-Jun 2024, ONS (2024)

[13] Diversity in Tech report 2024.

Quantum

Quantum, a specialised field that uses physics of sub-atomic particles for practical applications, has historically depended on a workforce with deep quantum expertise. This is typically gained through a quantum-focussed PhD and post-doctoral research. As quantum technologies are advancing, the skills needed by the industry have diversified, increasing the number of mid-skilled roles within the industry.[14] These include electrical and mechanical engineers and technicians, as well as lab technicians and technician scientists. These skills could be met by apprenticeships routes or other on-the-job training.[15]

CBI Economics estimates that 20,000 people are employed across the UK quantum industry, contributing £93,000 in Gross Value Added (GVA) per job which is 33% higher than the UK average.[16] Despite its transformative potential, only 33% of organisations have started strategic planning to prepare for the commercialisation of quantum.[17] UK quantum companies are generally small with around 80% having 50 employees or fewer.[18]

Additional support is likely to be required to enable these SMEs to invest in apprenticeships. One model for providing this support is the Advanced Therapies Apprenticeship Community, which case studies suggest have been successful in the life sciences sector.[19] Demand for quantum-related skills are also sought in industries like automative and transport; financial services; telecoms, media and entertainment technology and health and life sciences.[20]

AI

An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment.

UK companies have long been at the forefront of AI and machine learning innovation, and today the UK stands as one of the world's leading AI centres.[21] Despite this, our engagement highlighted the need to better understand AI skills needs and gaps, starting with improving data collection to better reflect real-world practices. Skills England is

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[14] Mid-level is level 4 and level 5

[15] Quantum skills task force working groups, a community workshop run by TechUK

[16] What's the value of the quantum economy?, CBI Economics (2024)

[17] Quantum Readiness Survey 2022, EY (2022)

[18] National Quantum Survey: Additional Evidence Annex, DSIT (2023)

[19] Testimonials & Case Studies – Old – ATAC Apprenticeship Community

[20] Quantum Readiness Survey 2022, EY (2022)

[21] UK Tech in the age of AI, Tech Nation (2024)

addressing this by creating a consistent skills classification for the UK to help resolve these inconsistencies.[22]

Government has identified key priorities for developing the talent pipeline, with attracting top AI professionals internationally a key short-term aim.[23] In the longer term, DfE (including Office for Students) in collaboration with DSIT and Skills England will contribute to supporting Higher Education Institutions to increase AI graduates and teach industry-relevant skills; widening diversity; expanding education pathways; DSIT's launch of scholarships; and ensuring lifelong skills programmes are AI ready.[24]

Given AI's potential to boost productivity and its impact on the labour market, it is essential our workforce acquires the necessary AI-related skills.[25] Despite this, the overall amount of AI talent we train and attract is a long way short of UK demand - with 36% of vacancies in occupations relevant to AI caused by skills shortages.[26] Occupations related to AI are projected to grow over twice as fast as other roles up to 2035.[27] In addition, 26% of AI companies say that a lack of technical skills prevent them from meeting their business goals.[28] Alongside the need for advanced technical skills, our engagement highlighted the need for transferable skills. These include managing change at pace (particularly in the tech sector), as well as essential digital skills across all industries (e.g. a better understanding of AI tools like ChatGPT).

The high skill requirements and wage costs of scientists and AI professionals are key barriers to recruiting suitable candidates, especially for SMEs, who make up most of the total business population in the UK economy. These roles can command a wage premium of around 14% for AI skills in the UK.[29] Almost all (99%) AI professional job adverts require education to at least graduate level with 37% requiring a PhD. Despite this very high-skill requirement, many roles appear to value specific skills, including programming languages and machine learning, above years of experience. Two-thirds of job adverts asked for less than 3 years experience.[30]

[22] A Skills Classification for the UK, DfE (2023)

[23] AI Opportunities Action Plan, DSIT (2025) (recommendations 14, 17, and 19 are specific to Skills England)

[24] AI Opportunities Action Plan, DSIT (2025) (recommendations 14, 17 and 19 are specific to Skills England); What AI means for jobs and how we're preparing the workforce, DfE (2025)

[25] Artificial Intelligence Sector study, DSIT (2024)

[26] Employer skills survey: 2022 DfE (2024); Jobs and Skills Dashboard, DfE (2024); to note ESS uses SOC 2010, which does not directly map to SOC 2020.

[27] Jobs and Skills Dashboard, DfE (2024)

[28] Artificial Intelligence Sector study, DSIT (2024)

[29] Business population estimates, DBT (2024); PwC's 2024 AI Jobs Barometer, PwC (2024)

[30] Bellamy et al (forthcoming), 'AI Skills for Life and Work: Summary Report,' a report prepared by Ipsos for DSIT and DCMS and 9 key findings from Understanding the UK AI labour market: 2020 Report, gov.uk (2021)

> Lack of diversity in the workforce and pipeline remains a concern for the industry. Stakeholders noted that low engagement with the industry from women starts at a young age and is challenging to change.

Training routes into the sector

Occupations relevant to critical technologies rely largely on higher education pathways for early career workers, with subjects including computer science (12%) engineering and technology (11%); physical sciences (6%) and biological sciences (5%).[31] In 2019, 61% of early-career workers roles relevant to critical technologies had higher education qualifications, (67% in quantum and 72% in AI), compared to 40% across all occupations. Apprenticeships accounted for 13% of the education pathways of early career-workers into the critical technologies sector (12% in quantum and 10% in AI), mostly through ICT and Engineering and Manufacturing routes.[32]

There are 3 digital T-levels (Digital support services; Digital business services; and Digital production, design and development) and over 5,500 students have started a Digital T Level since they launched in 2020 (17% of all T level entries since 2020).[33] The first wave of Higher Technical Qualifications (HTQ) at Levels 4 and 5 were in digital subjects, with an estimated 850 total learners enrolled in the first year (academic year 2022/23).[34] Digital HTQ subjects include: Higher National Diplomas in Digital Technologies and in Computing, foundation degree in Computer Science, Certificate of Higher Education in Cyber Security and the Higher National Certificate Data Analyst.[35]

Digital skills have been an important part of the Skills Bootcamps offer since their introduction in 2020. Latest published data shows that in the 2022/23 financial year, the majority of Skills Bootcamps were in the digital sector accounting for 61% of starts.[36]

Securing the future workforce

Apprenticeships are seen as fundamental in filling skills gaps in the digital sector and flexibility is critical. The vast majority of employers in the economy are small businesses (99%). Stakeholders highlighted they lacked resources to support long-term apprenticeships and would be better supported by shorter, more flexible courses.[37]

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[31] Jobs and Skills dashboard, DfE (2024)

[32] Jobs and Skills dashboard, DfE (2024)

[33] Totals derived from T level Action Plans, DfE (2020, 2021, 2022-23 2024)

[34] Higher Level Learners in England, Academic year 2022/23, DfE (2024)

[35] HND - Higher National Diploma; FdSc - Foundation Degree in Science; CertHE - Certificate of Higher Education

[36] Evaluation of Skills Bootcamps 2022 to 2023: Wave 3 implementation report, DfE (2024)

[37] UK Small Business Statistics, FSB, 2024 and Business population estimates, DBT (2024)

Employers discussed conflicting policy aims and drivers, including the need to support young people into work, improve diversity, facilitate career changes, and enhance social justice. It was suggested that there needs to be better alignment between the sector's needs and government support, with a clear outline of the ambition and how it will be delivered.

Gaps in provision

Through Skills England's engagement, stakeholders emphasised several key points regarding training flexibility and the development of skills required for the Digital and Technologies sector, which is particularly important for SMEs:

- Flexibility in training: Short-term, modular training linked to a skills passport and core competency framework was seen as essential for adapting to rapid changes in skills needs within the sector.

- Absence of clear and diverse pathways: Despite various qualifications, employers and learners often lack clear training routes. Employers seek engaging and intuitive occupational maps, especially for young people, while training programmes must adapt to diverse workforce needs and support career changers moving into mid-level skill roles. This can include online courses, self-paced learning, and pay-as-you-go modules.[38] The new offer should balance recruiting new talent with developing existing employees, enhancing flexibility, and tailoring pathways to individual needs.

- Further Education programmes: Increasing the range and flexibility of routes/programmes through further education is vital for retraining and upskilling the current workforce (including those at the start of their career), which is crucial given the expected limited growth in the UK's working-age population over the next 10 years.[39]

- AI apprenticeships for SMEs: Increasing AI apprenticeships for SMEs could significantly enhance technical AI skills in firms that struggle with high salary demands of AI technical skills.

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[38] Unlocking social mobility through accessible and inclusive digital education, Cranfield School of Management (2024); Higher Education in the UK - Setting the Stage for Lifelong Learning, Instructure (2024)

[39] UK Economic Outlook, PwC (2024)