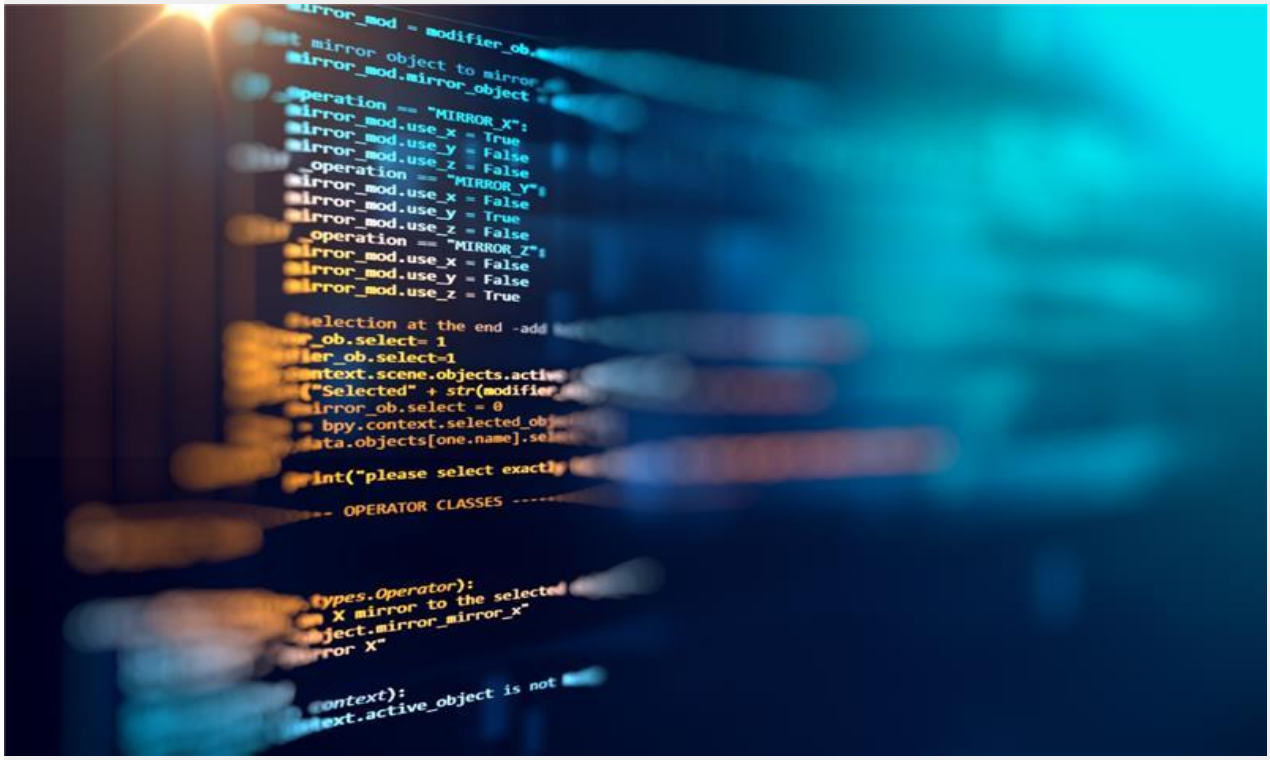
A White Paper on the training and skills gap for AI in four selected sectors

June 2025



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This White Paper is written by third parties and does not necessarily reflect the views of the UK government.

Glossary

Abbreviation	Definition
ACT	Artificial Intelligence (AI) Construction Training
ADAS	Advanced Driver Assistance Systems
AHRC	Arts and Humanities Research Council
AI	Artificial Intelligence
AIOE	Artificial Intelligence Occupational Exposure
AWS	Amazon Web Services
BRAID	Bridging Responsible AI Divides
BRO	Business Representative Organisation
CNN	Convolutional Neural Network
DCMS	Department for Culture, Media and Sport
DDoS	Distributed Denial-of-Service
EPSRC	Engineering and Physical Sciences Research Council
GAN	Generative Adversarial Networks
GenAI	Generative AI
GCP	Google Cloud Platform
GDP	Gross Domestic Product
GPT	Generative Pre-training Transformer
ILO	International Labour Organisation
ISCO	International Standard Classification of Occupations
JRC	Joint Research Centre
LLM	Large Language Model
MIT	Massachusetts Institute of Technology
ML	Machine Learning
NLP	Natural Language Processing
NSC	Net Skill Change
NUTS1	Nomenclature of Territorial Units for Statistics Level 1
PALLETS	Proactive AI-powered Solutions for Logistics Efficiency, Transparency and Safety
RAI	Responsible AI
RNN	Recurrent Neural Network
R&D	Research and Development
SAP	Systems Applications and Products
SAT	Security Awareness and Training
SIC	Standard Industrial Classification
STEM	Science, Technology, Engineering, and Mathematics
TFP	Transforming Food Production
TMS	Transportation Management System
UKRI	United Kingdom Research and Innovation
VFX	Visual Effects
WEF	World Economic Forum
WMS	Warehouse Management System

Executive Summary

Artificial Intelligence (AI) is reshaping the global economy at pace. It has the potential to improve productivity, support innovation and generate new economic opportunities. In the United Kingdom (UK), AI is transforming the nature and structure of work, fundamentally changing existing job roles and creating new ones. This has significant implications for the skills businesses need to survive and thrive. However, employer surveys strongly suggest that there is a significant AI skills gap in the UK. We define the skills gap as the difference between the AI capabilities employers require and what the existing workforce currently possesses. For example, just under one half of UK CEOs cited skills gaps as the number one barrier they face in adopting AI and other emerging technologies, and slightly over one half of these CEOs are upskilling their people to create a future-ready workforce (PwC, 2025a). Our survey also highlighted significant AI skills gaps in our four selected sectors.[1]

In this White Paper, AI refers to machine-driven capability to perform tasks at or beyond the level of human intelligence. This can apply to a broad range of skills, including: AI ethics, governance and regulations, AI systems and automation, autonomous driving, generative AI, machine learning, natural language processing, neural networks, robotics, and visual image recognition. Data literacy and digital literacy are also identified as broader foundational skills required for the successful implementation of AI.

In this context, the *Innovate UK BridgeAI programme* has established the 'AI Skills Hub' (the Hub) to boost AI adoption across four selected AI sectors, namely: Agriculture and Food Processing, Construction, Creative Industries and Transport, Warehousing and Logistics. The Hub is working closely with employers, training providers, technology partners and other stakeholders to create and nurture a collaborative ecosystem that supports employee upskilling, business engagement and the adoption of international best practice.

This White Paper summarises the Hub's research findings in relation to the current and future demand and supply of AI skills across the four selected sectors, along with the associated skills gaps. The findings are based on an extensive programme of research and engagement including: a review of 120+ academic and policy documents; the design and development of an 'AI skills taxonomy'; a detailed quantitative analysis of 65m+ job postings/vacancies from 2018 to 2024; a survey of 500+ UK businesses between February to May 2025; and a series of in-depth semi-structured interviews with employers, training providers, technology partners and other key stakeholders across the four selected sectors, conducted between February and June 2025 (see the *Methodological approach* sub-section and Annex B for additional information).

Overview of the four selected sectors

Innovate UK undertook an analysis to identify the four sectors within the UK that have been slower to adopt artificial intelligence yet stand to benefit the most from its implementation. These four selected sectors are crucial to the UK economy. They contribute, in total,

[1] This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

£360bn+ to the UK economy (14 per cent of UK total Gross Domestic Product, GDP) and employ over 5.5m people (17 per cent of UK total employment). Our desk-based research and stakeholder engagement to date have found the following in relation to the adoption of AI:

- **Agriculture and Food Processing** – AI has the potential to transform operational efficiency (e.g. through automating repetitive manual tasks) and revolutionise food quality and safety protocols (e.g. through more robust, automated compliance with sector standards). However, the sector has an ageing workforce and a strong reliance on seasonal labour, both of which have had a negative impact on the adoption and integration of AI. Agriculture and Food Processing is closely linked to Warehousing and Logistics through the handling and distribution of perishable goods. AI-driven improvements in logistics and warehousing — like route optimisation and automated storage — can directly benefit the efficiency and sustainability of the agricultural supply chain.
- **Construction** – AI can, in principle, generate improvements in the management, efficiency and safety of projects in this sector (e.g. through AI algorithms analysing big data on previous projects). However, the sector in the UK operates through complex supply chains and has a strong preference for traditional techniques, and this has constrained AI adoption. The Construction sector is closely linked to the Transport, Warehousing and Logistic sector, particularly through its role in building and maintaining transport infrastructure. This connection means that developments in AI — whether in project management, safety, or logistics — can have cross-cutting impacts, making a coordinated approach to AI adoption across both sectors necessary.
- **Creative Industries** – AI has huge potential in this sector, such as being used to generate new creative content, enhance animation techniques, and to use data analytics to tailor and target this to the preferences of individuals and small groups within the target audience. However, many in the sector are concerned about the sector-specific risks that AI poses, e.g. a potential lack of innovation and human-led originality, as well as a range of issues relating to copyright law.
- **Transport, Warehousing and Logistics** – AI has the potential, for example, to improve road and rail safety through optimising traffic management systems, reduce emissions through route optimisation, and use industrial robotics to transform the delivery of specific manual tasks. However, the cost of AI solutions in Transport, Warehousing and Logistics is seen by many as prohibitive, and the appetite for adopting AI has been limited by the need to minimise disruption to existing services.

See the *Overview of the four selected sectors* section for more information on the current landscape across the four sectors.

Demand for AI skills

The evidence clearly shows that global demand for AI-related skills is strong and has been increasing in recent years. For example, the *World Economic Forum (WEF)* reports that AI skills, including those relating to big data and cybersecurity, are emerging as amongst the fastest-growing competencies in demand across the global economy (WEF, 2025). Likewise, our analysis for the four selected sectors shows that the demand for technical AI skills grew between 2018 and 2024 at a rate that was around twice as high as the growth rate for non-AI skills. Similarly, a large majority of UK businesses (81 per cent) in the four sectors said that their organisation's need for AI was likely to increase over the next 5 years, and 72 per cent of businesses indicated that at least a quarter of their workforce would be working in AI roles by 2030. This was higher in the Agriculture and Food Processing and Creative Industries sectors.

Several specific technical AI skills are particularly important for UK businesses, of which the top three are as follows:

- **AI Systems and Automation** – this was the most in demand AI technical skill and was particularly important for businesses in the Agriculture and Food Processing and Construction sectors.
- **Generative AI (GenAI)** – this was the second highest in demand AI technical skill, particularly in the Creative Industries sector.
- **Data Literacy** – this was the third most sought-after AI skill, with the highest demand in Agriculture and Food Processing.

In addition to these, other important AI technical skills identified by employers included Digital Literacy, AI Ethics, Governance and Regulations, and Machine Learning.

Our research indicates that four key behavioural skills are necessary to support the adoption of AI across the sectors, specifically Critical and Analytical Thinking, Problem Solving, Communication, and Leadership. Our research has indicated that these behavioural skills are as important as technical skills for the adoption and integration of AI into their operations.

See the *Demand for AI skills* section for more information on the current and future demand for AI skills.

Supply of AI skills and training

The supply of AI skills across the four selected sectors is growing, but progress remains uneven and fragmented. As organisations navigate this evolving landscape, they are increasingly making strategic decisions about how to source and develop AI capabilities within their workforces. Our research indicates that, where businesses are proactively investing in new AI skills, they are using a three-pronged approach: (a) externally recruiting new talent and skills, (b) upskilling and re-training their existing workforce, and (c) using outsourcing and external consultants. Each of these methods is widely used, but the balance between them varies by sector and the level of AI expertise required.

Notably, when organisations choose to provide AI training for employees, internal delivery methods are strongly preferred. Over 80 per cent of employers opt for internal options — such as training delivered by other staff members or internally developed e-learning programmes — which, while cost-effective for larger organisations, can place a disproportionate burden on SMEs. This trend is consistent across sectors, with internal training used by 86 per cent of organisations in Agriculture and Food Processing, 89 per cent in Transport, Warehousing and Logistics, 71 per cent in the Creative Industries, and 69 per cent in Construction. Informal on-the-job training is also prevalent, with more than half of employers in each sector using methods like shadowing. Self-led internal programmes are also common, with 54 per cent of organisations in Agriculture and Food Processing and 56 per cent in the Creative Industries offering these options.

The UK government, particularly through *Innovate UK*, has launched numerous initiatives to enhance the adoption of AI across different sectors. These efforts have increasingly balanced a focus on research, development, and innovation with a growing emphasis on workforce skills development — both of which are critical to a thriving AI ecosystem. Our review of initiatives across the four selected sectors indicates that AI skills development is now receiving more direct and structured attention. A range of skills-focused programmes — such as the AI Construction Training (ACT) Programme, Centres for Doctoral Training in AI, and other sector-specific initiatives — are helping to build the capabilities needed for effective AI adoption.

BridgeAI is contributing to this momentum through targeted activities, including the BridgeAI Hub, which complements the UK's innovation-led approach with dedicated investment in workforce capability. By supporting both innovation and skills, BridgeAI is helping to ensure that AI adoption is inclusive, sustainable, and responsive to sector-specific needs.

In addition to government-led efforts, external AI training in the UK is provided by a diverse range of organisations, including private training providers, universities, professional bodies, technology providers, industry in-house programmes, and non-profit organisations. These providers offer a wide variety of training formats — from short courses, webinars, and bootcamps to multi-year academic programmes — covering areas such as computer science fundamentals, introduction to AI, complementary AI skills, and practical business applications of AI.

See the *Supply of AI skills and training* section for more information on the supply of AI skills and training.

Addressing the AI skills and training gap

Most employers (96 per cent collectively in all four sectors) indicated that they are experiencing an AI skills gap in their businesses. When probed, it was clear that this AI skills gap relates to all the specific technical skills identified previously, particularly Machine Learning, AI Ethics, Governance and Regulations, Data Maturity, and AI Systems and Automation. Nine out of ten employers said they have a skills gap in relation to five or more of these specific AI skills. Employers in Agriculture and Food Processing highlighted specific gaps in relation to Visual Image Recognition and Neural Networks, reflecting the potential of these techniques to gather real-time information on crop status, soil conditions and animal health.

There is also clear evidence of a skills gap in relation to the behavioural skills – such as Critical Thinking, Creativity and Leadership – that are required to integrate AI successfully into the business. This AI skills gap is inextricably linked to the AI training gap; businesses have not been able to provide training at a level or rate sufficient to plug the skills gap. For example, only one quarter of UK businesses in the selected sectors indicated that half or more of their workforce has been provided with AI training in the past year.

A large majority of employers (91 per cent) across the four selected sectors said they believe these AI skills and training gaps will have negative consequences for their business over the next 12 months. Employers highlighted a range of such consequences, including higher operating costs, difficulties in introducing new working practices and technologies, increased staff workload, difficulties in meeting quality standards, and losing business to competitors.

Employers were keen to address the skills gaps they faced, but they encountered several key barriers to doing so:

- **Awareness** – employers were often unaware of relevant AI courses **and** AI training provision, both locally and nationally.
- **Content** – many employers felt that existing AI training provision, in terms of both its level and content, did not adequately cover the specific issues facing their business and their sector.
- **Access** – employers sometimes struggled to access existing training, e.g. in-person training courses not being available locally.
- **Cost** – employers were concerned that some existing AI skills training is prohibitively expensive.
- **Time** – time was recognised as the biggest barrier for employers in relation to providing AI training for their workforce.

The Hub is aiming to address each of these barriers e.g., Cost, by curating and promoting some *pro bono* training materials; and Awareness, by providing a one-stop shop directory of relevant and available AI training.

See the *Addressing the AI skills gap* section for more information on the AI skills and training gap and how to resolve this.

Next steps

To build on the findings presented in this White Paper, three key steps will be taken in relation to the four selected sectors:

- **Step 1: Delivery of a national AI outreach strategy for the selected sectors** – this is being designed and delivered in 2025-26 to raise AI awareness, drive AI adoption, and create long-term engagement with AI skills development across the UK economy. This is being done through a mix of in-person regional events, dissemination of thought leadership, and the rollout of a series of digital campaigns.
- **Step 2: Refining content on the Hub** – building on the initial launch, the next phase will focus on refining and expanding the Hub's content to better align with the skills needs identified through our research. This includes curating targeted learning pathways, expanding course offerings, integrating a talent map that visually represents the supply and demand for AI skills across the country, enhancing user experience through feedback and testing, and introducing new features such as learner forums and blog content.
- **Step 3: Engagement with stakeholders and additional research** – the engagement campaign with four key groups of stakeholders — employers, training providers, and technology partners — will continue at pace. Additional primary and secondary research will also be undertaken, including cross-country comparisons, further forecasting of skills needs, and survey research with technology partners and training providers. If you would like to be engaged as part of this ongoing work, please contact the team at uk_ai_skills_hub@pwc.com.

See the *Next steps* section for more information on the three key steps that will be taken.

Introduction

Artificial intelligence, skills and the UK economy

Artificial Intelligence (AI) is reshaping the global economy at pace. It has the potential to improve productivity, support innovation, and generate new economic opportunities. From generating new forms of digital content in the Creative Industries to optimising supply chains and enhancing climate resilience through smart agriculture, AI can support more informed decision-making and streamline complex processes across both the public and private sectors. *PwC*'s AI Jobs Barometer (2025b) reported three times higher growth in revenue per worker in industries more exposed to AI, along with a 66 per cent higher rate of skills change in AI-exposed occupations. These technologies may enable the development of higher-value roles, operational efficiencies, and access to new markets — both in the UK and globally.

In the UK, AI is transforming the structure and nature of work in some of our key sectors. In Agriculture and Food Processing, AI is facilitating precision farming, requiring rural workers to develop skills in data analysis and AI system oversight. The Construction sector is adopting AI-driven tools such as digital twins and robotics, increasing the demand for digital competencies in traditionally manual occupations. In the Creative Industries, Generative AI (GenAI) is challenging conventional models of authorship and copyright, highlighting the need for both AI fluency and legal and ethical understanding. Meanwhile, the Transport, Warehousing and Logistics sector is increasingly using route optimisation, creating demand for workers capable of managing AI-enabled systems in real time. These examples reflect a broader trend: AI is not simply automating tasks but shifting the structure and nature of work across industries.

AI has significantly shifted the demand for skills in the UK economy. As AI technologies become more embedded in business operations, products, and services, they are altering job requirements, creating new roles, and changing existing ones. This technological shift has exposed a changing demand for skills in the economy, and the UK must assess and respond to these emerging workforce requirements in order to remain competitive in an AI-driven economy. Indeed, *PwC's* (2025a) 28th Annual Global CEO Survey found that more than half of UK CEOs believe their current business models will become unsustainable within a decade without reinvention; and 70 per cent anticipate AI will significantly alter how their organisations create, deliver, and capture value over the next three years.

UK businesses are currently experiencing significant skills shortages, particularly in relation to digital and AI. Almost half (47 per cent) of UK CEOs cited skills gaps as the number one barrier they face in adopting AI and other emerging technologies. 52 per cent of these CEOs are upskilling their people to create a future-ready workforce (PwC, 2025a). These gaps extend beyond technical expertise to include broader capabilities such as data literacy, ethical awareness, and adaptive problem-solving. Addressing these gaps is key to supporting productivity, inclusion, and long-term economic resilience.

AI skills gaps also need to be filled to mitigate and effectively manage the associated risks of AI adoption, such as displaced roles, reinforcement of existing inequalities, and introduction of new forms of bias. For instance, the *Trades Union Congress* highlights how the use of AI

in management functions can have significant implications for workers in terms of their employment rights, such as their rights to privacy, data protection and equality, their physical and mental wellbeing (TUC, 2020). Without targeted intervention, AI could widen digital divides, deepen regional inequalities, and create misalignment between workforce capabilities and employer needs. Regulation, inclusive design, and a sustained focus on skills development will be essential to ensuring AI is deployed responsibly and delivers public value (e.g. *Ada Lovelace Institute*, 2022).

The AI Skills Hub

The AI Skills Hub (the Hub) aims to establish an online and dynamic ecosystem that connects employers, training providers, and AI technology partners to facilitate learning and development. The Hub has been commissioned and funded by *Innovate UK*, a part of *UK Research and Innovation (UKRI),* as part of the BridgeAI programme. PwC has been commissioned to design, build, and run the Hub. Ultimately, the Hub aims to support the UK government's initiatives to unify the fragmented AI skills landscape, supporting progress against the following key outcomes:

- **Driving measurable change nationwide** – a national investment that supports and coordinates efforts to help organisations across the UK overcome challenges in upskilling employees. The Hub will increase employer uptake of curated, sector-specific training on AI and, over the long term, contribute towards greater adoption and associated productivity gains.
- **Empowering sector collaboration and unlocking AI opportunities** – by listening to the needs of employers, training providers, and technology partners, the AI Skills Hub will convene an enduring ecosystem in the four sectors. It will open new markets for training providers and create sales channels for AI technology partners.
- **Positioning the UK as a global leader in AI skills** – by embedding international best practices and addressing systemic barriers, the AI Skills Hub will accelerate the UK's journey and impact in AI innovation and skills development. With comprehensive regional coverage, it promotes balanced economic growth and strengthens the UK's global AI competitiveness.

This White Paper summarises the findings from the first stage of a programme of work related to the current and future demand, supply and gap for AI skills and the existing AI training provision across four selected sectors: Agriculture and Food Processing; Construction; Creative Industries; and Transport, Warehousing and Logistics.

Methodological approach

Our analysis is based on a robust research approach consisting of quantitative and qualitative research methods, as well as primary and secondary research. An overview of the key elements of the methodological approach is provided in the following Table, and further information on each of the key stages of the research is provided in Annex B.

Overview of key elements of methodological approach

Literature scan	A review of existing literature in the AI and skills space, with particular focus on the four selected sectors, was conducted to support understanding of the existing context of each sector. 120+ documents were reviewed including a range of reports from the UK government, think-tanks, research institutions and international advocacy non-profit organisations. Additional information on the methodological approach is provided in Annex B and a full list of the reports cited in this paper is provided in Annex D.

AI skills taxonomy	We designed an AI taxonomy from a bottom-up approach, using job posting data combined with input from subject matter experts to produce 11 technical 'level 2' skill types and nine behavioural 'level 2' skill types that then break down into their composite 'level 3' skills, to establish a shared language around the technical AI skills and supporting behavioural skills required. Our methodology is informed by the *Innovate UK BridgeAI* AI Skills for Business Competency Framework[2], led by *The Alan Turing Institute*, The *Government Office for Science* taxonomy, and *Lightcast's* global AI skills database. Additional information on the methodological approach is provided in Annex B.
Job posting data analysis	We analysed over 65 million job postings through *Lightcast*, between 2018 to 2024. Through this we were able to gain insight into the specific skills employers in different sectors and regions of the country require from the labour force. We also considered job trends, trends in employers demand for educational qualifications and analysis on the analysis on the net skill change for occupations with varying exposure to AI. Additional information on the methodological approach is provided in Annex B.
Employer survey	A targeted survey aimed at human resource (HR) and technology leads of employers in the four selected sectors was conducted between February and May 2025. There were 515 respondents: 126 from Agriculture and Food Processing, 128 from Construction, 135 from Creative Industries, and 126 from Transport, Warehousing and Logistics. The survey included sections on AI adoption, AI skills needs for technical and non-technical roles, AI training provision, and the Hub priorities. It was administered in full compliance with the Market Research Society Code of Conduct. Additional information on the methodological approach is provided in Annex B.
Stakeholder engagement	Qualitative interviews were conducted with key stakeholders from employers, training providers, technology partners and other key stakeholders working in or connected to one of the four selected sectors, between February and June 2025. The interviews provided a deeper understanding of AI skills demand (and supply from providers), challenges and opportunities. A consistent set of questions were asked dependent on stakeholder type, with additional questions based on research conducted on the stakeholder prior to the interview. We conducted 31 interviews to inform this initial White Paper. We typically engaged with Chief Technology Officers (~60%), HR Directors (~15%) or other senior leaders (~25%) amongst employers, AI skills leads at training providers, and key personnel at technology partners. In addition, we have attended five AI/Tech conferences and events to gather information on use cases, gather information on demand for skills and connect with sector stakeholders. Each interview has been largely based on a core script of interview questions specific to the stakeholder type: employer, training provider, technology partner, or business representative organisation. Additional information on the methodological approach is provided in Annex B.

[2] *Innovate UK Bridge AI* | AI Skills for Business Competency Framework | https://www.turing.ac.uk/skills/collaborate/ai-skills-business-framework

Purpose and structure of the White Paper

The purpose of the White Paper is to collect evidence to understand the requirements for AI skills and training within the four selected sectors, as well as to identify the associated skills and training gaps. This includes detailing the methodology, presenting research findings, and initiating further consultation. The insights gained from this White Paper will be utilised to shape the key training programmes offered on the Hub. This White Paper is written by third parties and does not necessarily reflect the views of the UK government.

The main sections of the White Paper are as follows:

- **Overview of four selected sectors** – literature scan and assessment of key themes from across 70+ documents, including: an overview of the sector and its workforce; and perceived benefits and barriers to AI adoption.
- **Demand for AI Skills** – the current, anticipated, and predicted future (based on a full AI adoption scenario) demand for AI skills, as informed by the job posting data analysis, employer survey, and stakeholder interviews. Predicted future demand for AI skills is included to provide another view of future demand given the self-reported and identified fear and cynicism around AI of employers in these sectors.
- **Supply of AI Skills and Training** – an overview of the existing AI training available, against training provider segmentation, with specific reference to training programmes that are sector-specific; as well as the existing initiatives across the four sectors that are supporting increased AI adoption.
- **Addressing the AI Skills Gap** – an analysis of the skills and training gaps in the workforce; as well as the potential barriers that employers could face when attempting to resolve the skills and training gaps and how the Hub can remove these barriers. Insights that are cross-cutting and sector-specific will be explored.
- **Next steps** – an outline of the proposed next steps as part of this White Paper series, as well as the overarching *Innovate UK* AI Skills Hub project.

In addition, the White Paper contains four technical annexes as follows:

- Annex A: Sector and sub-sector definitions.
- Annex B: Additional information on methodological approach.
- Annex C: Detailed results from the job posting data analysis.
- Annex D: Bibliography.

Overview of the four selected sectors

Introduction

In the rapidly evolving AI landscape, the workforce challenges and the necessity for skills development have become increasingly pronounced. This is especially true within our four selected sectors: Agriculture and Food Processing, Construction, Transport, Warehousing and Logistics, and Creative Industries. Despite the potential benefits of AI in these sectors, the current rate of implementation remains disproportionately low. This section provides an overview of each sector, exploring the unique workforce and skills challenges they encounter. It investigates key themes, including the imperative for upskilling, the barriers to technology adoption, and the implications of demographic changes.

The section is structured as follows:

- Contribution of selected sectors to the UK economy.
- Skills and AI in the four selected sectors.
- Conclusions and implications.

Contribution of selected sectors to the UK economy

Innovate UK undertook an analysis to identify the four sectors across the UK that were the lowest adopters of AI versus those that would gain the most from its adoption. It is acknowledged that the sectors were selected before the publication of the Industrial Strategy. Taken together, the selected sectors contribute approximately £362bn to the UK economy (14 per cent of UK total GDP) and 5.5m UK jobs (17 per cent of UK total employment rate). Importantly, they are all regarded as sectors in which AI has huge potential to stimulate growth.

Overview of four selected sectors

Sector	Sub-sectors	GVA (2023)	People employed (2024)
Agriculture and Food Processing	Agritech, Agroforestry, Farming, Fishing & Aquaculture, Food Processing, Livestock, etc.	£49 billion	0.7 million
Construction	Residential buildings, Commercial buildings, Infrastructure, etc.	£141 billion	1.5 million
Creative Industries	Architecture, Arts & Craft, Culture and Heritage, Design, Fashion, Film & TV, Gaming, Media, Music, Photography & Videography, Podcast, Radio & Audio,	£81 billion	1.6 million

Sector	Sub-sectors	GVA (2023)	People employed (2024)
	Publishing, Theatre & Performing Arts, Writing & Journalism, Visual Effects (VFX) & Animation, etc.		
Transport, Warehousing and Logistics	Aviation, Bus & Coach, Light Rail, Micro-mobility, Tram & Metro Services, Rail, Taxi & Private Hire, Water Transport, Personal Vehicles, etc.	£91 billion	1.7 million

Notes: The data for GVA is derived from *ONS* GVA by industry in 2023, published in 2025. The employment figures are based on *ONS UK* employment statistics from 2024, published in 2025. Sector classifications for the purposes of this analysis follow the SIC 2007 codes. Further information on the sector breakdown is available in Annex A.

Skills and AI in the four selected sectors

Agriculture and Food Processing

As global food security becomes an increasing concern, organisations in the sector must produce food sustainably, yet at an increased rate for population growth, while complying with environmental policies and adapting to evolving consumer expectations. This necessitates innovation and the integration of new technologies to stay competitive.

The workforce is diverse and essential to its success. However, the sector faces significant workforce challenges, including an ageing demographic, skills gaps related to technological adoption, and seasonal labour shortages. While AI adoption in Agriculture and Food Processing has historically been constrained by structural and demographic challenges, recent global data suggests that usage is increasing — albeit gradually — as the sector begins to recognise the value of AI in enhancing productivity and sustainability (PwC, 2025b).

Key workforce and skills challenges

1	**Ageing demographic**	• In 2023, over a third of all farm holders in England were over 65 years, with only 5 per cent aged under 35 years (Department for Environment, Food and Rural Affairs, 2024b). • The influx of younger workers is insufficient, due to a disconnect between modern career aspirations and the physically demanding nature of agricultural roles. Concerns about chemical exposure, machinery, and the sector's profitability further deter new entrants (PwC, 2023). This hinders the sector's ability to attract talent and acquire skills.
2	**Reliance upon seasonal labour**	• There are often labour shortages in the sector due to its need for seasonal workers, rather than full-time, as well as low salaries (Food Standards Agency, 2023). • Seasonal roles are often marked by high turnover rates, complicating skills retention and continuity in the workforce.
3	**Lack of technology adoption and innovation**	• Many experienced farmers are hesitant to adopt new technologies or lack the digital skills needed to keep up, creating a considerable skills gap (PwC, 2023). • This issue is expected to be exacerbated by an aging population and an unstable workforce. Younger employees

		are more inclined to introduce innovative ideas and contemporary practices, which can improve productivity and promote greater sustainability.

With rising global demand for food and a push for sustainable practices, significant transformation driven by advancements in AI is essential for the sector's future viability. The table below summarises the benefits and barriers to AI adoption.

Examples of perceived benefits and barriers of AI adoption in Agriculture and Food Processing

Example of perceived benefits	
Operational efficiency	● AI technologies automate repetitive tasks such as fertilising and pest monitoring, and enable real-time data analysis, for streamlined operations. ● By reducing labour and input costs while boosting crop yields, AI-driven systems enhance overall farm economics (McKinsey & Company, 2024). ● These improvements contribute to cost savings and allow resources to be utilised more effectively - minimising waste and environmental impact. For instance, precision agriculture practices enabled by AI help farmers apply water and nutrients only where and when they are needed, conserving resources and reducing runoff.
Food quality and safety	● AI can transform food quality and safety protocols by reducing dependencies on external factors like weather and supply chain issues, while enhancing compliance with sector standards. ● In agriculture, AI advances crop breeding through phenomics, gene discovery, and gene editing, strengthening plants' defences against pests and environmental stressors (PwC, 2025c). ● In food processing, AI systems monitor production environments, detect contamination risks, and enforce quality control, safeguarding consumer health and promoting greater product integrity.
Innovation in product development	● AI integration drives innovation in product development, enabling new food products that align with changing consumer preferences and dietary trends. ● Organisations, such as *FoodTech*, are utilising AI to explore alternatives like animal-free proteins and innovative ingredient replacements, enhancing taste and texture to meet market demands (PwC, 2025c). ● By fostering the development of novel food products, AI helps businesses gain a competitive edge and enhance brand recognition in a rapidly evolving marketplace.
Example of barriers to adoption	
Lack of awareness of technology	● *Innovate UK* (2023) reported a lack of awareness of the available technology stemming from poor dissemination by technology developers and researchers as a key barrier to technology adoption. ● This is likely to be exacerbated by socio-economic divides and geographical differences.
Skills-related barriers	● A study reveals that a third of senior leaders identify a lack of skilled labour as the primary barrier to integrating digital and AI solutions, particularly emphasising limitations in understanding the scope of such advancements (Food and Drink Federation, 2023). ● This challenge is markedly acute outside of London, where most food and drink processing occur.

Innovation fatigue and decision paralysis	● Organisations are experiencing innovation fatigue — a sense of being overwhelmed by the constant influx of new technologies and solutions. With a wide array of AI-driven tools and platforms emerging, many are unsure which innovations are worth their time, investment, and operational change (Innovate UK, 2023). ● This uncertainty can lead to decision paralysis, where the fear of choosing the "wrong" solution results in delayed or avoided adoption altogether.

Construction

Construction is one of the largest sectors in the UK economy, but there are significant labour force challenges emerging, including a pressing need to improve productivity and sustainability, talent and skills shortages and fluctuating demand.

Key workforce and skills challenges

1	**Skills shortages**	● The workforce has significant skills shortages. The latest Office for National Statistics (2025) figures show that there are over 35,000 job vacancies and employers report that over half of vacancies can't be filled due to a lack of required skills – the highest rate of any sector. ● The UK must ramp up the number of completed Construction apprentices by around 25,000 per year to meet demand and avoid the skills gap worsening – that's an increase of 34% above the current levels (Checkatrade, 2023).
2	**Ageing demographic**	● The skills shortages are being further exacerbated by an ageing demographic (Checkatrade, 2023). ● Without a sufficient pipeline of young talent, the UK will struggle to meet the increasing Construction demand.
3	**Cyclical instability**	● The sector is sensitive to demand fluctuations due to its cyclical nature, influenced by economic changes, government policy, and variations in housing and infrastructure investments. ● These fluctuations often result in rapid hiring and subsequent redundancies, creating an unstable work environment. This instability makes it challenging for the sector to attract talent, as potential workers may perceive Construction jobs as insecure or temporary.

AI is increasingly recognised as a transformative force in Construction, offering solutions that enhance productivity, safety, and efficiency within the sector. Notably, a report reveals that nearly half (46 per cent) of Construction workers believe that upskilling in technological competencies, especially AI, will be essential to their roles in the next five years (Ranstand, 2024). This optimism underscores the potential of AI to reshape the sector. The Construction and Transport, Warehousing and Logistics sectors share overlapping supply chains and also face similar workforce challenges, barriers to AI adoption, and technical skill gaps. Given that Construction firms often build and maintain transport infrastructure, AI innovations — particularly in project management, predictive maintenance, and logistics — can deliver mutual benefits. A coordinated approach to AI training and investment across these sectors is therefore essential.

Examples of perceived benefits and barriers of AI adoption in Construction

Example of perceived benefits	
Project management	● AI algorithms can analyse vast amounts of data from previous projects to optimise timelines, allocate resources effectively, and predict potential delays (Ranstand, 2024). ● Moreover, real-time monitoring through AI-powered systems allows for the continuous assessment of project progress, helping teams identify issues early and make timely adjustments. ● This streamlines operations and leads to significant cost savings by reducing waste and rework, ultimately improving overall efficiency.
Safety and compliance	● The sector struggles with a high incidence of lost labour days due to injuries and illness, exacerbated by challenges posed by heavy machinery and unpredictable work environments (Health and Safety Executive, 2024b). ● By employing AI alongside sensor and camera technologies, companies can proactively identify and address potential hazards on site (El-Hanfy, 2025). This mitigates risks but also contributes to lowering injury rates, thus creating a safer workspace for workers.
Quality Control	● AI can play a vital role in quality control by continuously monitoring Construction materials and processes to detect potential defects or weaknesses. ● With the ability to analyse data and recognise incompatibilities between various products and systems, AI can identify issues during the early design phase. This allows teams to address problems before they escalate, significantly reducing the likelihood of costly rework later in the project (Ranstand, 2024).
Example of barriers to adoption	
Complex supply chains	● The sector operates within fragmented supply chains composed of diverse vendors, subcontractors, and suppliers, each with distinct processes. ● This complexity can result in poor visibility and integration across the supply chain, creating communication and coordination challenges that hinder the adoption of new technologies.
Job insecurity and resistance to change	● Employees in the sector, particularly those used to traditional methods, resist change, which is exacerbated by an aging workforce. Notably, 34 per cent of Construction employees fear that AI will threaten their job stability, and over 27 per cent would rather switch jobs than learn to use AI technologies (Randstad, 2024). This fear of automation and skills obsolescence can significantly hinder the adoption of new technologies.
Complex regulatory environment	● The Construction sector faces numerous regulations and compliance requirements that differ by region, project type, and stakeholder. These complex regulations often concern safety, environmental impact, quality control, and labour practices, making it challenging to navigate compliance and hindering AI technology adoption.

Creative Industries

There is an ambition from the *UK government* to grow the sector by an extra £50 billion while creating one million extra jobs by 2030 (DCMS, 2023). As technology and AI continues to infuse the sector, there is a large opportunity for the UK. However, the sector faces several critical workforce and skills challenges that hinder their growth and innovation, including the prevalence of a self-employed workforce, significant talent and skills gaps, and insufficient investment in upskilling and training initiatives.

Key workforce and skills challenges

1	**Limited employee protection and benefits**	• A striking 32 per cent of those employed in the sector were self-employed, more than double the self-employment rate observed in the broader UK economy (14 per cent) (Goddard, 2023). • This prevalence of gig employment adds a layer of instability and insecurity, leaving many workers without the benefits and protections typically associated with traditional employment.
2	**Skills shortages**	• The sector is experiencing significant skills shortages, with employers particularly concerned about accessing advanced digital skills, as well as job-specific, transversal, and management skills. Businesses facing these shortages are over twice as likely to find that applicants need upgrades in specialised IT skills, such as graphic design and multimedia. • Additionally, around 60,000 creative workers were reported as not fully proficient in their roles in 2022, up by 15,000 since 2017 (Giles, Carey, and O'Brien, 2025).
3	**Access to training**	• Despite the substantive impact of skills deficiencies and the ambition of creative businesses, employers are not investing sufficiently in upskilling their workforce: 55 per cent of employers are providing training for their workforce, compared to the industry average of 60 per cent (Giles, Carey, and O'Brien, 2025). • Additionally, many creative professionals face challenges in accessing essential upskilling and reskilling opportunities as they are self-employed.

Recently, the integration of AI into the Creative Industries has catalysed significant transformations, bringing both opportunities and challenges. AI tools are increasingly utilised to enhance creative processes, streamline design workflows, and foster deeper customer connections. The table below summarises the benefits and barriers to AI adoption.

Examples of perceived benefits and barriers of AI adoption in Creative Industries

Example of perceived benefits	
Creative processes and content generation	• AI can streamline and enhance the creative processes involved in content generation, from ideation to execution. • For example, AI-driven platforms can assist in generating initial drafts for articles or suggesting visuals allowing creatives to focus on refining and imbuing their work with unique human elements. This is demonstrated by 82 per cent of marketers asserting that AI enables them to engage in more innovative work (Canva, 2025).
Data-driven personalisation	• In the competitive landscape of the sector, understanding the audience is crucial for success. AI can tailor content to individual preferences on a massive scale. • For instance, AI can generate personalised advertisements and messages that resonate with each target audience, enhancing engagement and conversion rate (PwC, 2024).
Operational efficiency	• AI tools can optimise workflows by automating project management tasks, tracking resource allocation, and predicting potential delays. 85 per cent of marketers surveyed are saving at least 208 hours annually using AI (Canva, 2025). • Organisations can reduce costs and maximise the productivity of their teams, allowing them to focus more on creative output.

Example of barriers to adoption	
Fear of job displacement	● As AI technologies become more capable of producing high-quality creative outputs, there are fears that human workers may be rendered obsolete, such as graphic design and content generation ● This anxiety is particularly prevalent among entry-level professionals, freelancers and self-employed (Queen Mary University, 2025).
Concerns about loss of creativity	● Another concern is the risk of diminished creativity as AI takes on a larger role in content creation. A survey revealed that 72 per cent of professionals are apprehensive that AI could lead to homogenised marketing, resulting in a lack of originality in outputs (Canva, 2025). ● The fear is that reliance on AI-generated content might produce predictable and formulaic results, undermining the unique human touch that characterises truly innovative work.
Copyright laws	● There is ambiguity surrounding copyright law related to AI-generated content. Many creators worry that their original work could be used by AI companies without proper compensation. A poll from *Stack Data Strategy* showed that 69 per cent of Britons believe creators should be paid when their copyrighted materials are used by AI. This fear of exploitation can discourage artists and creators from embracing AI technologies, as they are unsure of their rights and potential financial implications. ● In response to these concerns, organisations like the Copyright Clearance Centre are working on collective licensing solutions to ensure that copyright laws are upheld in AI applications.

Transport, Warehousing and Logistics

The sector faces ongoing supply chain disruptions caused by geopolitical tensions, trade disputes, and the lingering effects of the COVID-19 pandemic, which have led to shipping delays and increased costs. Regulatory pressures, particularly concerning environmental sustainability and emissions reductions, are also necessitating significant investment in green technologies and infrastructure. These issues are further exacerbated by the workforce and skills challenges.

Key workforce and skills challenges

1	**Skills shortages for specific roles**	● The sector is experiencing an ageing workforce, creating a shortage of talent across roles, most notably within heavy good vehicle (HGV) drivers. ● It is estimated that approximately 200,000 new drivers need to be recruited by 2030 to meet demand (RHA, 2025). ● Several factors contribute to this, including restrictive immigration policies that have limited the influx of skilled workers, compounding an already difficult situation. Poor working conditions and low pay have further dissuaded potential recruits from entering the field.
2	**High turnover rates**	● The sector also faces high turnover rates, particularly in warehousing roles. This creates ongoing recruitment challenges, leading to increased training costs and a lack of workforce stability. ● The demanding nature of the role, often characterised by long hours, physical labour and limited career opportunities contributes to frequent job changes.

3	**Constraints to technology adoption and innovation**	● The ageing workforce and high turnover rates are stifling innovation and adoption of technologies across the sector. ● Younger, more permanent employees typically exhibit greater motivation and enthusiasm to embrace technological advancements and drive innovation within the workplace. ● The lack of engagement from an aging workforce, which may be less inclined to adopt new technologies, further exacerbates this issue.

The Transport, Warehousing and Logistics sector would benefit from AI transformation due to improved road safety, reduction in emissions and transformation of tasks. Despite these benefits, in a recent *YouGov* poll of transport and logistics professionals, only 25 per cent stated that their organisation leveraged AI capabilities, suggesting significant untapped potential in the sector (HERE Technologies, 2024). The table below summarises the benefits and barriers to AI adoption.

Examples of perceived benefits and barriers of AI adoption in Transport, Warehousing and Logistics

Example of perceived benefits	
Improved road safety	● AI is enhancing road safety through advancements such as autonomous vehicles, optimising traffic management systems, and employing computer vision for safety interventions.
Reduction in emissions	● AI improves route optimisation and boosts capacity utilisation, both of which contribute to significant emissions reductions. Effective AI implementations can result in emissions reductions of up to 7 per cent through efficient route planning and asset management, with enhanced capacity utilisation yielding an additional 4 per cent decrease in emissions (WEF, 2025). ● Leading logistics providers, including *DHL*, *Amazon*, and *UPS*, have mainstreamed these technologies, improving goods delivery times by leveraging real-time traffic and weather analyses for route optimisation.
Transformation of tasks	● In the realm of industrial robotics, experts highlight the “Four Ds” framework — Dirty, Dull, Distant, and Dangerous — as areas where robots and AI can effectively support human workers. In express logistics, for example, AI-powered sorting robots are proving to be transformative, increasing sorting capacity by over 40 per cent (DHL, 2022). This not only enhances operational efficiency but also allows human workers to focus on more complex and rewarding tasks, ultimately leading to a more productive workforce.
Example of barriers to adoption	
AI investment costs	● According to *HERE Technologies* (2024) report, cost is cited as the number one barrier to technology implementation. ● The initial investment required for AI solutions — including hardware, software, and integration costs — can be daunting. Many organisations operate on thin profit margins across the sector and may prioritise short-term operational expenses over long-term technology investments.
Disruption to existing services	● Potential disruption to existing services is cited as the second largest barrier to technology adoption (HERE Technologies, 2024). ● Introducing AI solutions can result in disruptions to well-established processes and workflows in the Transport, Warehousing, and Logistics sector.

	● For instance, implementing AI-driven route optimisation tools or automated warehousing systems may require changes to how operations are run, which can temporarily disrupt service delivery and impact customer satisfaction.
Lack of AI technical skills	● Many organisations face substantial skills gaps related to data analytics, machine learning, and emerging AI tools. For example, warehouse workers may lack the technical skills necessary to operate automated picking systems or data-driven inventory management platforms.

Conclusions and implications

This section has provided an overview of the four selected UK sectors *Innovate UK* selected to be the focus of this work. All four sectors are regarded as ones in which AI has significant potential to stimulate growth, and they are also sectors in which the current rate of AI adoption is relatively low. Our research shows that the sectors are all facing important sector-specific workforce challenges and barriers to adopting AI, suggesting strongly that interventions aimed at tackling the issues need to have a bespoke, sector-specific flavour. In addition, the four sectors all share some features in relation to AI challenges and AI adoption, and this suggests that the following three implications apply to each sector.

1. *Creating a culture of innovation* – the business case for adoption of AI

Across all four sectors, there is a critical need for the effective adoption of innovative technologies to enhance productivity and sustainability, especially in the face of challenges like fluctuating demand, high staff turnover and demographic shifts. Integrating advanced technologies such as AI presents significant opportunities for operational transformation. Companies in these sectors should therefore prioritise creating a culture of innovation that embraces technological advancements and the integration of AI into their businesses.

2. *Bridging the skills gap* – the need for AI upskilling and reskilling

It is clear from existing evidence there is an urgent need across all sectors for AI upskilling and reskilling to keep pace with emerging technologies. As industries increasingly incorporate digital tools and AI, there is a growing recognition of substantial AI skills gaps among workers. This skills gap is underscored by findings from *PwC's* CEO survey (2025), where 47 per cent of UK CEOs identify skills shortages as the primary obstacle to advancing technology projects.

3. *Tackling the digital divide* – understanding the digital divide and how to tackle it

The need for equitable training opportunities is paramount in addressing the socio-economic and geographical disparities faced across these sectors. For example, the digital divide in Agriculture reveals how many lack awareness of the available technology, while the Creative Industries face challenges due to a diverse and often self-employed workforce, contributing to instability and skills shortages. Ensuring equitable access to training and development resources is essential for enabling all segments of the workforce to thrive amidst ongoing changes.

Demand for AI skills

Introduction

This section outlines the current and future demand for key technical and behavioural skills. Given the prevailing fears and scepticism around AI, it is assumed that there is latent demand for AI skills. Therefore, the report also explores AI use cases and their potential impact on future skill requirements in various sectors.

The section is structured as follows:

- Current and future demand for AI skills.
- Technical AI skills requirements.
- Behavioural AI skills requirements.
- Future possibilities for AI in selected sectors.
- Conclusions and implications.

Current and future demand for AI skills

Globally, technology-related skills — including AI, Big Data, Networking, Cybersecurity, and Technological Literacy — are expected to emerge as some of the fastest-growing competencies globally (WEF, 2025). Importantly, while specialised AI skills will be crucial in specific contexts, the broader shift in skill requirements encompasses a wider range of competencies. There is an increasing need for foundational digital literacy and data science skills, as well as essential cognitive and transversal skills, such as Critical Thinking, Problem-Solving, and Creativity (OECD, 2023).

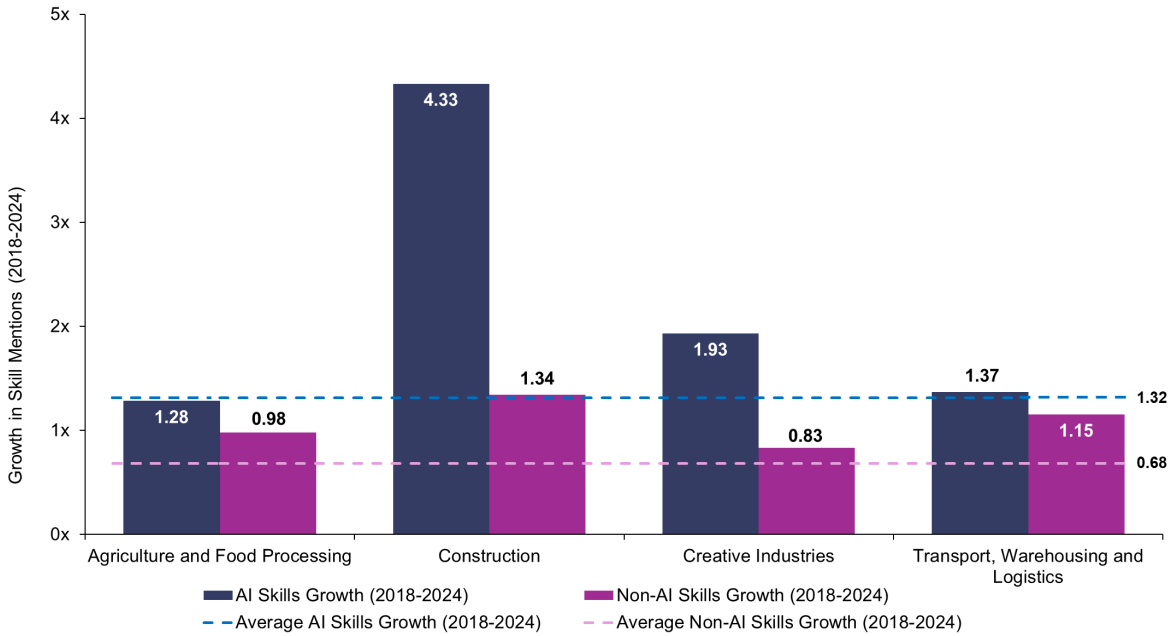
Demand for AI skills in the UK is experiencing significant growth, with various studies indicating a consensus on this upward trend (e.g. Bone et al, 2025; Schmidt et al, 2024; PwC, 2024). This demand extends beyond traditional "technology-heavy" sectors; even industries historically slower to adopt digital tools — such as agriculture — are beginning to recognise the transformative potential of AI.

AI adoption in the workforce typically manifests in two ways: augmentation and automation. Augmentation refers to the use of AI to enhance human capabilities — supporting decision-making, improving productivity, and enabling new forms of work — while automation involves AI replacing or performing tasks traditionally done by humans. Recent UK analysis shows that augmentation is outpacing automation, with job postings for augment roles growing faster and remaining more resilient over time. As of 2024, augment roles were indexed at nearly 1.4 times their 2012 levels, compared to just over 1.0 for automate roles. This trend reinforces the view that AI is making workers more valuable, not less — even in highly automatable roles — with job growth and wage premiums rising across AI-exposed sectors. Skills for AI-exposed jobs are evolving 66% faster than for other roles, underscoring the urgency of upskilling and reskilling across all sectors. Moreover, industries with higher AI exposure are seeing up to three times greater growth in revenue per employee, strengthening the economic case for accelerating AI adoption and workforce readiness across the UK.

Our job posting analysis for the four selected sectors shows that the demand for AI skills grew between 2018 and 2024 at a rate that was around twice as high as the growth rate for non-AI skills. The Construction sector saw the highest difference between growth rates,

while the Agriculture and Food Processing and Transport, Warehousing and Logistics sectors saw the smallest difference between growth rates.

Growth in the demand for AI and non-AI skills, by sector, 2018-2024



Notes: This data is taken from *PwC*'s analysis of 66 million job postings data provided by *Lightcast*. The figures show the trends in AI and non-AI skills mentions between 2018 and 2024 in the UK. The average growth figures provided represent the average across all UK sectors. Further information on our approach to the job posting data analysis is provided in Annex B.

The Construction sector's position as the sector with the largest gap between AI and non-AI skill growth (4.33x versus 1.34x) may reflect the sector's accelerated integration of AI tools and automation post-pandemic. As Construction firms increasingly see the opportunities with AI and adopt technologies like AI-powered design, robotics, and project management platforms, demand has surged for AI-related skills that support operational transformation.

In contrast, Agriculture and Food Processing was the only selected sector where growth in AI skills (1.28x) fell below the UK sector average (1.31x versus 1.34x) and showed only a slight increase compared to non-AI skills. This may reflect structural barriers such as limited digital infrastructure, fragmented employer bases, and slower uptake of AI innovation. While AI may be beginning to impact the sector through automation, its full potential may still be constrained by a lack of technical capability, awareness of benefits or investment in the sector. Stakeholders have reported uncertainty and a lack of enthusiasm, where they are unsure which product to invest in:

> **There are uncertainties about the cost and potential benefits. I think people will be sceptical as to what AI would bring. Is it worth the cost? Is it worth the effort?**
>
> Business representative organisation (BRO), Agriculture and Food Processing

> **Everyone is selling themselves as an AI expert and wants a piece of the action. AI is everywhere. We need a partner with real AI expertise, not just in it for the money, to complement our business growth. We're not the type to throw money around."**
>
> BRO, Agriculture and Food Processing

Technical AI skills requirements

Eleven key technical AI skills were identified in this research. These are described below.

Definitions of Technical AI skills

Skill	Description
AI Ethics, Governance and Regulations	Ensuring AI systems operate ethically, securely, and in compliance with legal and societal standards. It includes AI fairness, transparency, accountability, security, risk management, and regulatory compliance.
AI Systems and Automation	Autonomous decision-making, cognitive computing, and AI-driven automation. It includes AI-powered frameworks, intelligent decision support systems, multi-agent AI, expert systems, AI-driven IT operations.
Autonomous Driving	Self-driving vehicle technologies, enabling vehicles to operate without human intervention. It includes perception, sensor fusion, path planning, motion control, and Advanced Driver Assistance Systems (ADAS), distinct from general robotics.
Data Literacy	Ability and knowledge required to effectively work with data, from its collection and analysis to its interpretation and presentation. These skills are essential for making data-driven decisions and can be broadly categorised into technical and analytical skills.
Digital Literacy	Ability and knowledge required to effectively implement and manage digital technologies within an organisation to drive change and improve business processes.
Generative AI	Models and techniques that create new content, such as text, images, speech, and video. It includes large language models (LLMs), generative adversarial networks (GANs), text-to-image models, speech synthesis, and AI-powered content generation.
Machine Learning	Development and application of algorithms that enable computers to learn from data and improve performance over time without explicit programming. It includes supervised learning, unsupervised learning, reinforcement learning, feature engineering, and model evaluation techniques.
Natural Language Processing	Enabling computers to process, understand, analyse, and generate human language in written and spoken forms. It includes techniques such as speech recognition, chatbots, machine translation, large language models (LLMs), sentiment analysis, and text mining.
Neural Networks	Artificial neural network architectures inspired by the human brain. It includes convolutional neural networks (CNNs), recurrent neural networks (RNNs), generative adversarial networks (GANs), transformer models and attention mechanisms used in deep learning.

Skill	Description
Robotics	Design, construction, operation, and programming of robots that interact with the physical world. It includes industrial robots, humanoid robots, robotic automation, and mobile robotic systems, excluding self-driving vehicles.
Visual Image Recognition	Processing and interpretation of visual data, including images and videos. It encompasses image classification, object detection, facial recognition, image segmentation, motion analysis, and scene understanding.

Notes: These definitions are based on *PwC's* AI Skills Taxonomy developed for this project, informed by *The Innovate UK BridgeAI* AI Skills for Business Competency Framework, led by *The Alan Turing Institute*, the *UK Government Office for Science's* AI Skills Taxonomy, and *PwC's* AI Barometer Skills Taxonomy.

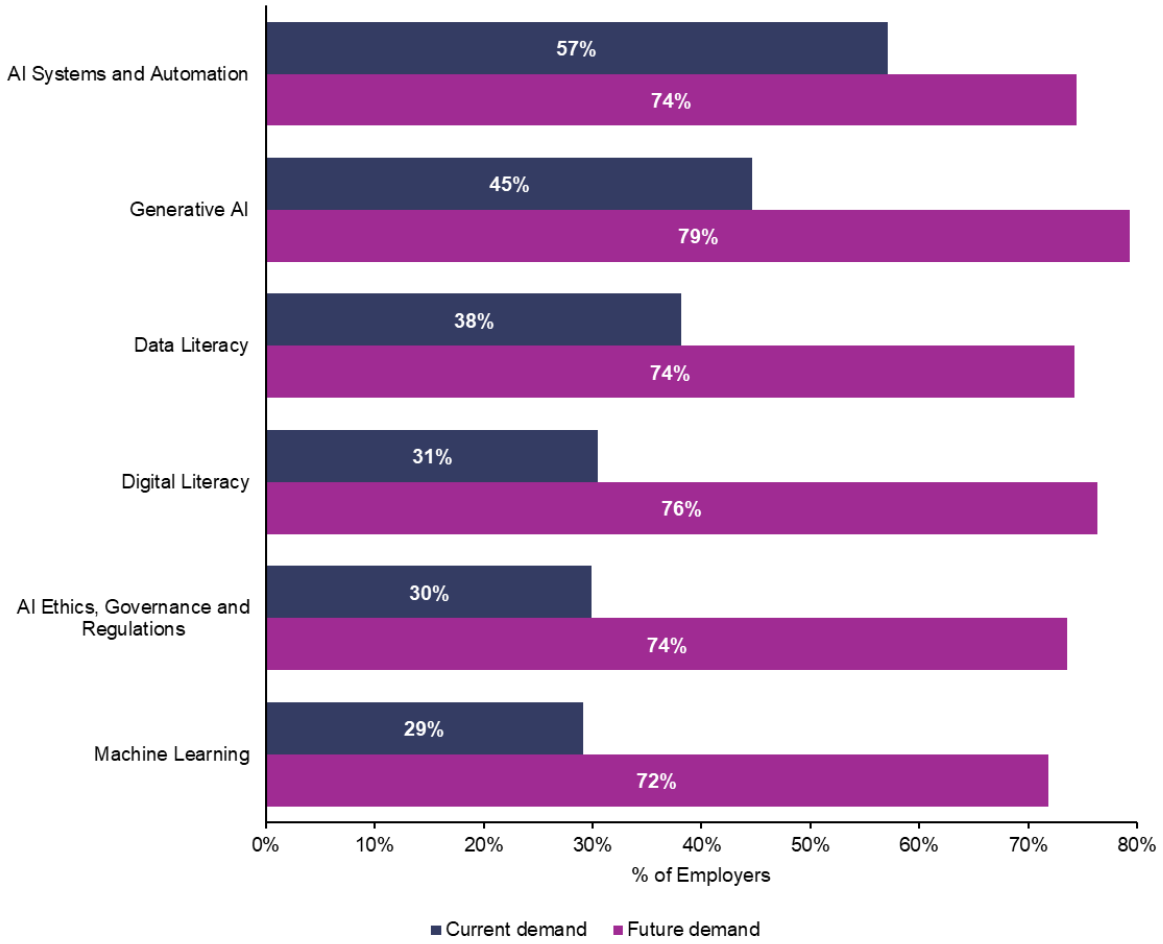
Our research indicates that six technical AI skills are most important in the four selected sectors (see Figure below). AI Systems and Automation ranked highest, with over half of employers (57 per cent) surveyed citing it as one of the top three most critical AI skills for organisational growth. This was followed by GenAI and Data Literacy, selected by 45 per cent and 38 per cent of employers respectively as essential AI capabilities. These trends were consistent across the four sectors.

From a future demand perspective, the trends are similar with a few minor differences. Almost 80 per cent of all employers surveyed (79 per cent) believe that demand for GenAI skills will increase in the next five years. Employers in Agriculture and Food Processing (58 per cent) and Creative Industries (57 per cent) foresee strong growth in GenAI skills. Construction expects modest gains in AI Systems and Automation. Transport, Warehousing, and Logistics predict significant growth in Data Literacy (48 per cent).

These insights highlight a common recognition across sectors that AI skills will be crucial for future success and innovation. This sentiment is echoed across different company sizes, with medium and large companies particularly optimistic about the future need for these skills. For example, 43 per cent of small companies and 41 per cent of large companies expect a significant increase in AI Systems and Automation.

> **We absolutely foresee skills changing across the next five years.**
>
> Employer, Agriculture and Food Processing

Top technical skills seen as most critical to growing organisations, now and in the future, by employers across the four selected sectors



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

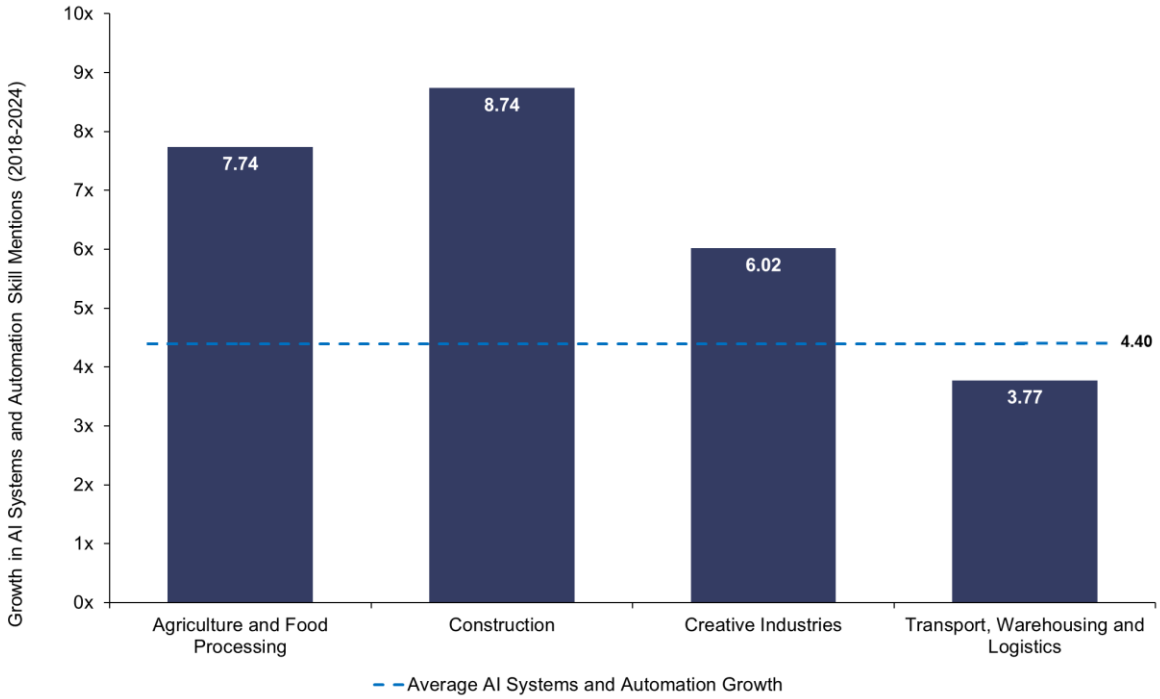
Additional findings on the top six most in demand technical skills are outlined below.

AI Systems and Automation

AI Systems and Automation was found to be one of the top three fastest growing AI skills in demand from 2018-2024 in the job posting data analysis. For every one skill mention that it had in 2018, it had 3.4 mentions in 2024. The rise of AI Systems and Automation may indicate how AI is gradually becoming an integral part of day-to-day business operations.

This skill was also the most in-demand for the Construction and Agriculture and Food Processing sectors from the job posting data analysis. In both sectors, the findings suggest that automation is quickly becoming a core operational competency. Organisations are not just experimenting with AI systems but are increasingly integrating them into day-to-day workflows, shifting workforce demands towards jobs that require expertise, maintenance and operation of automated AI systems. Notably, the Transport, Warehousing and Logistics was the only selected sector where growth in AI Systems and Automation skills (3.77x) was less than the UK sector average (4.4x). This may reflect the fact that many core automation processes in this sector, such as warehouse robotics and fleet scheduling, were already in use prior to 2018, meaning that some early adopters had already integrated these technologies before the analysis period. It could also point to slower expansion of advanced AI applications beyond logistics hubs and large operators, with smaller firms yet to fully implement or scale automation tools.

Growth in demand for AI and Automation Skills, by sector, 2018-2024



Notes: This data is taken from *PwC's* analysis of 66 million job postings data provided by *Lightcast*. The figures show the growth in AI Systems and Automation skill mentions between 2018 and 2024. The average represents the average across all UK sectors. Further information on our approach to the job posting data analysis is provided in Annex B.

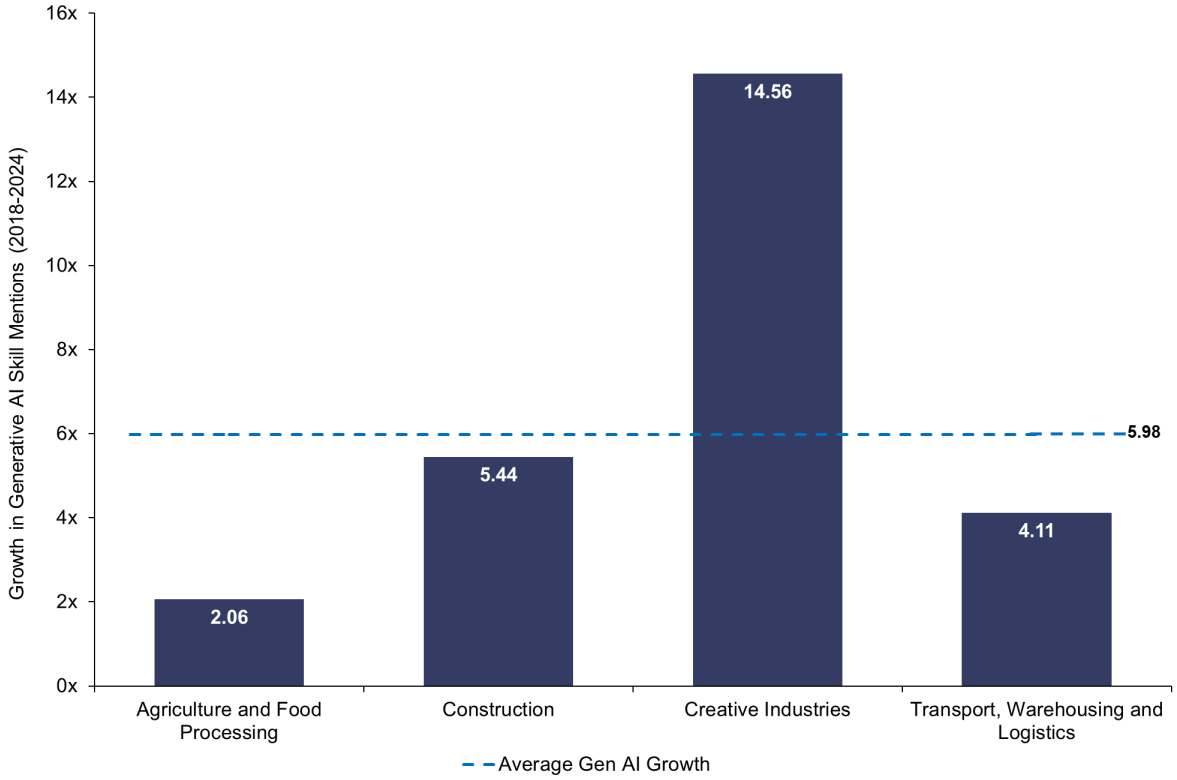
Generative AI

Generative AI (GenAI) was found to be the AI skill in fastest growing demand across the UK in our job posting data analysis. For every one mention that GenAI had in 2018, it had a significant 5.0 mentions in 2024, although it was not until 2022/23 that it saw a significant uptick in its skill mentions, spiking from 1.3 mentions in 2022 to 2.7 mentions in 2023 to easily establish itself as the leading AI skill by 2024. It is likely this timing coincided with the recent emergence and uptake of GenAI on a global scale, with day-to-day tools like GPTs having only become universally accessible to the general public over the past two to three years.

Across the four selected sectors, the Creative Industries sector saw by far the fastest growing demand for GenAI skills across 2018-2024, with mentions growing significantly (14.56x) from 2018 to 2024. This is unsurprising, given the previously established nature of the Creative Industries sector as an active adopter of GenAI tools in enhancing creativity and accelerating visual, audio and textual content production.

Contrastingly, the Agriculture and Food Processing (2.06x) and the Transport, Warehousing and Logistics sectors (4.11x) trailed behind the UK average (5.98x). This slower growth may reflect limited applicability or awareness of generative tools in these sectors, where operational AI such as automation or robotics has traditionally been the dominant focus. It may also point to lower digital literacy or reduced investment in content-facing AI applications, especially among smaller employers or firms with constrained innovation budgets. These results suggest that while GenAI is rapidly gaining traction, its impact remains uneven across sectors and may be concentrated in industries where communication, design, and content creation are core to value generation. As generative tools become more powerful and accessible, employers in traditionally non-creative sectors may need targeted support to identify practical, productivity-enhancing GenAI use cases.

Growth in demand for GenAI skills, by sector, 2018-2024

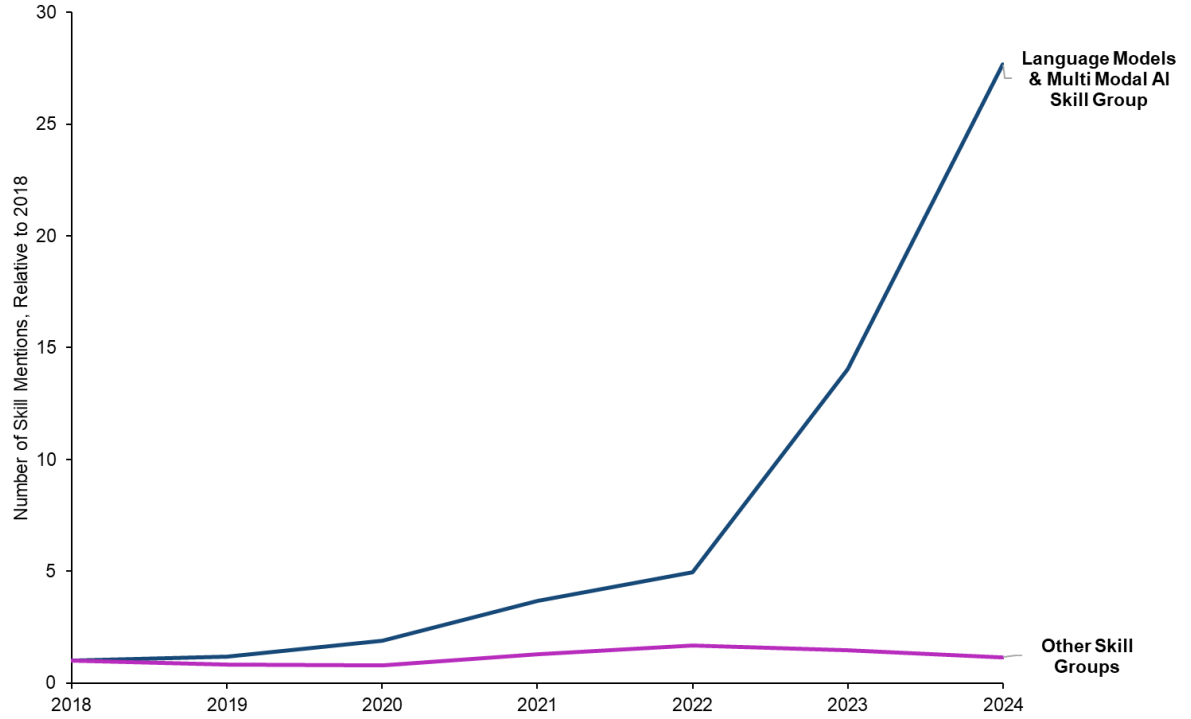


Notes: This data is taken from *PwC's* analysis of 66 million job postings data provided by *Lightcast.* The figures show the growth in GenAI skill mentions between 2018 and 2024. The average represents the average across all UK sectors. Further information on our approach to the job posting data analysis is provided in Annex B.

> **AI literacy is now a must-have skill, especially prompt engineering, for Marketing / Design.**
>
> Employer, Creative Industries sector

It is worth noting, however, that, across the job postings, many of the fastest growing AI skills such as ChatGPT, generative pre-training transformer (GPT) and Multimodal Learning were framed in broad, generalised terms often referencing tools like ChatGPT without specifying the underlying technical skills required to use them effectively. In addition, demand for Language Model and Multi-Modal AI skills remained relatively modest up until 2021, but then accelerated sharply from 2022 onwards, outpacing the growth rate of all other AI skill groups combined. For every one skill mention the Language Model and Multi-Modal AI skills group had in 2018, they had 5.0 mentions in 2022 and then a significant 14.0 mentions in 2023 and 27.7 mentions in 2024. Contrastingly, for every one skill mention the other level three skill groups had in 2018, only 1.7, 1.5 and 1.2 mentions were recorded across 2022-2024, respectively.

Growth in demand for Language Models & Multi Modal AI skills



Notes: This data is taken from *PwC's* analysis of 66 million job postings data provided by *Lightcast.* The figures show the trends in Language Models & Multi Modal AI skills mentions versus other level 3 skill groups skills mentions since 2018. Further information on our approach to the job posting data analysis is provided in Annex B.

The sudden divergence observed in the results coincides with the mainstream public adoption of Large Language Models and GenAI tools like ChatGPT, Google Bard and similar platforms. These results suggest that while the underlying growth in Language Model and Multi-Modal AI related skills is likely genuine, reflecting the rapid uptake of GenAI across sectors, there is also likely a degree of inflated skill mentions driven by employer familiarity and overuse of buzzwords, rather than detailed knowledge of technical AI competencies.

As such, it becomes important to view significant growth rates of skills like ChatGPT or GPT with a degree of caution. While these terms indicate a clear rising interest in GenAI expertise and capabilities, they may not always correspond to specific, technical skill demands in job postings. Ultimately, these findings highlight the significance of contextualising skills data, particularly in situations like the job postings analysis where specific language used by employers can drastically bias the way in which results are perceived.

Data Literacy

Data literacy has repeatedly been identified as critical to enabling the adoption of AI in an organisation and across UK industries. Indeed, it has been found that 85 per cent of AI projects fail due to lack of relevant data, poor data quality and unclear objectives (Francis, 2024). The implementation of AI requires robust data strategy, governance, and management; as well as data readiness, as demonstrated via data quality, references/metadata, governance and access, lineage, and more (see *Digital Catapult's* AI Adoption Toolkit[3] for more).

[3] Digital Catapult | AI Adoption Toolkit | https://apps.digicatapult.org.uk/ai-adoption-toolkit/

> **Data investment is crucial. Data must be clean, consistent, and structured. Currently, 47 per cent of industry data is still paper based.**
>
> Consultant, Construction sector

Our survey found that 38 per cent of employers identified Data Literacy as one of the top three most critical AI skills for organisational growth, with consistent responses across organisation sizes — 34 per cent of small, 39 per cent of medium, and 42 per cent of large organisations. This suggests a widespread recognition of the role of data literacy in enhancing business growth and efficiency. From a sector perspective, Agriculture and Food Processing ranked highest at 44 per cent, while the Creative Industries ranked lowest at 33 per cent. This indicates that data literacy is seen as especially vital in Agriculture and Food Processing, where AI applications often rely on structured data for optimising supply chains, improving crop yields, and ensuring food safety. In contrast, the Creative Industries may place greater emphasis on generative and design-focused AI tools, where data literacy plays a less central role. Stakeholders echoed this trend, emphasising the importance of data skills as a foundation for successful AI adoption.

> **Data management skills are essential; without them, tips on data, auditing systems, and data management systems will not be useful.**
>
> Business representative organisation, Cross-cutting

Digital Literacy

Digital Literacy has emerged as a critical skill among stakeholders interviewed and ranked as one of the top technical skills essential for organisational growth, as evidenced by the survey findings. This significance is consistent across all four sectors analysed, with the Creative Industries recognising it at the highest rate of 35 per cent, while Agriculture and Food Processing noted the lowest at 29 per cent.

This skill set involves not only familiarity with digital tools and technologies but also the ability to foster an adaptive organisational culture, establish efficient processes, and implement a strategic vision that prioritises innovation and agility. In sectors such as the Creative Industries, where fast-paced changes are commonplace, those with strong digital literacy skills are better equipped to leverage AI advancements effectively — whether enhancing content creation, improving customer engagement, or streamlining operations.

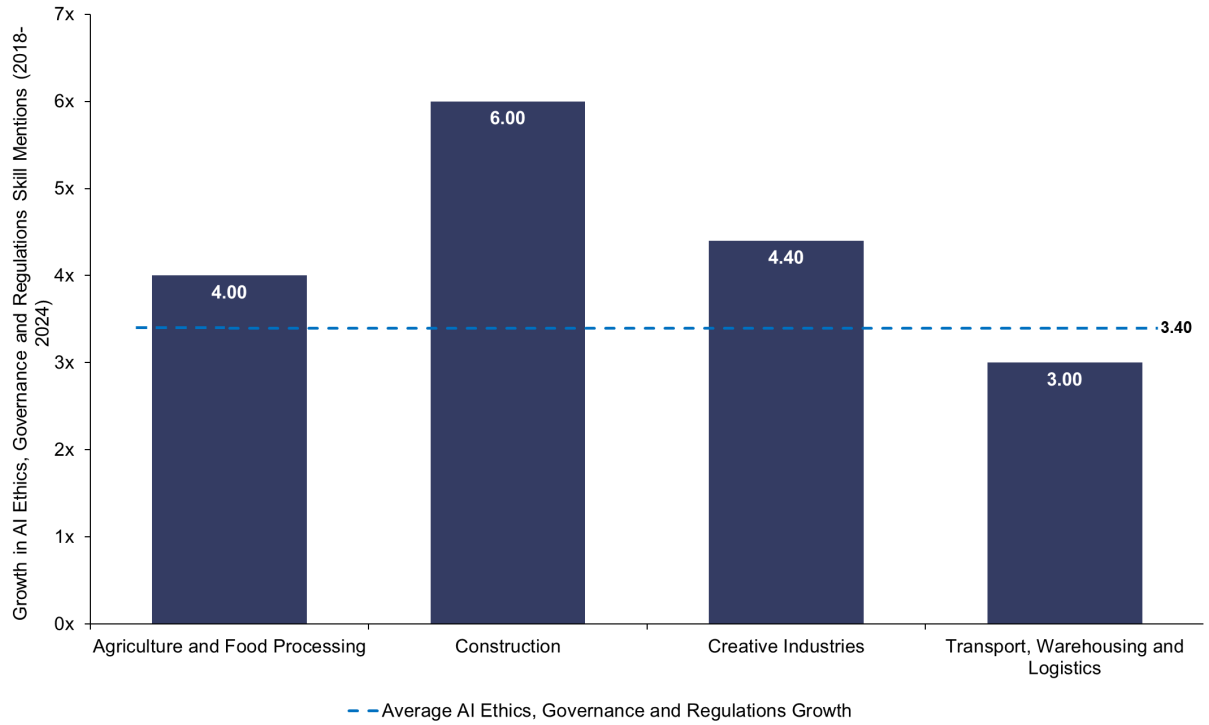
Organisations who fail to recognise the significance of this critical skill set may struggle to create the necessary digital infrastructure and processes required to realise full AI adoption in their organisation and its associated benefits.

AI Ethics, Governance and Regulations

In the survey, the Agriculture and Food Processing sector reported the highest demand for AI Ethics, Governance, and Regulation, while the Construction sector recorded the lowest. Stakeholder interviews revealed that the lower AI adoption in Agriculture and Food Processing is often driven by fear and uncertainty, which likely contributes to the heightened demand for expertise in this skill. This trend underscores a significant shift in skills priorities as AI adoption grows. As AI becomes more embedded in everyday life, the demand for responsible, transparent, and explainable AI usage is accelerating. Stakeholders are increasingly acknowledging the importance, especially given the increasing complexity and evolution of these frameworks.

AI Ethics, Governance and Regulations was also found to be one of the top three fastest growing AI skills in demand from 2018-2024 in the job posting data analysis. For every one skill mention that AI Ethics, Governance and Regulations had in 2018, it had 3.4 mentions in 2024.

Growth in demand for AI Ethics, Governance and Regulations skill mentions, by sector, 2018-2024

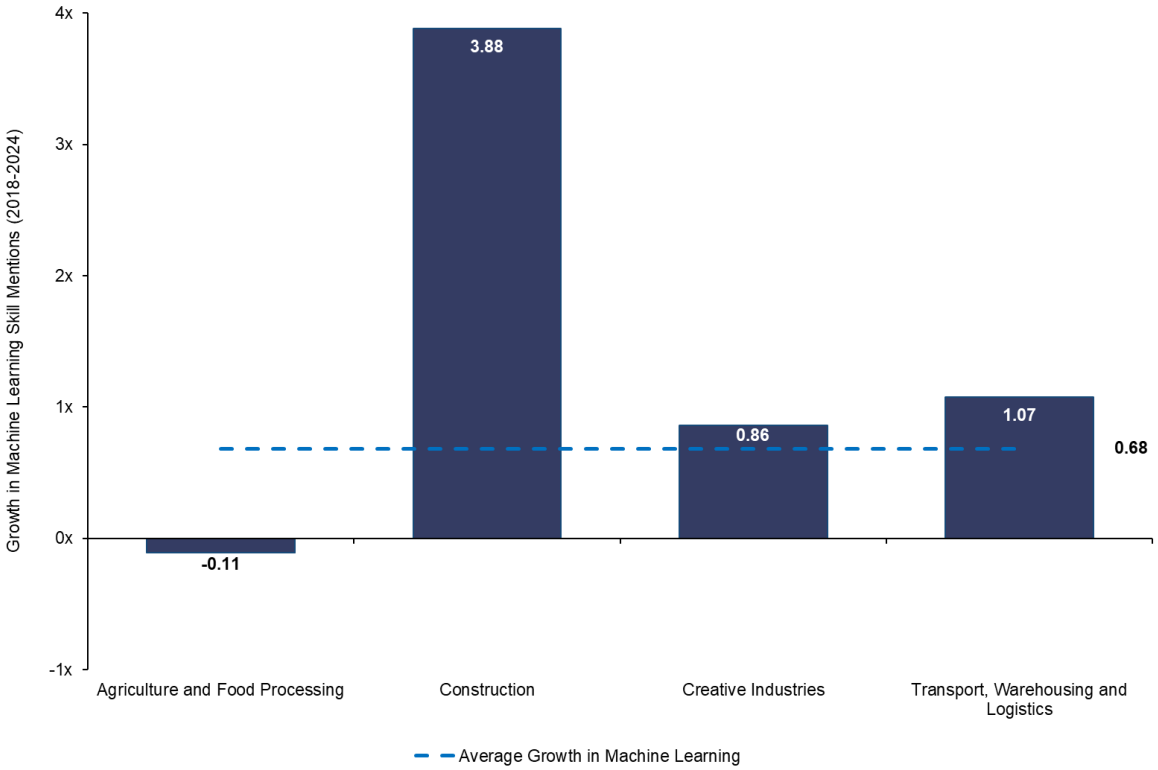


Notes: This data is taken from *PwC*'s analysis of 66 million job postings data provided by *Lightcast.* The figures show the growth in AI Ethics, Governance and Regulations skill mentions between 2018 and 2024. The average represents the average across all UK sectors. Further information on our approach to the job posting data analysis is provided in Annex B.

Machine Learning

Machine Learning was identified as one of the top technical AI skills essential for organisational growth, according to survey findings. This importance is relatively consistent across all four sectors analysed, with Agriculture and Food Processing recognising it at the highest 34 per cent and Construction at the lowest 24 per cent. The variation in how different sectors value Machine Learning likely stems from the nature of their operations, data environments, and technological maturity. Agriculture and Food Processing leads due to its reliance on predictive tools, precision agriculture, and supply chain optimisation. In contrast, lower emphasis on this by some organisations in the Construction sector may reflect their slower digital adoption, fragmented data, and a focus on physical processes.

Growth in demand for Machine Learning skill mentions, by sector, 2018-2024



Notes: This data is taken from *PwC*'s analysis of 66 million job postings data provided by *Lightcast*. The figures show the growth in Machine Learning skill mentions between 2018 and 2024. The average represents the average across all UK sectors. Further information on our approach to the job posting data analysis is provided in Annex B.

Behavioural AI skills requirements

In addition to technical skills, specific behavioural skills are essential to the successful adoption of AI to support embedding AI fully as an organisation and across a sector.

Definitions of behavioural skills that support AI adoption

Skill	Description
Communication	The skill to convey AI-driven insights with clarity, confidence, and adaptability, ensuring that diverse audiences can engage with, trust, and act on AI-informed decisions. This involves framing discussions in accessible ways, translating complex AI outputs into meaningful narratives, and fostering dialogue that encourages responsible AI adoption.
Critical and Analytical Thinking	The capacity to question assumptions, assess information with objectivity, and validate decisions in AI-augmented environments. This involves applying logical reasoning, recognising limitations, and using contextual awareness to challenge AI-generated insights. It also includes the ability to escalate challenges when necessary and engage in self-reflection to validate outputs, ensuring they are informed, fair, and responsible.
Ethical Awareness and Decision Making	The ability to recognise, assess, and navigate the ethical implications of AI-driven decisions, ensuring fairness, accountability, and inclusivity. This involves challenging biases, understanding cultural nuances, and maintaining self-awareness when making AI-informed choices.

Skill	Description
Leadership	The ability to influence, empower and lead teams and oneself to embrace AI-driven change, foster innovation, and ensure ethical AI adoption. This involves building trust, promoting collaboration, demonstrating emotional intelligence, and leading by example in AI-augmented workplaces.
Problem Solving	The ability to approach challenges with curiosity, structured reasoning, and creativity, for AI-driven solutions to be sensible, effective, scalable and aligned with business and sector needs. This involves leveraging data, balancing risks such as data privacy, and fostering an innovation mindset to navigate complex problems and drive AI adoption with confidence.
Self-Development and Lifelong Learning	The mindset of continuously learning, proactively seeking growth, adapting, and evolving one's skills in an AI-driven world. This involves remaining open to new AI concepts, building resilience in shifting work environments, and cultivating a habit of self-improvement to stay ahead in an evolving digital landscape.
Systems Thinking	The ability to understand AI as part of a broader system, recognising interdependencies between AI, data, human expertise, and business processes. This includes evaluating how AI integrates within an organisation, assessing dependencies, and applying design thinking to create sustainable, user-friendly AI solutions.

Notes: These definitions are based on *PwC*'s AI Skills Taxonomy developed for this project, informed by *The Innovate UK BridgeAI* AI Skills for Business Competency Framework, led by *The Alan Turing Institute*, the *UK Government Office for Science's* AI Skills Taxonomy, and *PwC's* AI Barometer Skills Taxonomy.

Critical and Analytical Thinking, closely followed by Problem Solving, were found to be two of the top three most critical skills to supporting AI adoption, with 62 per cent and 60 per cent of employers surveyed indicating this, respectively. One employer stated that:

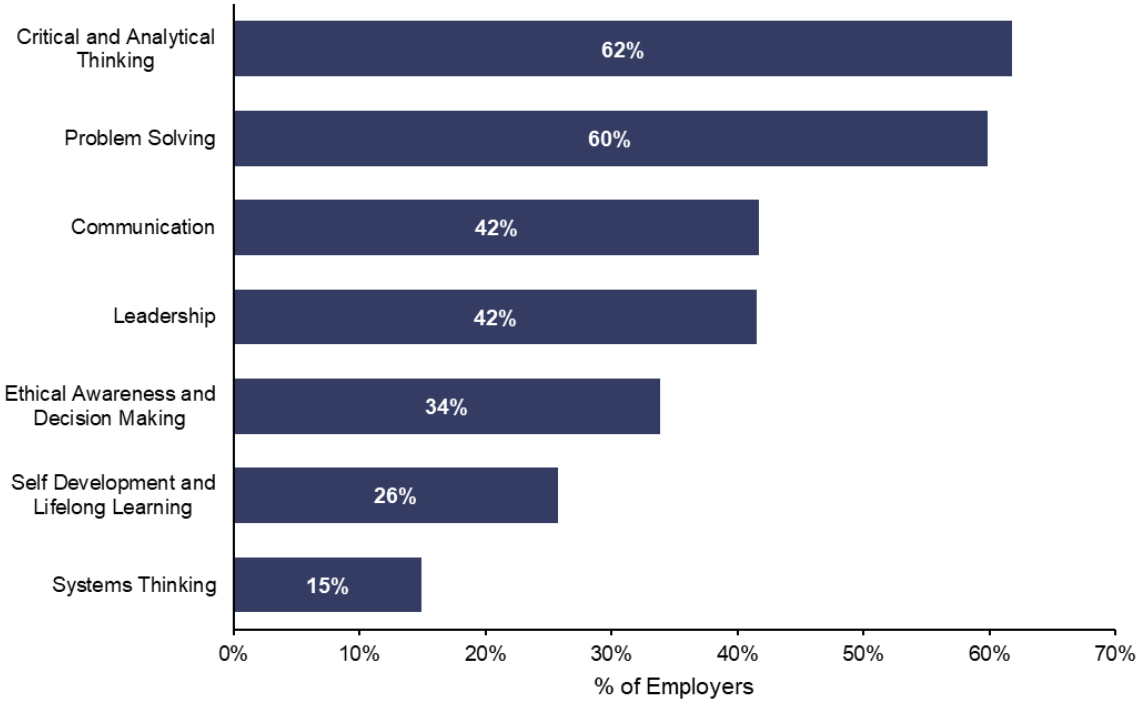
> **Critical thinking is incredibly important. The one skill I would love to support within my organisation is ensuring everyone continues to think for themselves and challenge the data.**
>
> Employer, Creative Industries sector

42 per cent of employers surveyed stated that Communication and Leadership were two of the top three ranked most critical behavioural skills required to support AI adoption, respectively. Systems Thinking was found to be the least critical behavioural skill required to support AI adoption, with only 15 per cent of employers surveyed stating that it was important.

Across the sectors, similar trends were observed in the identification of the top ranked behavioural skills overall, with Problem Solving and Critical and Analytical Thinking being the most emphasised competencies. Within Agriculture and Food Processing and Transport, Warehousing and Logistics, critical and analytical thinking are identified as the topmost skills critical to supporting AI adoption at 66 per cent and 64 per cent of employers, while in the Creative Industries this is Problem Solving, with 72 per cent of employers indicating this.

Regarding organisation sizes, Critical and Analytical Thinking is identified as the most critical skill in medium and large sized organisations, with 67 per cent and 65 per cent of employers in both categories emphasising its importance, while Problem Solving is seen as most critical in small organisations with 60 per cent of employers indicating this.

Top behavioural skills seen as most critical to supporting AI adoption and maturity in organisations by employers across the four selected sectors



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

The Figure below examines three key behavioural skills — Critical and Analytical Thinking, Leadership, and Ethical Awareness and Decision-making — and their connection to technical AI skills, highlighting their importance in AI initiatives.

The link between technical and behavioural skills

Critical and Analytical Thinking

Critical and Analytical Thinking are essential for AI adoption, as they enable professionals to effectively evaluate data, algorithms, and outcomes. These skills empower employees to scrutinise AI-generated results, identify potential biases, and challenge underlying assumptions. For example, in a company using AI to analyse soil health and predict optimal planting times, employees that are adept in critical thinking can assess the accuracy and reliability of the input data. By questioning the quality of historical data, such as weather patterns and soil samples, they can detect anomalies or biases that may distort the results.

Leadership and Communication

Effective Leadership and Communication are crucial for facilitating AI adoption across all levels of an organisation. Leaders must not only champion the adoption of AI technologies but also communicate their vision clearly to team members and leverage insights for strategic planning. Transparent communication can alleviate concerns and scepticism among staff, fostering a culture of collaboration and innovation that will support adoption of AI.

Ethical Awareness and Decision-making AI Skills

As organisations adopt AI, ethical considerations become increasingly important. Employees must be trained to recognise the ethical implications of AI technologies to make informed decisions that reflect a commitment to fairness and responsibility. For instance, logistics company using AI for hiring drivers must ensure that its algorithms do not perpetuate biases in recruiting practices. Employees with strong ethical awareness can identify potential pitfalls in AI decision-making processes.

Future possibilities for AI in selected sectors

As many employers in the four selected sectors self-reported a feeling of cynicism and fear around use and full adoption of AI, as well as barriers to adoption - such as awareness, accessibility and affordability - we have assumed that a certain degree of latent demand is at play here, in addition to the anticipated future demand articulated by employers in the previous sub-section. To explore this further and what the further potential of AI could look like in these sectors, we explore use cases for AI across each of the four selected sectors, as well as a cross-cutting example. This will be a key area for future research as part of this White Paper series to explore the true demand for AI skills, if it is to be fully adopted across all organisations in these four selected sectors.

Agriculture and Food Processing use cases

AI is being widely adopted in the Agriculture and Food Processing sector, bringing transformative changes across various aspects of the sector. AI technologies are enhancing efficiency, productivity, and sustainability through innovative use cases such as precision farming, predictive analytics, and automated processing. Precision farming utilises AI-driven tools like drones and satellite imagery to monitor crop health, soil conditions, and irrigation needs, enabling more targeted and efficient resource use. Drones equipped with AI can also be used to monitor large or remote agricultural areas and detect early signs of crop stress or equipment faults, particularly in high-heat or otherwise challenging environments. These applications are helping to reduce waste, improve yields, and support more sustainable farming practices.

Use case #1

Enhancing dairy farm efficiency through AI-driven heat stress analysis

Using AI and real-time analysis for early identification of heat stress in cows, improving welfare and milk production.

Galebreaker, which specialises in optimising environments for dairy cows, and *Smart Bell*, which provides animal monitoring via ear tags, have partnered with each other to leverage AI for detecting early signs of heat stress in cows. This collaboration used ear tags, behaviour modelling, and real-time analysis to identify heat stress earlier than traditional methods, resulting in happier, healthier cows that produce more milk. Targeting the UK housed dairy sector — valued at £4.4 billion in 2020 (Elise Uberoi, 2021) - this initiative aims to address the resistance to technological change in a market with an ageing population. With the potential for significant financial losses from heat stress amounting to around £31,000 per average herd annually, and AI-assisted ventilation devices costing about £70,000 with a payback period of just over two years, this AI-driven solution promises to enhance farm efficiency and revolutionise data utilisation through improved animal welfare and productivity.

Key skills required:

- ✓ Machine learning.
- ✓ Data science.
- ✓ Deep learning frameworks.

Impact of AI:

- ✓ Early warning signs are detected earlier → quicker response, higher quality products.
- ✓ Reduced workload on frontline workers not watching in real-time → time savings.
- ✓ Enhanced animal welfare through improved monitoring → healthier cows, leading to increased milk production.
- ✓ Data-driven decision-making allows for optimised resource allocation → improved operational efficiency and cost-effectiveness.

Construction use cases

AI is being increasingly adopted in the Construction sector to streamline internal operations, reduce administrative burden, and enhance productivity, including through intelligent automation to support routine tasks such as document generation, internal communication, and workflow coordination. These tools are helping organisations save time, improve accuracy, and enable staff to focus on higher-value strategic work — demonstrating how AI can augment, rather than replace, human capabilities in day-to-day operations. AI is also being used to support predictive maintenance and site monitoring, particularly in hazardous or hard-to-reach environments. When combined with drones, AI systems can inspect infrastructure such as bridges, rooftops, or high-temperature zones — reducing the need for manual inspections and improving safety, speed, and data accuracy.

Use case #2:

Streamlining operations through intelligent automation

AI can automate routine writing tasks, standardise messaging, and enhance internal communication — saving time and improving efficiency across the business.

As well as leveraging general-purpose and commercially available AI tools, like ChatGPT and Claude, *Welch Group* also benefits from AI capability being built into the platforms it already relies upon on, including Qargo (its transportation management system (TMS)) and Clarus (its warehouse management system (WMS)). It has found that these embedded AI features in platforms it already relies upon often deliver the most immediate value, cutting down admin, speeding up workflows, and improving accuracy in day-to-day work tasks.

Welch Group uses Claude extensively for long-form content like tenders, board papers, and internal documentation. Claude is particularly strong at pulling together multiple sources and streamlining complex writing tasks. *Welch Group* has also created a few custom GPTs that help it standardise messaging, automate first-draft policy documents, and improve internal comms, saving around 50% of time on repeatable content workflows across the Solutions, Commercial, and Marketing teams. These AI tools have significantly boosted productivity, freeing up an estimated 8–12 hours per week per heavy user. Tender preparation has become 2–3 times faster, enabling teams to respond more efficiently and competitively. By analysing complex datasets and generating actionable insights, large language models (LLMs) empower teams to make informed decisions, enhance collaboration, and focus more on strategic initiatives rather than repetitive tasks.

Key skills required:

- ✓ Generative AI.
- ✓ AI systems and automation.
- ✓ Natural language processing.
- ✓ Data and digital literacy.
- ✓ Digital literacy.

Impact of AI:

- ✓ Faster creation of tenders, board papers, and internal documentation, resulting in improved turnaround times and responsiveness across teams.
- ✓ Enhanced data analysis capabilities enabling teams to extract insights from complex datasets more efficiently, leading to improved decision-making.
- ✓ Increased employee productivity from time savings on repetitive writing tasks, allowing employees to focus on strategic initiatives and high-value collaboration.

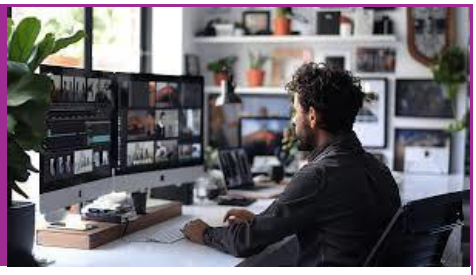
Creative Industries use cases

AI is revolutionising the Creative Industries, offering new tools and methods for artistic expression and production. AI technologies are being utilised to enhance creativity, streamline workflows, and engage audiences through applications such as content creation, trend prediction, and personalised recommendations. These innovations are transforming how artists, designers, and creators work, allowing for more dynamic and interactive experiences. The adoption of AI in the Creative Industries is fostering a new era of creativity and innovation, pushing the boundaries of what is possible in art and media.

Use case #3:

Streamlining content production workflows through AI

Leveraging AI-driven tools to enhance efficiency, reduce turnaround times, and elevate storytelling in marketing campaigns.



TAG is a creative production agency built around delivery excellence — ensuring that content not only gets created, but that it lands, effectively and on time. To achieve this, *TAG* integrates automation and AI-powered tools across the entire production workflow — from intake to delivery. Structured briefing systems, including native language briefing capabilities, enable local-market teams to feed directly into automated production pipelines. This significantly reduces turnaround time by eliminating translation gaps, reducing rework, and accelerating the move from brief to creative execution.

Automation supports the generation of dynamic content variants at scale, including language localisation, product swaps, and platform-specific adaptations — all while ensuring consistent brand compliance. Templated creative systems and data-driven workflows allow *TAG* to version and deploy high volumes of content efficiently across markets, often delivering campaigns up to 60%, as a conservative estimate, faster than traditional production models. By freeing creative teams from repetitive tasks and manual processes, *TAG* enables greater focus on storytelling and strategic creative thinking — resulting in higher-quality outputs, faster delivery, and better business outcomes for clients.

Key skills required:

- ✓ AI systems and automation.
- ✓ Machine learning.
- ✓ Data literacy.
- ✓ Digital literacy.
- ✓ Visual image recognition.

Impact of AI:

- ✓ Reduced turnaround times for campaign delivering, leading to increased client satisfaction.
- ✓ Enhanced quality of creative outputs through improved focus on strategic storytelling.
- ✓ Efficient management of high-volume content production across multiple markets.

Transport, Warehousing and Logistics use cases

AI is making significant strides in the Transport, Warehousing, and Logistics sector, optimising operations and improving efficiency across the board. AI technologies are being used to enhance route planning, predictive maintenance, and automated warehousing processes. Both Construction and Transport, Warehousing and Logistics are leveraging AI for predictive maintenance, project scheduling, and operational optimisation — highlighting the potential for shared innovation and cross-sector learning, particularly where infrastructure development and logistics intersect. AI also plays a growing role in monitoring the condition of vehicles, machinery, and storage facilities, especially in high-temperature or high-traffic environments. When paired with drones or sensor networks, AI enables automated inspections of hard-to-access areas such as warehouse roofs, loading bays, or transport infrastructure — reducing downtime, improving safety, and ensuring smoother logistics operations.

Use case #4:

Enhancing route planning for transport customers

AI can be used to forecast demand on travel routes (e.g. traffic, congestion) and/or public transportation (e.g. degree of crowding) and communicate these insights to potential users to help inform decision-making.

Esoterix is developing AI-powered Crowding Alert Technology (CAT) to forecast how busy a train will be, and reforecasts if disruption affects the train schedule. This is a back-end technology designed to power a variety of front-end services. On average over thirty thousand trains run each day outside of Trasport for London. More than 3% of trains are cancelled and over 30% of trains are late enough to generate schedule updates (Office of Rail and Road, 2025). A single disrupted train might generate over 1000 messages (totalling around two million per average day), and the effects of the delay might affect a significant portion of the five million daily average passenger journeys. We digest these updates alongside historic automated passenger counts from rail operators with a pipeline that uses Kubernetes, Kafka, Neo4J and Couchbase. The initial predictive engine uses heavily engineered data to instil network awareness, combined with an XGBoost decision forest model, forming a digital twin of the network over the day ahead. As new information comes in, the predictions are updated for the whole network. *Esoterix* is preparing for a product release on the Rail Data Marketplace and has already had interest from major industry stakeholders.

Key skills required:

- ✓ AI systems and automation.
- ✓ Machine learning.
- ✓ Data literacy.
- ✓ Digital literacy.
- ✓ Collaboration.

Impact of AI:

- ✓ Information-driven decision-making, leading to greater customer / public satisfaction, less congestion on roads and crowding on public transportation.

Cross-cutting use cases

AI is transforming the world of work by introducing innovative use cases that span broad themes such as automation, data analysis, and enhanced decision-making. These advancements are revolutionising how tasks are performed and reshaping job profiles, along with the skills required to succeed in an AI-enabled environment. From predictive maintenance and intelligent automation to streamlined workflows and improved communication, AI is driving greater efficiency, reducing manual burden, and enabling more strategic, data-informed operations. As adoption continues to grow, organisations are increasingly positioned for transformative change and long-term innovation.

Conclusions and implications

This section has provided a detailed analysis of the current and anticipated future demand for AI skills across the four selected sectors in the UK. Our findings indicate a strong, upward trend in the demand for both the technical and behavioural skills that are essential for effective AI integration. As sectors navigate the evolving landscape of AI, understanding these demands is crucial for informing training strategies and initiatives. Our findings suggest three key implications that, in principle, apply to all four sectors (see Table below).

1. *Addressing the strong and growing demand for AI skills*

The primary and secondary research evidence is compelling in relation to the strong and growing demand for AI skills. For example, our job postings analysis reflected a 29 per cent faster increase in AI-related skills between 2018 and 2024 compared to the overall UK sector average. This trend shows a widespread recognition of AI's transformative potential, transcending traditional technology-heavy industries and reaching sectors increasingly keen on leveraging advanced technologies. The strong and growing demand needs to be addressed.

2. *Embracing AI technical skills and supporting behavioural skills*

While technical skills like AI Systems and Automation and GenAI are vital, there is a clear recognition amongst business of the importance of behavioural skills such as communication, critical thinking, and ethical awareness. These complementary proficiencies are essential for fostering an organisational culture where AI can be adopted responsibly and effectively. Businesses and training providers both need to be mindful of this and ensure that both technical and behavioural aspects of AI skills are built into their plans for upskilling workforces.

3. *Capturing the latent demand for AI skills*

As organisations in the key sectors expressed both optimism and caution regarding AI adoption, exploring future possibilities for AI is essential. The data suggests that while there is a recognised potential for AI to transform operational efficiencies and decision-making processes, challenges such as employee scepticism, ethical considerations and data literacy must be addressed. We have identified several use cases that begin to illustrate how AI can reshape job profiles and associated skill requirements. Future research should build on this and identify additional use cases that can illustrate and articulate the future possibilities for AI in each of the four sectors.

Supply of AI skills and training

Introduction

This section provides an overview of the supply of AI skills and training in the UK[4]. It highlights the current landscape of AI skills, the diverse range of training providers, and the numerous initiatives launched to address AI skills needs across different sectors. Additionally, it discusses the imbalance between research and development (R&D) initiatives and skills programmes, emphasising the need for targeted efforts to develop AI skills alongside technological advancements to ensure a well-prepared workforce capable of leveraging AI innovations effectively.

The section is structured as follows:

- Current landscape of AI Skills
- Sectoral preferences for provision of AI skills
- Overview of existing AI and skills initiatives
- Overview of existing AI training provision
- Conclusions and implications

Current landscape of AI skills

There is a concerted effort to boost the supply of AI skills and/or training in the UK, with the government's AI Opportunities Action Plan (DSIT, 2025), published earlier this year, highlighting the need for the UK to train, attract and retain the next generation of AI professionals. Most crucial to this is the UK's existing workforce, with at least 80 per cent of 2030's predicted UK workforce already in employment (Allas, et al., 2019). *FutureDotNow* and *Lloyds Bank* (2024) estimate that around 52 per cent of this workforce still lack all the digital skills needed for the workplace. At the same time, the level of AI fluency varies significantly depending on the type of role: for instance, a recent survey found that over four in five (83 per cent) UK leaders use GenAI regularly in their jobs, while only one in five (21 per cent) frontline workers report receiving the training they need to do so — well below the European average (Beauchene, et al., 2024). These role-based differences are not the only concern, with the disparities further compounded by demographic factors. *FutureDotNow* and *Lloyds Bank* (2024) also found that women and individuals with impairments, particularly physical impairments, are less likely to possess essential digital workplace skills, although women's digital confidence and capability were on par with men's by other measures. Taken together, these gaps highlight the uneven distribution of digital readiness across the workforce. Digital skills form the foundation for AI capability — and without them, widespread adoption will remain out of reach.

New entrants to the workforce also play a critical role in preparing for an AI-enabled future. In 2022, 46,000 students graduated from AI-relevant higher education programmes in the UK (GOV.UK, 2025a). Additionally, a further 7,600 students enrolled in AI and data science

[4] In the context of this White Paper, "supply" refers to two key aspects: (a) Workforce: this includes individuals with AI skills who are either part of sectors' current employees or are entering the workforce. (b) Training Provision: this pertains to the capacity of employers or the government to enhance the AI skills of the existing or new entrants to the workforce within sectors.

postgraduate conversion courses supported by Office for Students allocated funding between April 2020 and March 2023 (Office for Students, 2024).

However, these figures only capture part of the picture. According to *HEPI* (2025) almost all students (92 per cent) now use AI in some form — up from 66 per cent in 2024 — with 88 per cent using GenAI specifically for assessments, up from 53 per cent the previous year. Students primarily use GenAI to explain concepts, summarise articles, and suggest research ideas, though 18 per cent reported including AI-generated text directly in their work. Notably, a digital divide persists: students who are male, studying STEM subjects, or from wealthier backgrounds report greater enthusiasm for AI and fewer concerns about its risks, such as academic misconduct or biased outputs.

The labour market is showing signs of shifting from a qualification-based model to one that values practical skills. Our job posting analysis found that the proportion of AI roles requiring a degree has declined from 91 per cent to 84 per cent since 2018. While this remains higher than the 47 per cent average across all jobs, it suggests a growing openness to skills-based hiring — even in technical fields. This trend aligns with findings from other sources, such as the study published in ScienceDirect (Bone, et al., 2025), which highlights the growing emphasis on practical skills and competencies over formal qualifications. The study indicates that employers are increasingly valuing specific AI skills and hands-on experience, reflecting a broader shift in the labour market towards skills-based hiring practices.

These insights suggest that while the student pipeline is growing, and AI usage among learners is rising rapidly, the system does not yet meet evolving demands of the labour market. A stronger focus on practical, inclusive, and skills-based training will be essential to ensure that the next generation of workers is equipped to thrive in an AI-driven economy.

In addition, geographic disparities can also present challenges to organisations in accessing skilled AI talent, particularly for employers outside major tech hubs. The UK - particularly the golden triangle of London, Oxford, and Cambridge - is a popular location for AI startups (McCrea, 2025). Our job posting data analysis supports this, identifying London as the leading employer and main hub of AI jobs across 2018-2024 by some distance, but it was the Northern regions (North East, Yorkshire, North West, Scotland) that saw the fastest growth in AI job demand from 2018-2024.

There is a clear disparity across nations and regions, with a significant tech cluster in London putting other cities and towns at a disadvantage…Having resources on hand is crucial, and this is where an AI hub would be of great use.

Business representative organisation, Cross-cutting

Recruitment challenges are likely to be exacerbated by geographic variances in access to talent. London is likely to have more qualified candidates due to proximity to technology hubs, while rural regions are likely to face significant barriers in recruiting skilled workers. These geographical differences, as well as socio-economic disparities, create knowledge and skill disparities that impact the Agriculture and Food Processing sector, for example. The Agriculture and Food Processing sector often lags other industries in deploying digital technologies due to these skill gaps and the need for a more holistic approach to workforce development (Bampasidou et al., 2024)).

Recent research and skilling initiatives in the UK, such as the *BridgeAI* programme, are part of a broader policy push to expand access to AI and its benefits on expanding access to AI and its benefits across the country. These efforts include funding programmes, workforce upskilling and regional engagement through AI roadshows (Innovate UK, 2025b); as well as

the introduction of AI Growth Zones, to boost investment and jobs related to AI regionally, and deliver on the government's plan for change.

Sectoral preferences for provision of AI skills

There are different ways for organisations to access AI talent in their workforce: recruitment, outsourcing, consultancy, and upskilling. Different organisations have different preferences, and these may depend on the type, quantity and level of AI skills that they are looking for.

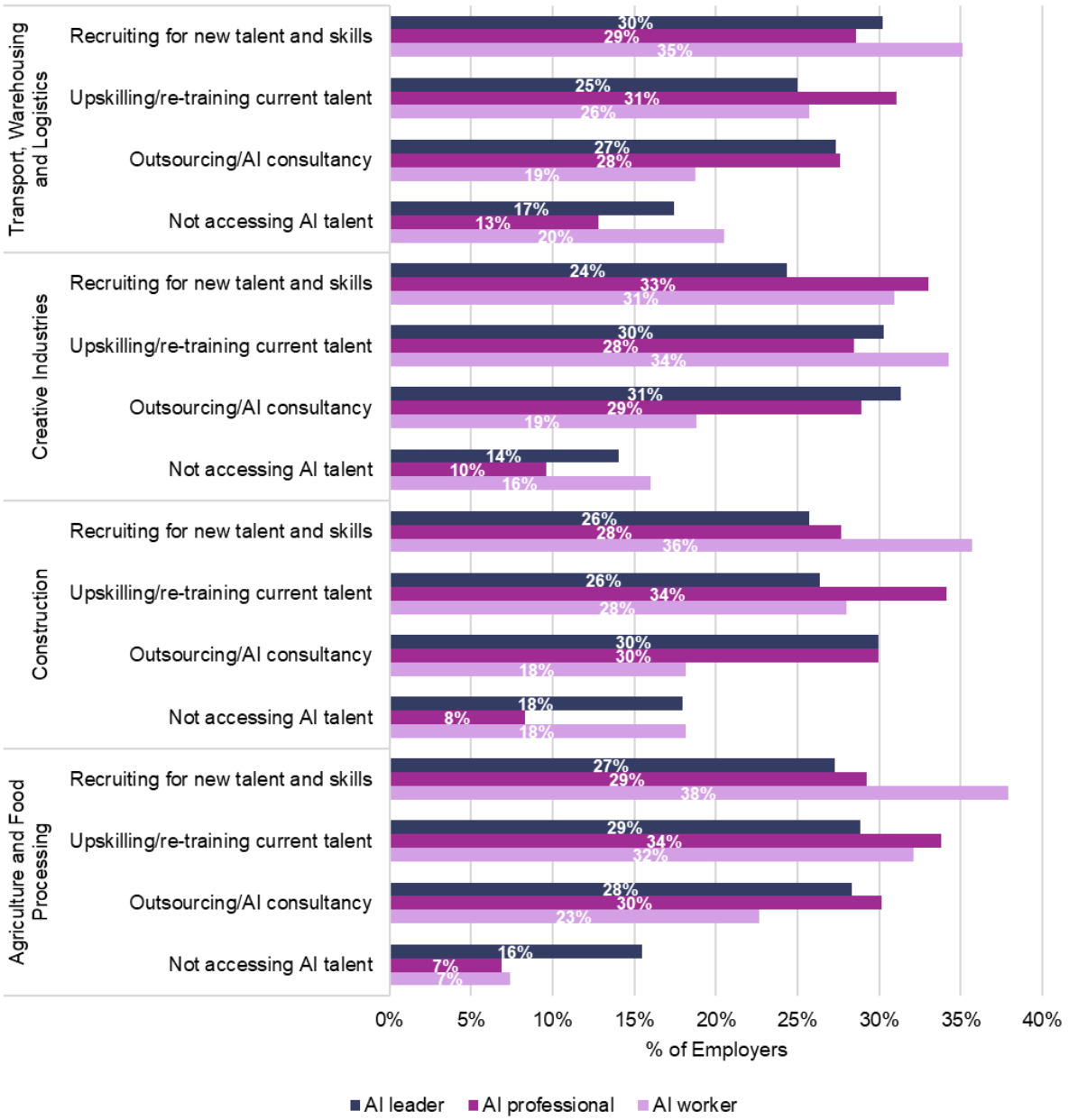
> **Digital transformation is an ongoing process with no end state. At the executive level, it is about bringing in expertise and consulting on how to transform the organisation to extract greater business performance and build future business models. For mid-management, it is about making key hires to meet unmet client needs and maintain competitive parity. Key areas include retail media, social influence, and next-gen performance, requiring hyper-specialist digital targeting capabilities. The workforce moves quickly, and a blend of expertise and adaptability is essential.**
>
> Employer, Creative Industries sector

Our employer survey found that preferences for accessing AI talent vary significantly across different sectors and levels of AI expertise, including AI workers, AI professionals and AI leaders. AI workers are employees whose primary roles are outside of AI or data, but who use AI tools as part of their work. They understand how AI can affect their role and the wider workplace, and they know how to use these tools effectively. AI professionals are specialists who work directly with AI and data. They design, build, and manage AI systems, and often have expertise in areas like computer science, statistics, or robotics. AI leaders are senior figures — often executives — who oversee how AI is used across the organisation. They shape AI strategy, plan for future technologies, and ensure AI is used in a way that aligns with business goals (Innovate UK Bridge AI, 2024).

For AI workers, recruiting new talent is the preferred method in Agriculture and Food Processing (38 per cent) and Construction (36 per cent), while upskilling is favoured in Creative Industries (34 per cent) and Transport, Warehousing and Logistics (26 per cent). Outsourcing is less common for AI workers but still utilised, with percentages ranging from 18 per cent to 23 per cent across sectors. For AI professionals, upskilling and re-training current talent is the most popular approach in Agriculture and Food Processing (34 per cent) and Construction (34 per cent), whereas recruiting new talent is slightly more favoured in Creative Industries (33 per cent) and Transport, Warehousing and Logistics (29 per cent). Outsourcing remains significant, with 30 per cent of organisations in Agriculture and Food Processing and Construction opting for this method. At the AI leader level, outsourcing is the leading method in Construction (30 per cent) and Creative Industries (31 per cent), while recruiting new talent is preferred in Transport, Warehousing and Logistics (30 per cent). Upskilling is also a common strategy for AI leaders, particularly in Agriculture and Food Processing (29 per cent) (see Figure below).

> **On-the-job training is preferred. With only 30 staff and smaller teams, they simply don't have the capacity to release someone for two days a week to attend college or university. On-the-job learning, with the occasional day out, is what works best.**
>
> BRO, Construction

Employers' views on the different methods of accessing AI skills across the four selected sectors, by sector



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

Recruiting new talent is a widely preferred method for accessing AI skills across various sectors. Organisations in Agriculture and Food Processing (38 per cent) and Construction (36 per cent) particularly favour this approach for AI workers. By recruiting, organisations can bring in fresh perspectives and specialised expertise that may not be available within their current workforce. This method allows organisations to quickly fill gaps in their AI capabilities and stay competitive in a rapidly evolving technological landscape. Recruiting also helps ensure the workforce remains dynamic and adaptable to evolving AI developments. For AI leaders, recruiting is notably preferred in Transport, Warehousing and Logistics (30 per cent), highlighting the importance of bringing in experienced professionals to guide AI initiatives.

> **There is an element of bringing in targeted hires as new revenue channels open. For example, retail media was not big 5 years ago but is now huge for us.**
>
> Employer, Creative Industries sector

Outsourcing and AI consultancy are key methods for accessing high-level AI expertise. This approach is particularly favoured in Construction (30 per cent) and Creative Industries (31 per cent) for AI leaders. Outsourcing allows organisations to leverage external expertise and resources without the need for long-term commitments. It is a flexible solution that can be tailored to specific project needs, enabling companies to access innovative AI technologies and methodologies. By partnering with specialised AI consultancies, organisations can benefit from the latest sector insights and innovations, ensuring that their AI strategies are robust and forward-thinking. Outsourcing is also a practical choice for sectors where in-house AI expertise may be limited or where rapid deployment of AI solutions is required.

> **[Our] partnership allows for co-recruitment, enabling us to seek talent from SAT platform or SAP tech vendor sides who also possess a creative discipline, addressing the hybrid needs of the industry.**
>
> Employer, Creative Industries sector

Upskilling and re-training current talent is a popular approach for building AI capabilities within organisations. This method is particularly favoured for AI professionals in Agriculture and Food Processing (34 per cent) and Construction (34 per cent). Upskilling involves enhancing the skills of existing employees through targeted training programmes, workshops, and continuous learning opportunities. It is a cost-effective strategy that leverages the existing workforce's familiarity with the company's operations and culture. By investing in upskilling, organisations can foster a culture of innovation and adaptability, ensuring that their employees are equipped to handle new AI challenges and opportunities. Upskilling is also significant for AI leaders in Agriculture and Food Processing (29 per cent), reflecting the importance of continuous professional development at all levels. This approach helps organisations maintain a competitive edge by ensuring that their talent pool remains current with the latest AI advancements.

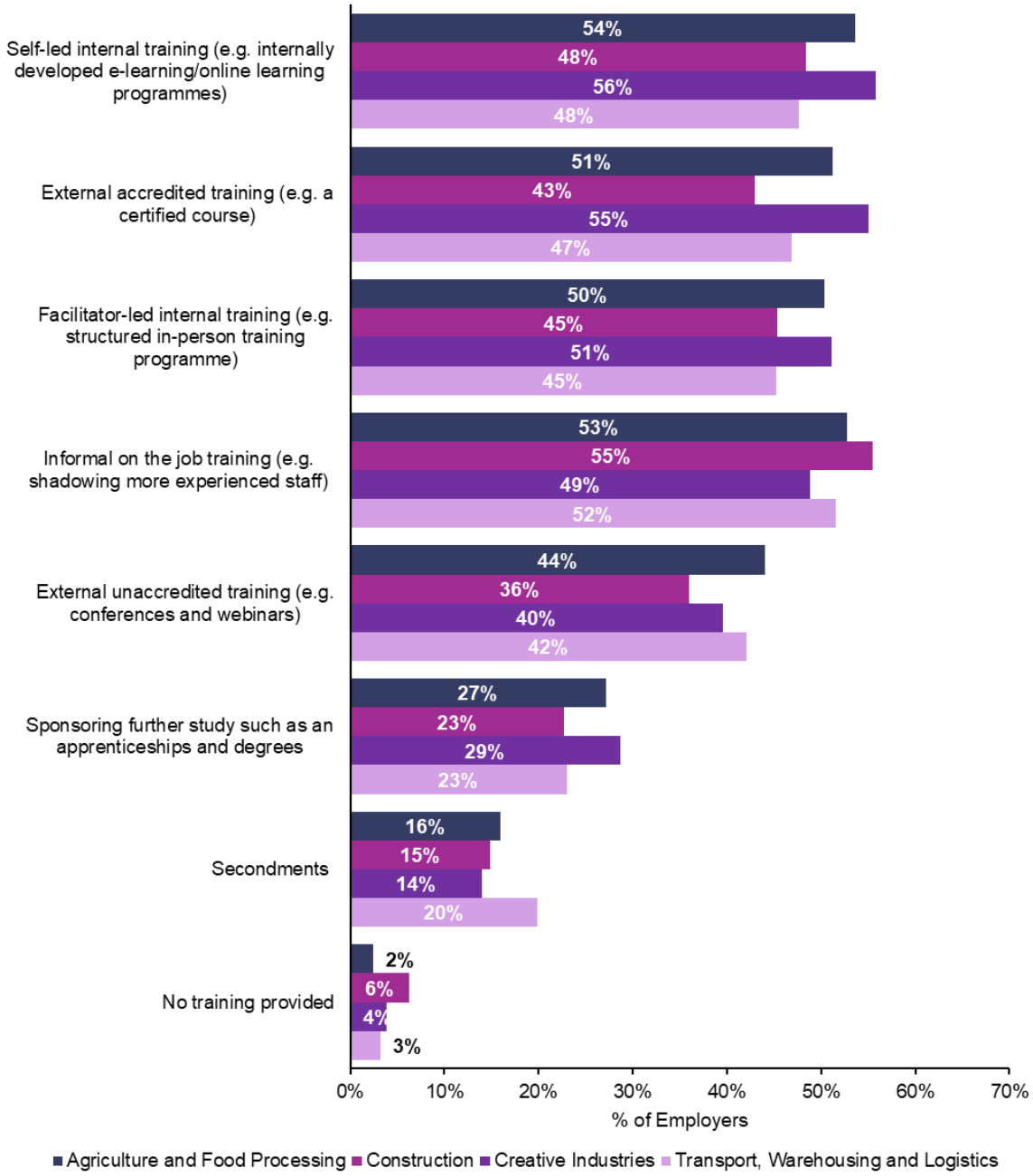
> **We are starting with the assumption of training our people and providing them with the necessary tools and resources. Through learning, they will still need to rely on their core skill set, which includes human creativity, conceptual thinking, and a strategic mindset.**
>
> Employer, Creative Industries sector

In terms of methodologies adopted to upskill workforces, our employer survey further found that a diverse range of training methods were utilised across different sectors. Informal on-the-job training, such as shadowing more experienced staff, is highly prevalent, with the majority of organisations in Agriculture and Food Processing, Construction, Transport, Warehousing and Logistics (53 per cent, 55 per cent, and 52 per cent, respectively) and 49 per cent of organisations in the Creative Industries providing this type of training. This method allows employees to learn directly from their colleagues, fostering a hands-on learning environment.

> **Given the small team sizes — often just 30 people — there's a strong preference for on-the-job training. They simply don't have the capacity to release someone for two days a week to attend college. Instead, they favour practical learning with the occasional day out.**
> BRO, Construction

Self-led internal training programmes, including e-learning and online learning, are also widely adopted. The majority of organisations across Agriculture and Food Processing (54 per cent) and Creative Industries (56 per cent) provide these programmes, with a further 48 per cent in Construction and Transport, Warehousing and Logistics each. This approach allows employees to learn at their own pace and access training materials as needed, fostering a culture of continuous learning and development. Moreover, facilitator-led internal training programmes are another common method, with approximately half of the organisations in these sectors offering structured in-person training (50 per cent in Agriculture and Food Processing, 45 per cent in Construction, 51 per cent in Creative Industries, and 45 per cent in Transport, Warehousing and Logistics). These programmes provide a more formal and interactive learning environment, allowing employees to engage directly with trainers and peers (see Figure below).

AI-related training opportunities provided to employees by employers across the four selected sectors, by sector

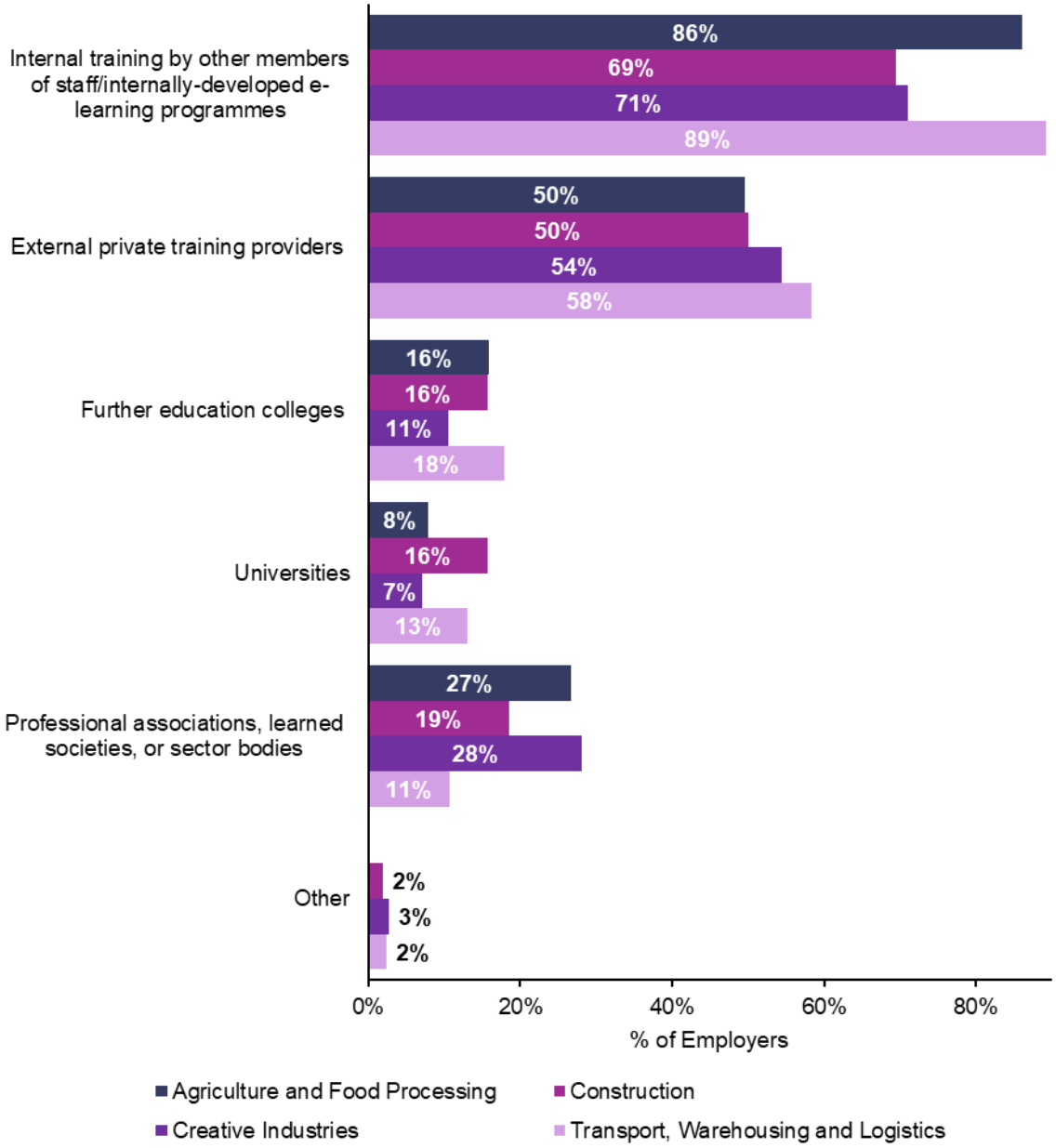


Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the job posting data analysis is provided in Annex B.

When it comes to the specific providers of AI training utilised, internal training by other members of staff or internally developed e-learning programmes is the most common, with the majority of organisations in Agriculture and Food Processing (86 per cent), Construction (69 per cent), Creative Industries (71 per cent), and Transport, Warehousing and Logistics (89 per cent) utilising this method. This method was also preferred by a majority of small sized organisations (53 per cent) and 43 per cent of the medium sized. While cost-effective for larger organisations, this can place a disproportionate burden on SMEs. External training providers also play a significant role in AI training. Around half of the organisations in these sectors opt for external private training providers (50 per cent in Agriculture and Food Processing, 50 per cent in Construction, 54 per cent in Creative Industries, and 58 per cent in Transport, Warehousing and Logistics). These providers offer specialised courses and certifications that can enhance the skills and knowledge of employees.

Further education colleges contribute to AI training as well, particularly in Construction (16 per cent) and Transport, Warehousing and Logistics (18 per cent). These institutions provide more formal education opportunities, such as apprenticeships and degrees, which can help employees gain in-depth knowledge and expertise in AI (see Figure X). These findings highlight the importance of a multifaceted approach to AI training, combining internal and external resources to ensure comprehensive skill development. By leveraging various training opportunities and providers, organisations can effectively build and maintain their AI capabilities, fostering a workforce that is well-equipped to navigate the complexities of AI technologies.

Training providers utilised to provide AI training to employees by employers across the four selected sectors, by sector



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 407 UK employers. Further information on our approach to the employer survey is provided in Annex B.

Overview of existing AI and skills initiatives

The UK government has introduced a range of publicly funded initiatives aimed at accelerating AI adoption and building AI capabilities across the four selected sectors. These

initiatives reflect a dual focus: many are geared toward promoting research, development, and technological innovation — such as funding for cutting-edge research, support for AI startups, and the development of novel AI applications. At the same time, there is a growing recognition of the importance of workforce skills development, with several targeted programmes beginning to address this need more directly.

Initiatives such as the *AI Construction Training Programme* and the *Centres for Doctoral Training in AI* exemplify efforts to build a pipeline of skilled AI talent. Additionally, sector-specific programmes are emerging to support foundational and advanced AI skills across different occupational levels. While R&D continues to dominate the landscape, the skills agenda is gaining momentum, and there is increasing policy attention on ensuring that the workforce is equipped to engage with and implement AI technologies effectively.

This evolving balance between innovation and skills development is encouraging, but further coordination and investment will be essential to ensure that technological progress is matched by workforce readiness. Without this, there remains a risk that the pace of AI integration could outstrip the sector's ability to adopt and apply it meaningfully. The table below outlines examples of initiatives in AI research and development (R&D) and skills development across the UK; this list is intended to be illustrative rather than comprehensive.

Overview of existing publicly and privately funded AI R&D and skills initiatives

AI initiatives focused on R&D
1. *Innovate UK and Biotechnology and Biological Sciences Research Council (BBSRC)* funded *Transforming Food Production* (£90M): AI/robotics boost yields (15 per cent) and cut water/fertilizer use by 25-30 per cent (e.g., Hummingbird Technologies' drone analytics) (UKRI, 2024). 2. *Innovate UK* and *BBSRC* funded *Agrimetrics* (£50M): integrates various data sources to support decision-making in farming (Agrimetrics, 2024). 3. *Innovate UK* and *BBSRC* funded *Agri-Tech Catalyst* (£70M): supports innovative projects that address agricultural challenges (e.g., AI-driven pest monitoring systems) (UKRI, 2025a). 4. *European Commission* funded *Smart Agri-Hubs* (£20M): fosters digital innovation hubs (e.g. AI-based soil health monitoring systems) (Smart Agri-Hubs, n.d.). 5. *Innovate UK* funded *BridgeAI Programme* (£100M): Predictive maintenance cuts costs by 20 per cent (Balfour Beatty case study). 6. *Innovate UK* funded *Core Innovation Hub* (£72M): AI design tools reduce project time/costs by 25-30 per cent (Arup collaboration) (Construction Innovation Hub, 2022). 7. *Arts and Humanities Research Council (ARCH)* funded *Creative Industries Clusters* (£56M): AI predicts fashion trends (e.g., London Fashion Week success) (UKRI, 2024). 8. *Serpentine R&D Platform* and *King's College London* funded *Creative AI Lab* (£2M): facilitates projects to showcase AI's potential in visual arts (Creative AI Lab, 2024). 9. *Digital Catapult* funded *Creative AI Programme* (£1M): supports start-ups in developing AI tools (e.g. AI-powered video editing software used by BBC Studios) (Digital Catapult, 2024). 10. *UKRI* funded *Robok Proactive AI-powered Solutions for Logistics Efficiency, Transparency and Safety (PALLETS)* (£1M): AI-CCTV reduces bottlenecks by 15 per cent (Port of Dover case) (EU Start-ups, 2025). 11. Privately funded *AI Route Optimisation* (£2.5M): Cuts delivery times by 20 per cent. 12. *Innovate UK and Department for Transport* funded *Smart Shipping Acceleration Fund* (£8M): integrates AI to optimise supply chain operations (UKRI Business Connect, 2025). 13. Privately funded *AI-Driven Fleet Management Programme* (£1.5M): enhances fleet efficiency using AI algorithms (e.g. "EcoFleet" project, which reduced fuel consumption by 10 per cent).

14. Privately funded *Predictive Maintenance for Transport Systems* (£1M): leverages AI to predict equipment failures (e.g. "Proactive Maintenance" project which notably decreased downtime by 20 per cent).
15. *AI for Good* funded *AI for Good Programme*: leverages AI to address social challenges, e.g. by encouraging equal access to transformation to break many barriers and empowering individuals — especially women — to explore, innovate, and inspire others *(AI for Good, 2024).*
16. *UKRI Challenge Fund* funded *Transforming Construction through Digital and AI Technologies* (£170M): applies AI and digital tools to streamline planning, reduce material waste, and enhance on-site safety, driving efficiency and sustainability in Construction (UKRI, 2025c).

AI initiatives focused on skills

1. *Engineering and Physical Sciences Research Council (EPSRC)* funded *Responsible AI (RAI) UK* (£31M): focuses on developing responsible AI practices by connecting UK research with leading global research centres and institutions (RAI, 2024).
2. *AHRC* funded *Bridging Responsible AI Divides (BRAID) UK* (£15.9M): supports interdisciplinary research and community-building activities to promote responsible AI practices across various sectors (BRAID, 2025)
3. *Innovate UK Bridge AI* funded *AI in Construction Skills for the Future* (£5M): offers specialised training modules, industry expert insights, and real-world case studies (Trilateral Research, 2024)).
4. *Innovate UK Bridge AI* funded *AI Construction Training (ACT) Programme*(value of funding cannot be determined from available research): delivers targeted AI training to upskill the Construction workforce, supporting digital adoption and productivity gains across the sector (AGF, 2025).
5. *University of Cambridge* funded *Digital Construction on a Shoestring* (value of funding cannot be determined from available research): provides low-cost digital solutions through workshops and toolkits (University of Cambridge, 2022).
6. *Innovate UK Bridge AI* funded *AI for Construction SMEs* (value of funding cannot be determined from available research): integrates AI into small firms to boost efficiency and innovation (Innovate UK, 2025c).
7. *Innovate UK Bridge AI* funded *AI for Creative Industries* (value of funding cannot be determined from available research): equips leaders in media, design, and the arts to apply AI in content creation, trend forecasting, and audience engagement (Innovate UK, 2025c).
8. *Innovate UK Bridge AI* funded *AI for Transport and Logistics* (value of funding cannot be determined from available research): supports logistics and supply chain leaders in using AI for route optimisation, predictive maintenance, and operational efficiency (Innovate UK, 2025c).
9. *Innovate UK Bridge AI* funded *AI for Agriculture and Food Processing* (value of funding cannot be determined from available research)*:* introduces AI tools for precision farming, crop monitoring, and food supply chain optimisation (Innovate UK, 2025c).
10. *Innovate UK* funded *Bespoke AI and Data Science Advice for SMEs* (value of funding cannot be determined from available research)*:* provides tailored expert guidance to help small businesses apply AI and data science to real-world challenges (Innovate UK, 2025b).
11. *Science and Technology Facilities Council (STFC) Hartree Centre* funded *Discover Digital Transformation Training Programme* (value of funding cannot be determined from available research)*:* introduces business leaders to the fundamentals of digital transformation, with a focus on AI integration (STFC Hartree Centre, 2025a).
12. *STFC Hartree Centre* funded *Innovation Voucher* (up to £15,000): provide up to 31 days of expert support in data science and AI to help businesses explore, assess, and implement AI solutions, conduct feasibility studies, receive tailored training, and

develop strategic roadmaps for data-driven transformation (STFC Hartree Centre, 2025a).

13. *STFC Hartree Centre* funded *High Performance Computing Voucher* (up to £5,000): provide organisations with access to the Hartree Centre's Scafell Pike supercomputer, enabling them to run larger models faster and more efficiently, enhance technical capabilities, and compete with bigger rivals without increasing overheads (STFC Hartree Centre, 2025a).
14. *STFC Hartree Centre Training Portal* (value of funding cannot be determined from available research): offers free, self-paced virtual courses that empower organisations to harness AI and data-driven technologies for smarter, faster decision-making (STFC Hartree Centre, 2025b).
15. *Innovate UK* funded *Applied AI Suite* (value of funding cannot be determined from available research): offers practical, hands-on training in deploying AI tools for measurable business outcomes (Innovate UK, 2025a).
16. *Innovate UK* funded *Improving digital trust - consultancy from BSI* (value of funding cannot be determined from available research): delivers expert support to help organisations build trustworthy, standards-aligned AI systems (Innovate UK, 2025e).
17. *UKRI* funded *Centres for Doctoral Training in AI* (£117M): provide advanced training in AI and data science (UKRI, 2023).
18. *AI Match-Fit Programme* (value of funding cannot be determined from available research): establishes 12 new AI skill centres and funding for postgraduate research.
19. *AI Startups Catalyst* (value of funding cannot be determined from available research): aims to accelerate AI startups through mentorship and funding.

We have provided additional information in the boxes below in relation to five of these initiatives:

1	***AI for Good Programme***
	The ***AI for Good Programme*** (AI for Good, 2024) is a UK government initiative designed to harness the transformative potential of artificial intelligence to address some of society's most pressing challenges. While the programme does not yet have a publicly confirmed standalone funding figure, it is closely aligned with the UK's broader AI strategy, which includes significant investments in responsible and inclusive AI development. The programme supports early-stage research and policy development aimed at embedding ethical and socially beneficial AI practices across sectors such as healthcare, climate resilience, education, and public services. It encourages collaboration between academia, industry, and civil society to ensure that AI technologies are developed and deployed in ways that are transparent, fair, and aligned with public values.
2	***Transforming Food Production***
	The ***Transforming Food Production (TFP)*** (UKRI, 2025c) initiative is one of the strongest AI initiatives in the UK, with a fund size of £90 million. It aims to revolutionise food production by integrating AI and robotics into farming practices. The initiative supports projects that enhance productivity and sustainability. For instance, the AI-driven precision farming project by Hummingbird Technologies uses drone and satellite imagery to provide detailed analytics on crop health, leading to optimised resource use by up to 20 per cent and higher yields by approximately 15 per cent (Innovate UK, 2024). The *TFP* initiative also focuses on reducing the environmental impact of farming through AI-powered solutions, such as AI-driven irrigation systems that have reduced water usage by 25 per cent and AI-based nutrient management systems that have decreased fertiliser use by 30 per cent, thereby minimising resource wastage and improving efficiency (UKRI, 2024).

3	***AI in Construction: Skills for the Future***
	The ***AI in Construction: Skills for the Future*** (Trilateral Research, 2024) initiative, part of the Innovate UK BridgeAI Programme, is dedicated to equipping Construction professionals with the necessary AI skills. With a fund size of £5 million, this initiative offers specialised training modules, industry expert insights, and real-world case studies. A notable success is the AI-powered safety monitoring system developed by Skanska, which has enhanced on-site safety and reduced accidents by 30 per cent (AGF, 2025). The initiative's focus on practical, industry-specific training ensures that participants can effectively implement AI solutions in their projects.
4	***Creative Industries Clusters Programme***
	The ***Creative Industries Clusters Programme*** (UKRI, 2025c), funded with £56 million, supports collaborations between universities and creative businesses to drive innovation through AI. Notable examples include partnerships with the University of Edinburgh and the University of Glasgow, which have led to the development of AI-enhanced fashion design projects. One such project used AI to predict fashion trends and streamline the design process, resulting in a successful collection showcased at London Fashion Week (UKRI, 2024). The programme has also facilitated over 970 unique industry or academia R&D collaborations and created or safeguarded 5,563 jobs (UKRI, 2024). By providing funding and resources for research and development, the programme fosters partnerships that leverage AI to enhance creativity and productivity in the Creative Industries.
5	***PALLETS (Proactive AI-powered Solutions for Logistics Efficiency, Transparency and Safety)***
	The ***PALLETS (Proactive AI-powered Solutions for Logistics Efficiency, Transparency and Safety)*** (University of Essex, 2025) initiative is a notable AI project in the UK, despite its relatively modest fund size of £1 million from UK Research and Innovation (UKRI). What sets *PALLETS* apart is its innovative approach to integrating AI with existing CCTV systems, transforming video monitoring into a proactive tool for real-time hazard detection and operational improvements (Logistics Business, 2025). A key project under this initiative is the collaboration with the Port of Dover, which has shown early success by reducing operational bottlenecks by 15 per cent and improving hazard detection accuracy by 20 per cent using computer vision technology (Essex University, 2025). By addressing significant industry challenges such as hazard detection and operational bottlenecks, *PALLETS* is setting new benchmarks in AI-driven safety and efficiency.
6	***Discover Digital Transformation Training Programme***
	The ***Discover Digital Transformation Training Programme*** (STFC Hartree Centre, 2025a) is a practical, expert-led initiative designed to help businesses and public sector organisations explore and adopt digital, data-driven, and AI technologies. Aimed at decision-makers and professionals across sectors such as agriculture, creative industries, construction, and transportation, the programme supports organisations of all sizes in building digital readiness and developing tailored action plans for AI adoption. Delivered through five focused sessions — available individually or as a complete series — the training covers key areas including data science, analytics, artificial intelligence, modelling, digital twinning, and scalable cloud platforms. Participants will gain insights into improving data quality, understanding analytics, and assessing AI readiness to boost productivity and reduce costs. With over 280 individuals already upskilled, including 235 unique attendees and 76 badges awarded, this programme plays a vital role in preparing UK industry for a

	digital future. To participate, registration is required via the Hartree Centre Training Portal. "**They are beginner friendly. All the speakers explainer everything really well, gave lots of examples and made the presentation engaging**." (DDT Attendee).

Overview of existing AI training provision

There are six main types of providers of AI training programmes, including private training providers, universities and academic institutions, professional bodies and industry associations, technology providers, industry in-house providers, and non-profit organisations and charities.

Overview of types of AI training providers

Type of provider	Description
Private training providers	Offer specialised training tailored to industry needs. They provide flexible learning options, including short-term and intensive programmes.
Universities and academic institutions	Provide comprehensive educational programmes, including undergraduate, master, and PhD courses. They offer both full-time and part-time study options, often with a strong research component.
Professional bodies and industry associations	Deliver industry-recognised certifications, courses, and pathways designed to meet professional standards and enhance career development. They often provide access to exclusive resources and networks.
Technology providers	Offer training on specific technologies and tools, including courses, modules, and certifications. They focus on practical skills and applied knowledge, relevant to their products and services.
Industry in-house providers	Provide internal training programmes tailored to the specific needs of their employees. These programmes often focus on company-specific processes, tools, and methodologies.
Non-profit organisations and charities	Offer training programmes aimed at skill development and community support. They often focus on accessible and inclusive education, providing opportunities for underserved populations.

The training providers above offer a wide range of training opportunities, with varying formats and durations, from noticeably short courses to multi-year training programmes designed to improve AI literacy (see table below).

Overview of type of AI training programmes and their durations

Type of training	Description
Less than 3 months:	
Articles	Written pieces that provide detailed information, insights, or research findings on specific topics. Examples include industry publications or research papers on AI trends and technologies.
Applied skills and assessments	Practical training that focuses on developing specific skills through hands-on activities and real-world applications. Examples include

Type of training	Description
	practical exercises or assessments on platforms such as *Coursera* or *Udacity*.
Short courses	Brief educational programmes designed to provide knowledge and skills in a specific area. Examples include short online courses on AI fundamentals.
Game-based learning	An educational approach that uses interactive games to teach concepts and skills. Examples include educational games that teach AI concepts, such as *AI Dungeon* or *Code Combat*.
Micro-learning programmes	Short, focused learning modules that cover specific topics or skills. Examples include modular learning programmes on platforms such as *Duolingo* or *Khan Academy*.
Pathways with certification	Structured learning paths that lead to certification upon completion. Examples include structured learning paths that lead to a certification upon completion.
Sandbox Environments	Controlled, virtual spaces where learners can experiment and practice skills without real-world consequences. Examples include experimenting with AI tools in controlled, virtual environments such as *Google Colab*.
Self-led learning	Educational programmes that allow learners to study at their own pace without direct instructor guidance. Examples include virtual training labs, e-learning modules, sandbox environments.
Seminars, webinars, online lectures, and workshops	Various formats of live or recorded educational sessions. Seminars and webinars are typically interactive and focus on specific topics, while online lectures provide detailed information on subjects. Workshops involve hands-on activities and practical training.
Skills Bootcamps	Intensive training programmes designed to quickly develop specific skills. Examples include intensive, short-term training programmes designed to teach specific skills.
Training material	Examples include training resources provided by AI companies.
3-6 months:	
Skills Bootcamps	Intensive training programmes designed to quickly develop specific skills. Examples include intensive, short-term training programmes designed to teach specific skills.
Pathways with certification	Structured learning paths that lead to certification upon completion. Examples include structured learning paths that lead to a certification upon completion.
Postgraduate modules and certificates	Advanced educational units and certifications offered at the postgraduate level. Examples include individual postgraduate-level courses or certificate programmes offered by universities.

Type of training	Description
6-18 months:	
Apprenticeships, typically Levels 3-4	Work-based training programmes that combine practical experience with classroom instruction. Apprenticeships at Levels 3-4 are intermediate to advanced and prepare learners for specific careers. Examples include work-based training programmes that combine on-the-job training with academic instruction.
Pathways with certifications	Structured learning paths that lead to certification upon completion. Examples include structured learning paths that lead to a certification upon completion.
Postgraduate qualifications (MSA, MSc, MPhil)	Advanced academic degrees awarded after completing postgraduate studies. Examples include advanced academic degrees in AI-related fields.
Training Courses	Structured educational programmes that provide knowledge and skills in specific areas. Examples include comprehensive training courses that cover a wide range of topics.
18 months - 4 years:	
Undergraduate qualifications (BSc, BEng, BSA)	Academic degrees awarded after completing undergraduate studies. Examples include bachelor's degrees in AI-related fields from universities.
Postgraduate qualifications (MSc, MSA, MPhil)	Advanced academic degrees awarded after completing postgraduate studies. Examples include advanced academic degrees in AI-related fields from universities such as a Master of Science in Artificial Intelligence from *Stanford* or *Oxford*.
Postgraduate research (PhD, DPhil)	Advanced research degrees awarded after completing extensive research in a specific field. Examples include doctoral research in AI at institutions such as *Massachusetts Institute of Technology (MIT)* or the *University of Cambridge*.

These programmes can be grouped into six broad categories, including:

- Fundamentals of Computer Science
- Introduction to AI
- Complementary AI Skills
- AI Sector-Specific Use Cases
- Academic and Higher Education Programmes, and
- Practical Business Application of AI and Business Transformation

Fundamentals of computer science

While specific training programmes tailored exclusively to the AI domain are still emerging, a broad spectrum of computer science training programmes are available. These programmes underpin present-day AI and provide essential skills that combine engineering, electronics and Information Technology. They are offered by various institutions and organisations, and cater to various levels of expertise, from beginners to advanced learners.

These programmes equip learners with industry-relevant skills, such as computing systems, hardware, and theoretical computer science and its formal methods. This includes for example, set theory, logic, formal languages, transition systems, automata theory, data structures, algorithms, computability, computational complexity, semantics of programming languages, logics of programming, the theory of concurrency, probabilistic computation, cryptography, and machine learning, all of which are crucial for interdisciplinary careers in AI. Developing safe and transparent AI will depend on foundational computing principles, which remain essential even as AI continues to evolve.

Introduction to AI

Introduction to AI programmes include a comprehensive array of courses designed to equip learners with foundational and intermediate knowledge in AI. These programmes introduce core AI techniques and concepts, including supervised learning (e.g. classification and regression), unsupervised learning (e.g. clustering and dimensionality reduction), and foundational deep learning topics such as neural networks, convolutional neural networks (CNNs), recurrent neural networks (RNNs), and generative models. Learners are also introduced to key principles in model training and evaluation, data preprocessing, overfitting and regularisation, as well as practical considerations such as interpretability, fairness, and responsible AI development, ensuring a well-rounded understanding of the field. Offered by renowned institutions and organisations, these courses cater to beginner and intermediate level learners and combine elements of natural language processing, automated reasoning, knowledge representation, computer vision, robotics and machine learning. The courses are accessible around the UK, with many available online, making them accessible to a diverse audience.

Complementary AI Skills

AI builds on foundations established by more traditional and well-established disciplines. Complementary AI Skills training courses include a diverse range of courses designed to enhance foundational and advanced knowledge in AI. These programmes focus on critical areas such as responsible AI; explainable AI; AI ethics and governance; AI public policy and regulation; cybersecurity; information privacy; Human-Centred Design; Human-Computer Interaction; Sustainable development practices; and business and leadership skills, providing learners with the skills needed to navigate the complexities of AI implementation and management. They cater to various levels of expertise, from beginner to advanced.

The programmes emphasise the importance of ethical considerations, transparency, and accountability in AI practices. By focusing on complementary AI skills, these programmes equip learners with the skills to implement AI responsibly and effectively within their organisations. They combine elements of AI, data science, business strategy, and ethics, providing a comprehensive education that addresses the unique challenges and opportunities in the AI landscape.

Ultimately, AI is not only about advancing computational capabilities but is intricately linked to issues of bias and fairness, where algorithms can inadvertently perpetuate social inequities or inflict harm. For example, cybersecurity goes beyond technical measures, encompassing trust and social resilience in protecting critical infrastructure and IoT devices, which are often vulnerable to cyber threats such as distributed denial-of-service (DDoS) attacks, botnet exploitation, and data breaches — all of which can compromise the integrity, confidentiality, and availability of critical systems and infrastructure. A human-centred approach to AI, grounded in transparency, interpretability, and usability, can help improve user interaction and collaboration with intelligent systems, making them more adaptive and efficient. By providing training in these related areas, the Hub supports the design of intelligent systems that prioritise human needs, values, and experiences.

AI Sector-Specific Use Cases

Courses on AI sector-specific use cases showcase a diverse range of programmes designed to apply AI across various industries. These courses provide specialised knowledge and practical skills tailored to the four specified sectors, including agriculture, Construction, Creative Industries, and Transport, Warehousing, and Logistics. Offered by leading universities, training centres, and professional organisations, these programmes cater to different levels of expertise, from beginner to advanced.

These sector-specific programmes emphasise the practical applications of AI, such as enhancing agricultural productivity, optimising supply chain management, revolutionising Construction practices, and driving innovation in Creative Industries. By focusing on real-world use cases, these programmes equip learners with the skills needed to implement AI solutions effectively within their respective fields. The integration of innovative tools, including AI, ML, natural language processing (NLP), robotics, big data analytics, the Internet of Things (IoT), and automation, provides a comprehensive education that addresses the unique challenges and opportunities within each sector in today's fast-changing technological landscape.

As these technologies continue to evolve, they are improving operational efficiency, increasing productivity, and enabling new types of roles that were not possible just a few years ago. As they continue to evolve, there is growing demand for professionals with the skills to develop, manage, and apply them effectively. Building a workforce with the right technical expertise is essential to stay competitive and ensure smooth, effective implementation.

Academic and Higher Education Programmes

The Academic and Higher Education programmes in AI include a range of undergraduate, master's, specialised courses and doctoral training programmes designed to provide in-depth knowledge and expertise in various aspects of AI. These advanced programmes focus on innovative AI technologies and their applications across different sectors. They cover a wide array of research topics, including AI for sustainable futures, safe and trusted AI, environmental risks, socially intelligent agents, and more. The interdisciplinary nature of these programmes combines elements of computer science, engineering, and domain-specific knowledge, providing a comprehensive education in AI.

The programmes are designed to cater to undergraduate and advanced learners, including postgraduate students (master's and doctoral) and professionals seeking to deepen their expertise in AI. They offer opportunities for research, practical applications, and collaboration with industry partners, ensuring that graduates are well-prepared for careers in academia, research, and industry.

Practical Business Application of AI and Business Transformation

Practical Business Application of AI and Business Transformation courses are offered by hyperscalers and cloud service providers. Hyperscalers are large-scale cloud service providers, like *Amazon Web Services (AWS), Microsoft Azure*, and *Google Cloud Platform (GCP),* that offer massive computing resources, storage, and networking infrastructure globally. Computing power, or "compute," is crucial for the development and deployment of artificial intelligence (AI) capabilities. These organisations offer programmes that include a diverse array of AI and cloud computing courses, pathways, and certifications meticulously designed to equip learners with relevant AI skills, helping them understand how to manage and oversee AI development and deployment.

These courses cover a broad spectrum of topics, including AI fundamentals, cloud architecture, cloud-based systems, platform infrastructure, machine learning, responsible AI practices, software offerings, and data management. They emphasise hands-on learning

and real-world applications, ensuring that participants can not only implement AI and cloud solutions, but also design, deploy, and manage scalable services across a range of professional contexts and use cases. This material examines the benefits and complexities of leveraging cloud resources, with guidance on enhancing cost-efficiency, ensuring security, and achieving scalable solutions. It also introduces best practices for selecting appropriate cloud services, managing workloads efficiently, and aligning cloud strategies with organisational goals.

Conclusions and implications

This section has provided an overview of existing AI skills and training initiatives across the four selected sectors. There is some excellent AI skills and training provision by a range of organisations (e.g. universities, private training providers, and representative bodies), and a rich mix of training formats (e.g. short courses, webinars, degree programmes etc). However, the provision of AI skills training is uneven, and not at the level it needs to be. For example, only one fifth of frontline UK workers received AI training, and around one half of the UK workforce do not have the digital skills they need to operate effectively in the workforce. These findings suggest four key implications that apply to all four selected sectors (see Table below).

1. *Focusing on skills investment* – tackle investment disparities in AI initiatives

While AI research and development has attracted substantial investment, this has not been mirrored in the area of skills development. The number and scale of initiatives focused specifically on building AI-related skills remain limited in comparison. This imbalance suggests that while technological innovation is being prioritised, the parallel development of a skilled workforce is lagging. Addressing this gap will be critical to ensuring that the benefits of AI can be fully realised across the economy.

2. *Embracing diverse training needs* – tailor training to sector-specific requirements

Each sector exhibits unique gaps in AI skills and capabilities. For example, the Construction sector, despite having initiatives like BridgeAI, still faces challenges with AI adoption among SMEs. Similarly, in Transport there is clearly a need for more comprehensive AI integration to address operational bottlenecks and safety concerns. It is essential that training and skills providers embrace these sector-specific gaps to maximise the impact of AI technologies.

3. *Creating a collaborative ecosystem* – encouraging stakeholders to work in partnership

No one organisation or type of organisation can singlehandedly solve the issues that have been identified in this research. Rather a collaborative approach is required in which Government, business, training providers and other stakeholders work constructively together in a synergistic ecosystem. Effective collaboration will enhance resource allocation, knowledge sharing, and the practical application of AI technologies, ensuring a holistic approach to skill development.

4. *Leveraging the Hub* – use the Hub to spearhead change

The findings, in principle, underscore the importance of having a centralised skills Hub to coordinate and streamline AI training and development efforts. The Hub can facilitate cross-sector collaboration, share best practices, and provide a unified platform for

upskilling the workforce. The Hub can help bridge the skills gap more effectively and ensure a consistent supply of AI talent across all sectors.

Addressing the AI skills and training gap

Introduction

This section addresses the AI skills and training gaps in the UK for employers in the four selected sectors, the impact these are having on businesses and the key barriers that are faced when trying to address them. We distinguish in our analysis between the 'skills gap' and the 'training gap.' We define the *skills gap* as the difference between the AI capabilities employers require (e.g. Machine Learning, AI Ethics, Data Literacy) and what the workforce possesses. The *current skills gap* is defined as the difference between the AI capabilities employers require (e.g. machine learning, AI ethics, data literacy) and what the existing workforce currently possesses. The *future skills gap* is defined as the difference between the AI capabilities employers require and what the future workforce, current and anticipated incoming, currently possesses. We define the *training gap* as the shortfall in training opportunities or uptake that prevents the workforce from acquiring those needed AI skills.

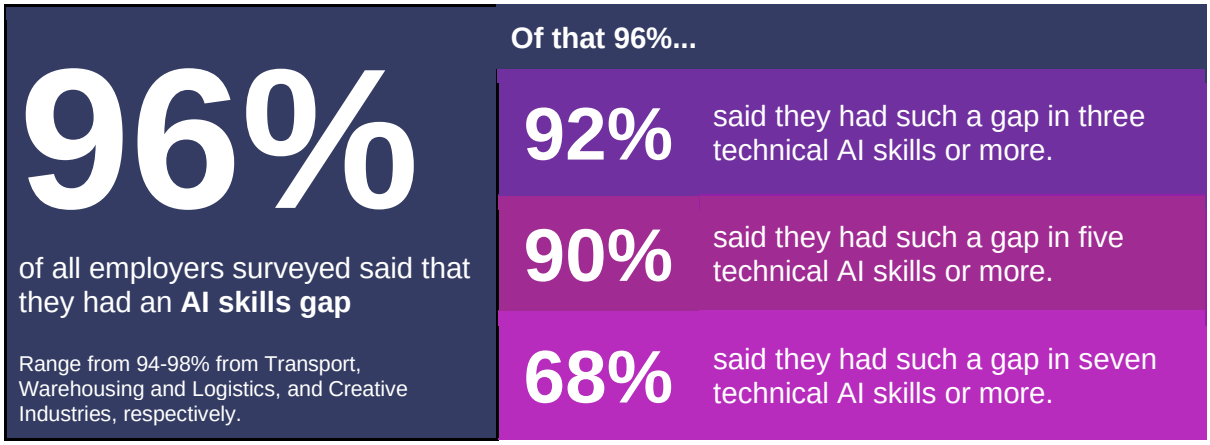
The section is structured as follows:

- AI skills gap
- AI training gap
- Impact of the skills and training gaps on businesses
- Barriers to resolving the skills and training gaps
- Conclusions and implications

AI skills gap

There is high demand across all UK industries for AI skills, and internationally, and a widely recognised skills gap (e.g. PwC, 2024). This is consistent with our survey findings which show that the vast majority (96 per cent) of employers say they are experiencing an AI skills gap in their business. The four selected sectors feel that same gap, in terms of technical and the required behavioural skills for AI adoption, limiting their ability to adopt AI fully (see Figure below).

Percentage of employers across the four selected sectors with an AI skills gap



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. Respondents were asked "Which AI-related skills currently exist in your organisation and to what degree?" The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

Of those who reported having an AI skills gap, 90 per cent said they had such a gap in five AI skills or more. This was greater for the Agriculture and Food Processing and Construction sectors, at 91 per cent. The Creative Industries sector was the least likely to report having a skills gap in five AI skills or more, but 87 per cent of organisations that said they had a skills gap said it was of five or more.

The AI skills representing the biggest gap across employers surveyed were AI Ethics, Governance and Regulations, with 75 per cent respondents saying they had a gap in this skill; followed by Machine Learning at 75 per cent; then Data Literacy at 74 per cent; and finally, AI Systems and Automation at 74 per cent. This correlates largely with those AI skills most in demand currently by employers in these sectors (see Current Demand section).

For the most part, the top skills gap across all employers surveyed aligned with those in the four selected sectors. GenAI and Visual Image Recognition also featured as a key skills gap in the Construction sector, at 77 per cent each in this sector. The Agriculture and Food Processing sector demonstrated the highest variance in skills gaps, with its top skills gap being Visual Image Recognition at 74 per cent, followed by Neural Networks at 72 per cent, and Data Literacy, Digital Literacy and Natural Language Processing coming in at joint third with 71 per cent. This demonstrates again how the AI skills landscape and need in this sector look vastly different to that of the other selected sectors, requiring different interventions and specific, tailored training programmes. It is worth noting that the Construction and Transport, Warehousing and Logistics sectors report strikingly similar AI skills gaps, particularly in AI Ethics and Governance, Machine Learning, and Data Literacy. This alignment suggests an opportunity for joint training initiatives and shared curriculum development to address common capability needs.

AI-related skills gaps of employers across the four selected sectors

Agriculture and Food Processing	Construction
#1 – Visual Image Recognition – 74% #2 – Neural Networks – 72% #3 – Data Literacy – 70% #4 – Digital Literacy – 70% #5 – Natural Language Processing – 70% #6 – AI Ethics, Gov and Regulations – 70% #7 – Autonomous Driving – 70% #8 – Machine Learning – 69% #9 – Robotics – 69% #10 – GenAI – 68%	#1 – AI Ethics, Gov and Regulations – 80% #2 – Machine Learning – 78% #3 – GenAI – 77% #4 – Data Literacy – 77% #5 – Visual Image Recognition – 77% #6 – AI Systems and Automation – 75% #7 – Digital Literacy – 73% #8 – Natural Language Processing – 71% #9 – Neural Networks – 71% #10 – Robotics – 70%
Creative Industries	**Transport, Warehousing and Logistics**
#1 – AI Systems and Automation – 78% #2 – Machine Learning – 78% #3 – AI Ethics, Gov and Regulations – 77% #4 – Data Literacy – 76% #5 – Natural Language Processing – 74% #6 – Visual Image Recognition – 73% #7 – Digital Literacy – 70% #8 – Neural Networks – 69% #9 – Autonomous Driving – 65% #10 – GenAI – 65%	#1 – AI Systems and Automation – 77% #2 – AI Ethics, Gov and Regulations – 75% #3 – Data Literacy – 74% #4 – Machine Learning – 73% #5 – Digital Literacy – 71% #6 – GenAI – 70% #7 – Natural Language Processing – 65% #8 – Visual Image Recognition – 65% #9 – Neural Networks – 63% #10 – Autonomous Driving – 63%

Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

> **We are often finding that organisations are asking for creative thinking, analytical thinking, basic technical, technological literacy, curiosity and lifelong learning. But also, leadership and social influence.**
>
> Business representative organisation, Cross-cutting

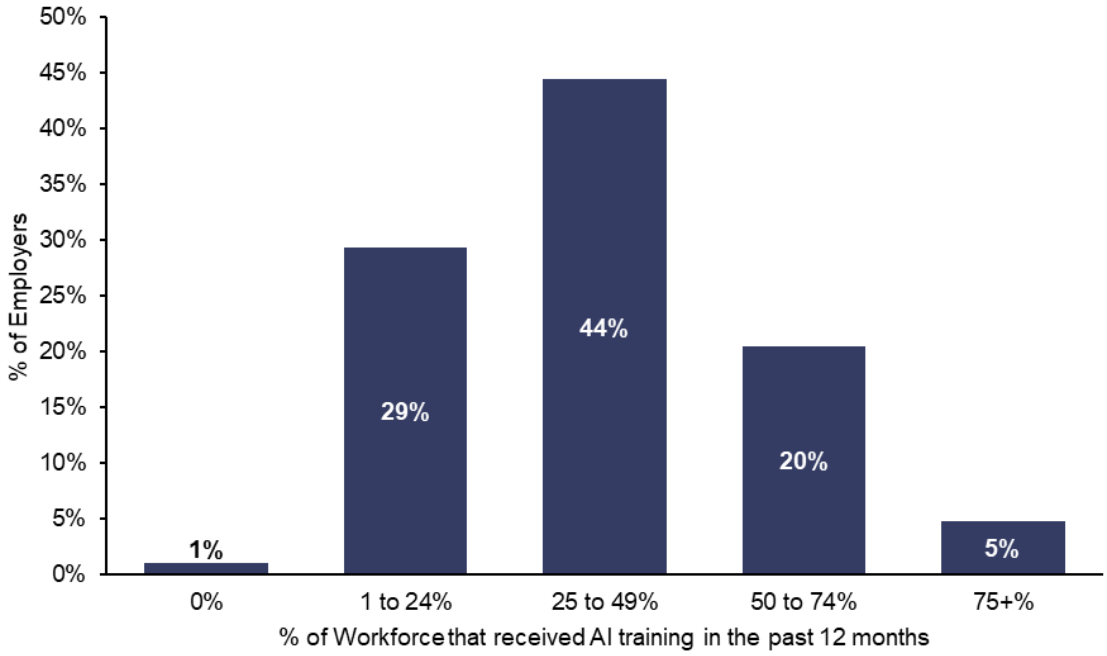
Of the 4 per cent of employers surveyed who said that they had no AI skills gap, either because they had sufficient access to the skills required already or had no need for them, the most came from the Transport, Warehousing and Logistics sector (37 per cent) and the least came from the Creative Industries sector (16 per cent). This points to a potential underestimation of AI's importance or lack of proactive skill development initiatives in the sector.

AI training gap

While 96 per cent of employers identified a skills gap within their organisation, the majority (73 per cent) of employers have only been able to provide training for up to half of their workforce. A quarter of the organisations surveyed said that at least half of their workforce had received AI-skills training in the last year. 44 per cent said that between 25-49 per cent of their workforce had received such training in this time. Only 1 per cent indicated that none of their workforce had received such training. These results held up across organisation size and region, although a much larger degree of the workforce was upskilled in organisations that only operated on a virtual basis, with 50 per cent saying that at least 75 per cent of their

organisation had received AI-skills training in the last year, although the sample size was small (n=6) for such organisations.

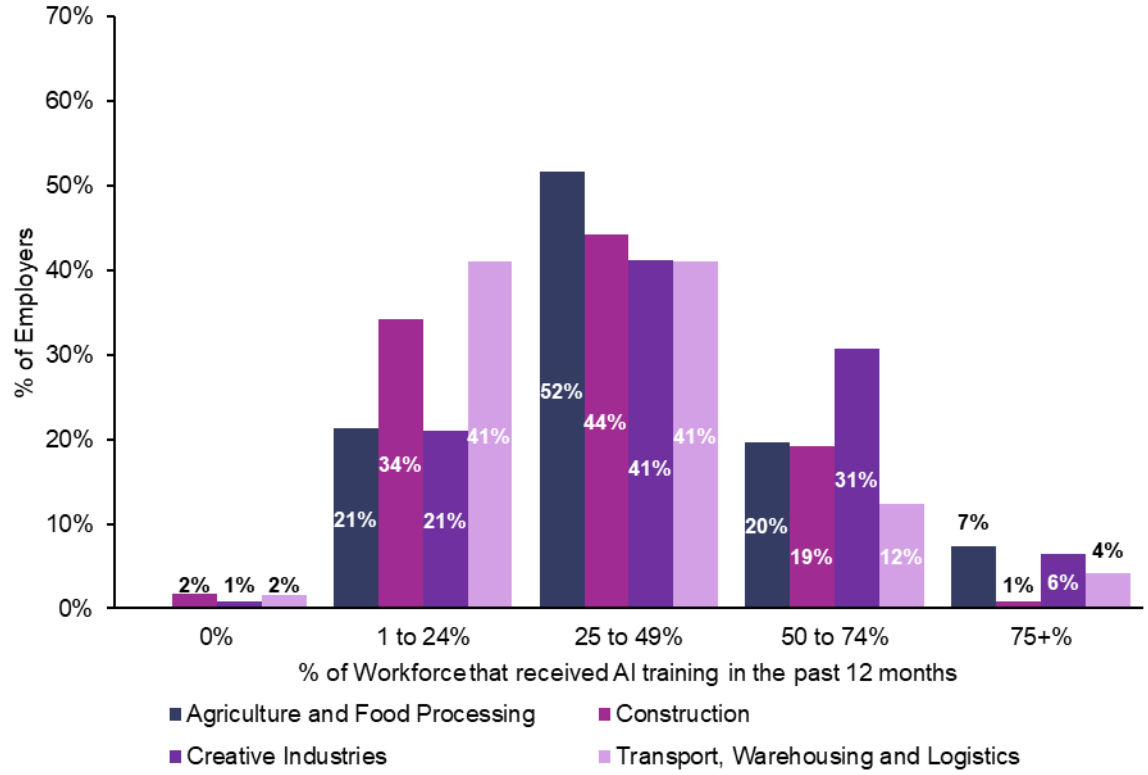
Proportion of workforce trained in last 12 months by employers across the four selected sectors



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

Sector analysis did, however, seem to make a slight difference in the proportion of workforce receiving AI-skills training in the last year, with higher rates in the Creative Industries and Agriculture and Food Processing sectors. In the Creative Industries, the integration of AI tools in content creation, marketing, and design processes often requires professionals to be agile and acquire new skills to remain competitive and relevant. As a result, organisations in this sector are likely to invest more heavily in training their workforce to harness these emerging technologies effectively. Similarly, in the Agriculture and Food Processing sector, there is a growing pressure to modernise and adopt more sophisticated technologies due to macro-economic challenges, meaning they may be more likely to prioritise AI skills training.

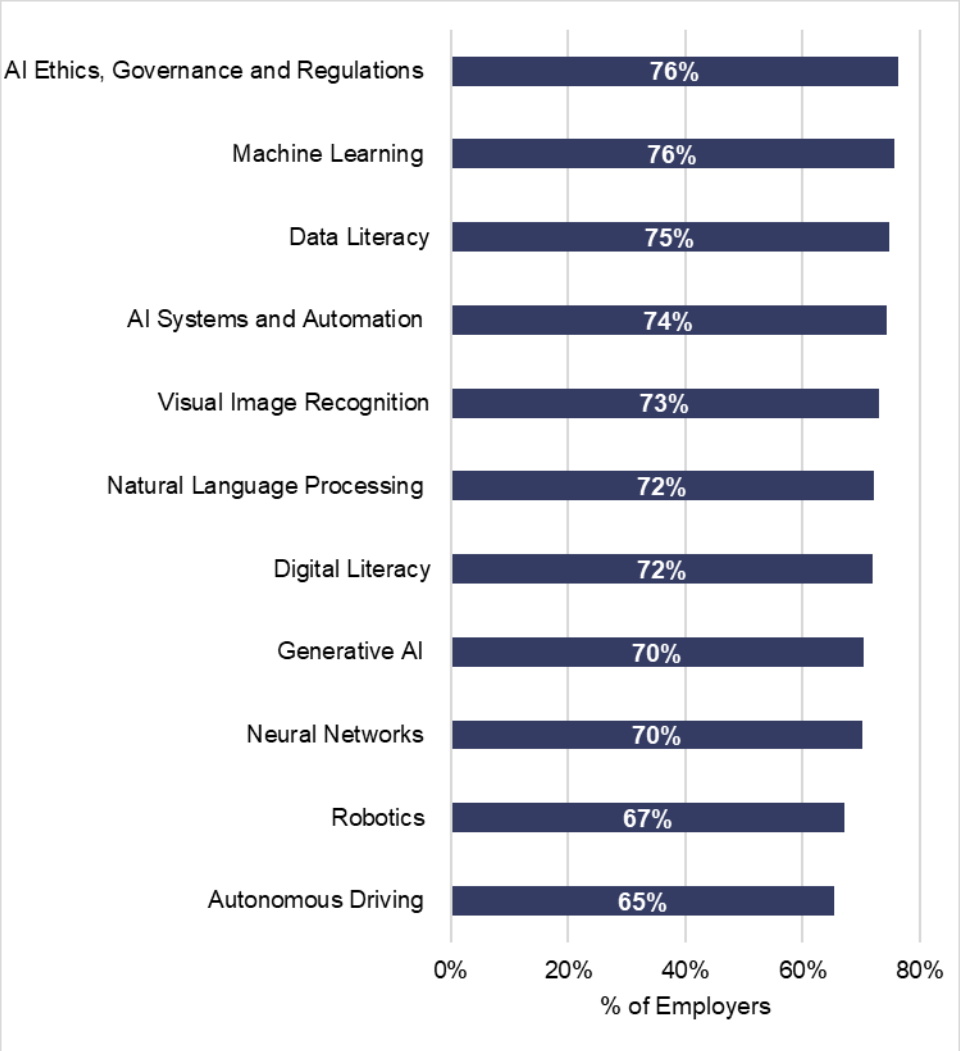
Proportion of workforce trained in last 12 months by employers across the four selected sectors, by sector



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

Of those who were trained across the four selected sectors, notable skills gaps remained across their technical skills. 76 per cent still reported a skills gap in AI Ethics, Governance and Regulations and Machine Learning; and 75 per cent still reported a gap in Data Literacy. These findings suggest a critical training gap in these areas of AI technical skills, highlighting the need for targeted training providing to fill these gaps. Existing provision may not touch on these relevant capabilities due to a general oversight in curriculum design that prioritises foundational technical skills while neglecting the emerging complexities of AI Ethics and Governance. Additionally, training programmes appear to lack the necessary sector-specific context that would make such skills more applicable and relevant. This could be exacerbated by the rapid evolution of AI technologies, leading to outdated course content that fails to keep pace with current demands.

Percentage of employers across the four selected sectors, who are already providing AI training and still reporting specific AI skills gaps



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. Respondents were asked "Which AI-related skills currently exist in your organisation and to what degree?" The total sample size was 488 UK employers. Further information on our approach to the employer survey is provided in Annex B.

The need for specifically tailored training programmes has also been highlighted as a training gap across employers in all the four selected sectors in the survey. In the Agriculture and Food Processing sector, 15 per cent surveyed said that they were unaware of any available training provision to support them, with only 5 per cent in the Transport, Warehousing and Logistics sector. They have the highest variance in skills needs and gaps compared with the other selected sectors due to its unique blend of manual labour, biological systems, and emerging AI applications like visual image recognition and neural networks. This suggests the sector may require more specific and tailored training than what exists currently on the market; or there is a communication and visibility issue, where training may exist, but it is not reaching or resonating with the intended audience.

To resolve this gap in sectoral tailored training programmes, training providers, particularly across the Agriculture and Food Processing sector, could consider rebranding their courses, rather than creating new provision. By adapting current courses to include case studies, best practices, and targeted skill sets pertinent to the four sectors, providers can leverage existing materials and create a more practical and engaging learning experience, without the resource-intensive process of starting from nothing.

> **There is a higher demand for training programmes tailored to specific sectors.**
>
> Employer and training provider, Creative Industries sector

Employers across the four selected sectors also noted the importance of including digital literacy, as well as soft skills, in training provision. These skills were indicated as being of great importance in the adoption of AI.

> **Another layer of training provision should include IT skills, digital literacy and soft skills.**
>
> Employer, Construction sector

> **Training and education must evolve to focus on soft skills, ensuring future talent thrives in an AI-augmented world.**
>
> Employer, Creative Industries sector

Impact of the skills and training gaps on employers

Percentage of employers across the four selected sectors saying the AI skills and training gap would impact on their organisation negatively

91%

of employers surveyed believed that the **AI skills and training gap would result in negative consequences on their organisation in the next 12 months**.

Of that 91%:

53% believed an AI skills and training gap would result in **higher operating costs**. This is a particular concern for the Agriculture and Food Processing sector at 61 per cent, especially in comparison to the Creative Industries sector at 46 per cent.

42% stated that an AI skills and training gap would result in **difficulties in introducing new working practices, processes or technology**. This was less felt by the Transport, Warehousing and Logistic sector at 37 per cent.

41% worried that an AI skills and training gap would **increase workload for other staff**. This was particularly noted by the Creative Industries sector at 47 per cent; and least by the Transport, Warehousing and Logistics sector at 37 per cent.

Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

32 per cent stated that an AI skills and training gap would create difficulty in meeting quality standards; and result in outsourcing or subcontracting of work, which might have been done in-house. The Transport, Warehousing and Logistics sector noted feeling particularly concerned by the latter, at 39 per cent, versus the Construction sector, at 24 per cent. Large and medium sized organisations were also more concerned by this, at 38 per cent and 34 per cent respectively, versus small organisations at 24 per cent. This could be attributed to larger firms having more complex operations that rely heavily on AI for scalability and efficiency, making them more susceptible to quality issues stemming from skills deficiencies. Smaller organisations might operate with a more streamlined model or possess less ambitious AI integration plans, thus experiencing less immediate pressure to outsource.

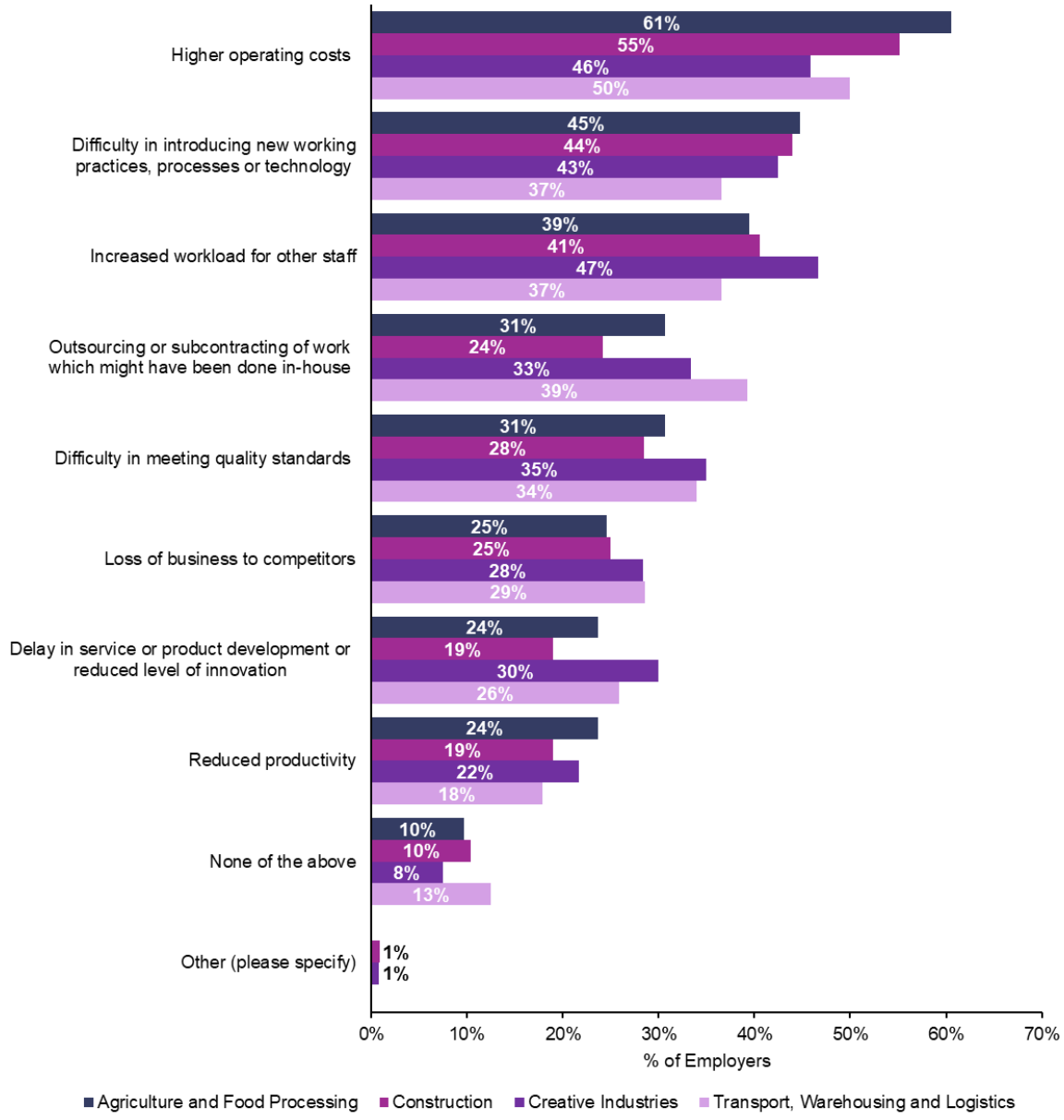
27 per cent worried about loss of business to competitors. This concern was greater for large organisations, at 34 per cent. This heightened apprehension can be attributed to the competitive advantage that proficient use of AI technologies offers. Large firms, with greater resources and visibility in their respective markets, may endure the most of this competitive pressure. If they cannot leverage AI effectively to improve their offerings, they risk falling behind nimble competitors who are better equipped to harness these technologies.

25 per cent stated that it would result in a delay in service or product development or reduced level of innovation. This was a larger concern for the Creative Industries sector at 30 per cent versus the Construction sector at 19 per cent. The Creative Industries thrive on innovation and timely delivery, making them overly sensitive to any impediments in skill

acquisition that could hinder creativity and the development of new ideas. 21 per cent were concerned by a potential reduction in productivity because of an AI skills and training gap.

Medium sized organisations worried more than large and small organisations about a delay in service or product development or reduced level of innovation, increased workload for other staff, and higher operating costs, but the least about loss of business to competitors.

Impact of AI skills gaps across employers in the four selected sectors, by sector



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

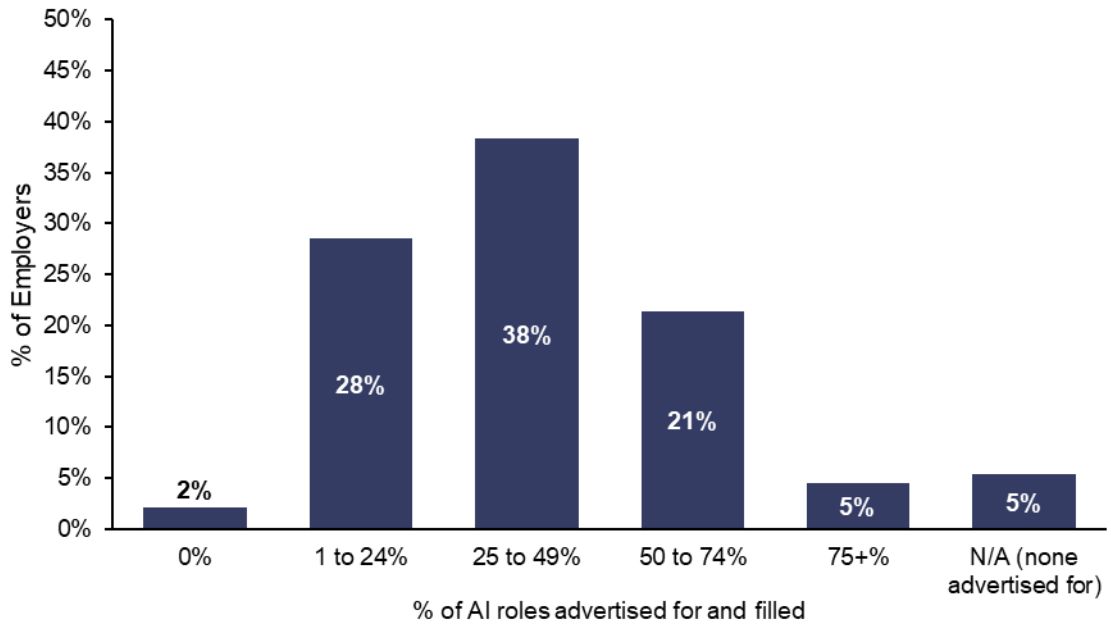
Barriers to resolving the skills and training gaps

Resolving the gap must be tackled through recruitment, upskilling, outsourcing, or consultancy. The former two are more permanent solutions to closing the gap, however, organisations in our four selected sectors have faced barriers to both.

Recruitment

Only 5 per cent of employers surveyed were able to fill at least three quarters of the AI related roles that they advertised for. Only 26 per cent could fill at least half of the gaps. The Agriculture and Food Processing sector found it easier to fill their AI related roles, with 33 per cent being able to recruit for more than half of those advertised. Organisations recruiting in the South East or Virtual only found it similarly easier to fill their AI related roles, at 33 per cent also; closely followed by London, the East of England, and Northern Ireland at 32 per cent; and the North West at 31 per cent. Organisations in Yorkshire and Humber found it the most difficult, with only 9 per cent able to fill at least half of the AI related roles that they advertised for. These regional trends speak to the regional disparity found in the supply of AI skills, and the need for intervention.

Proportion of AI related roles advertised for and filled across employers in the four selected sectors



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. Respondents were asked "What proportion of AI related roles, that you have advertised for, have you been able to fill?" The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

The Agriculture and Food Processing sector was also one of the most likely to be advertising for AI related roles, at 97 per cent, in comparison to an average of 95 per cent. Larger organisations were as likely to be recruiting for AI related roles also, at 97 per cent, especially in comparison to smaller organisations, at 93 per cent. Virtual only organisations were the least likely to recruit for AI related roles, at 33 per cent, whilst also being one of the most likely to fill over half, at 33 per cent, as aforementioned.

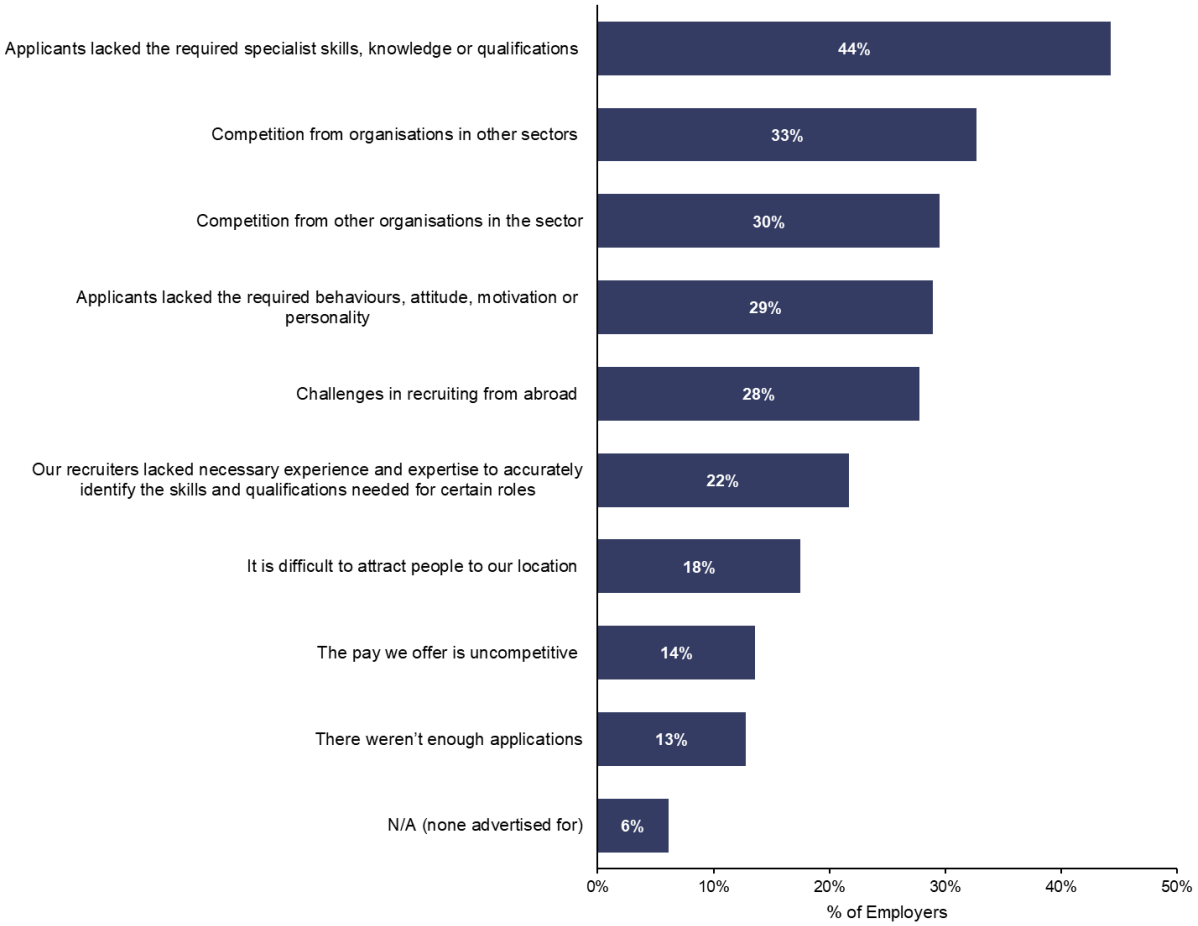
Organisations who advertised for AI related roles cited applicants' capability as the biggest barrier to recruitment, specifically their lack of the required specialist skills, knowledge and/or qualifications, with 47 per cent saying so. This may be attributed to organisations overestimating the requirements for AI skills due to inadequate knowledge of the actual demand, coupled with a limited number of potential candidates in the broader job market who meet the specified job profile. Additionally, the rapid evolution of skills profiles for AI positions contributes to this issue. Indeed, PwC's (2025b) latest AI jobs barometer found that skills for AI-exposed jobs are changing 66% faster than for other jobs; and more than 2.5x faster than last year. Organisations citing this barrier was felt more greatly by large and medium sized organisations, at 54 per cent and 46 per cent respectively, in comparison to small organisations, at 39 per cent. This may be due to larger organisations having more complex and specialised AI-related roles that require a higher level of expertise and a

specific set of skills, making it more challenging to find suitable candidates. Additionally, these organisations may have more defined and stringent hiring standards due to their scale and operational needs, further limiting their candidate pool. In contrast, small organisations might be more flexible in their hiring practices or may prioritise candidates who show the potential for growth and adaptation over specific qualifications, allowing them to navigate the talent shortage more effectively.

31 per cent of employers recruiting also noted applicants' lack of the required behaviours, attitude, motivation or personality. Applicants' lack of the required behaviours, attitude, motivation or personality was especially noted in the Agriculture and Food Processing sector, at 38 per cent. In comparison, only 23 per cent noted this as a barrier in the Construction sector.

Competition was seen as a significant barrier too, with 31 per cent noting competition from other organisations in the sector; and 35 per cent noting competition from organisations in other sectors. Interestingly, the Transport, Warehousing and Logistics sector was the least concerned by competition from other organisations in the sector out of the four, at 24 per cent, and the most concerned by competition from organisations in other sectors, at 40 per cent. This may be due to concerns about the perceived attractiveness of AI related jobs in the sector, although in stakeholder conversations, there seemed to be more concerns raised by the Agriculture and Food Processing and Construction sectors when it came to this. The Creative Industries self-reported being the least concerned by competition from organisations in other sectors, at 29 per cent, perhaps due to a perceived greater attractiveness of AI related roles in this sector, especially with the rising use of GenAI. Competition from other organisations in the sector was also felt more prominently by large and medium sized organisations, at 34 per cent and 33 per cent respectively, in comparison to small organisations, at 25 per cent. This could be due to their greater visibility and market presence, which makes them more susceptible to talent poaching.

Barriers to recruitment of AI-related roles across employers in the four selected sectors



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

This fear of competition alone, however, demonstrates the sheer demand for AI skills across the UK and international economy. There is an appetite for international talent across the four selected sectors as well as domestic talent due to this demand. Indeed, 30 per cent cited challenges in recruiting from abroad as a barrier to recruitment. This was particularly prevalent in the Agriculture and Food Processing sector, at 37 per cent, than the other sectors, such as Construction and Transport, Warehousing and Logistics, at 26 per cent and 27 per cent, respectively. It is clear, therefore, that government intervention to support upskilling of domestic talent and the recruitment of international talent is required.

In comparison, only 14 per cent respectively stated that pay or number of applicants was an issue. This shows that there is an appetite for these roles in the labour market, but insufficient capability to deliver. This may be due to availability and accessibility of AI training in the UK, as well as soft skills, if behaviours, attitude and motivation were also noted as a barrier.

Given these barriers to recruitment, it may seem like an easier solution to upskill your existing workforce in the required AI skills to support adoption and its associated benefits; however, many organisations face barriers in providing training also.

Upskilling

88 per cent of employers surveyed faced barriers in providing training to their workforce. The most significant barrier of these was time, with 44 per cent of employers saying there was not sufficient time for training.

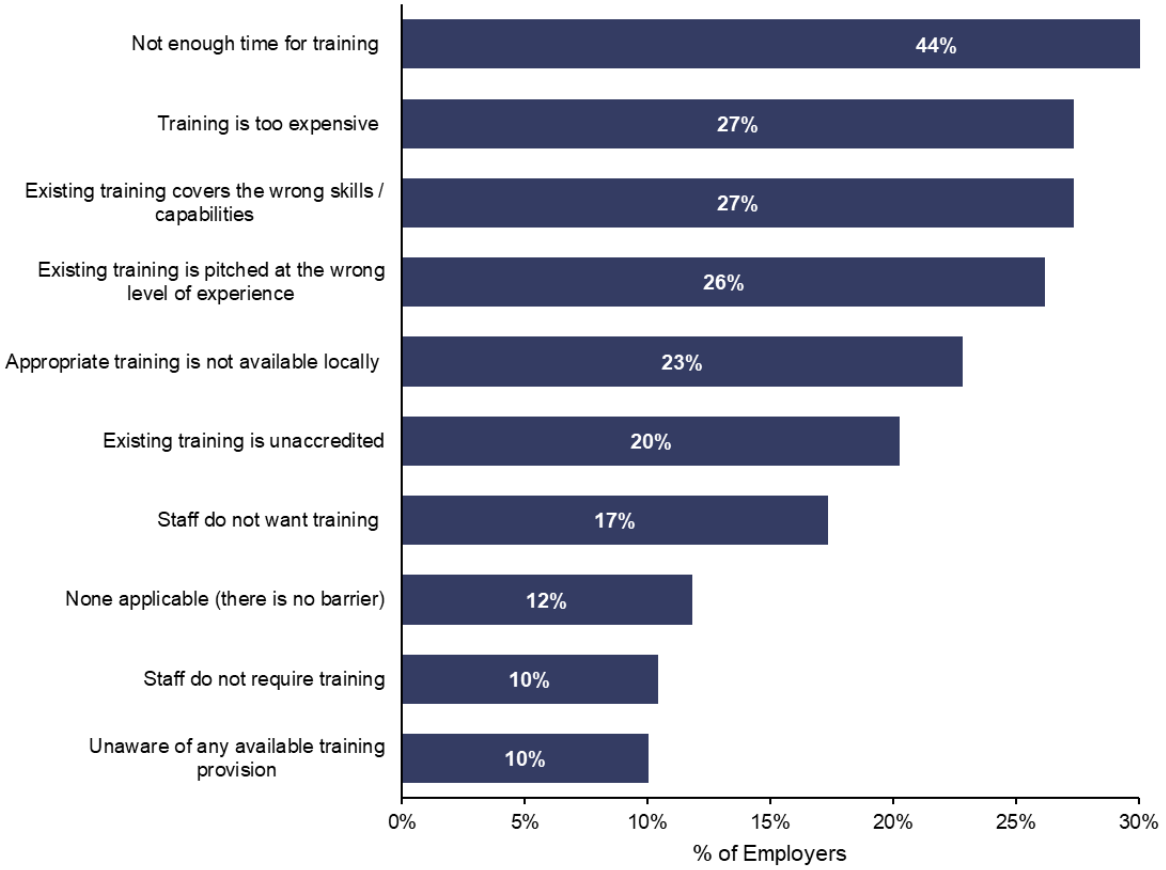
> **Time seems to be the big barrier to organisations accessing training - cross-cutting despite organisation size, but definitely by smaller more than larger organisations…Financial constraints and concerns about information security and safety are also major barriers to AI training.**
>
> Training provider, Cross-cutting

This was followed by the cost of training and existing training not covering the appropriate capabilities and skills required, both at 27 per cent. 26 per cent of employers surveyed also said that existing training was pitched at the wrong level of experience. Employers in the Transport, Warehousing and Logistics sector were less likely to cite lack of awareness or time as a barrier to providing training than the other three selected sectors, although the latter was still acknowledged to be the most prevalent barrier to providing training. They were, however, more likely to cite cost as a barrier, at 32 per cent compared to the average of 27 per cent and especially the Construction sector at 22 per cent. This may be due to how the Construction sector tends to work as a whole, at least on the frontline:

> **In the Construction sector, the vast majority of people on the Construction site are self-employed. This tax-efficient structure has been in place for a long time and tends to drive different behaviours among employers. The ease of transitioning from one business to another can act as a barrier to upskilling, potentially hindering widespread adoption of such initiatives.**
>
> Employer, Construction sector

The Creative Industries were by far the most likely to cite time as a barrier at 48 per cent; and the Agriculture and Food Processing sector were most likely to cite lack of awareness at 15 per cent. The latter may be due to it having the highest variance in skills needs and gaps from the other selected sectors; and, therefore, potentially requiring more specific and tailored training than what exists on the market.

Barriers to providing AI training across employers in the four selected sectors



Notes: This data is based on *PwC*'s employer survey conducted between February and May 2025. The total sample size was 508 UK employers. Further information on our approach to the employer survey is provided in Annex B.

Some of these barriers looked different depending on size, with small organisations being twice as likely to say that their staff do not require training; as well as being 1.5 times more likely to be unaware of any available training provision. They were also four times less likely to say that existing training was pitched at the wrong level of experience.

The Hub will seek to remedy a portion of these current barriers faced by organisations of all sizes and regions in our four selected sectors.

Outsourcing and consultancy

Stakeholders across the sectors expressed concerns there is a risk of knowledge transfer loss post-engagement. This is particularly acute when external consultants or outsourced teams are not embedded within internal workflows or lack structured handover processes. There is also the possibility of reliance on third-party providers creating dependencies that inhibit the development of in-house capabilities, making it harder to build sustainable AI expertise.

> **Do we need to employ an AI expert in the business full-time? That is a big commitment — especially when you are not sure they will be working at full capacity from day one. It might take a year to build up that need. But then again, you do not want to pay consultancy fees and lose that knowledge. So, is it better to train a team internally and start experimenting?**
>
> Employer, Agriculture and Food Processing

Conclusions and implications

This section has presented evidence on the gaps in both AI skills and AI training that UK businesses are currently having to navigate. The overwhelming majority of businesses in the four selected sectors (96 per cent) reported the existence of an AI skills gap, underscoring the urgent need for a coordinated response to prepare the workforce for an AI-driven future. The businesses have indicated clearly that a balanced approach - that includes both AI technical skills and supporting behavioural skills - is required. They have also emphasised the need for tailored and sector-specific training frameworks to ensure adequate access to necessary skills.

Building on these findings, the Hub aims to create an online, dynamic ecosystem that brings together employers, training providers, and AI technology partners to foster learning and growth. It will focus on connecting stakeholders with curated training, developing talent pipelines, promoting best practices, and championing sector-relevant AI innovation. The Hub will specifically support organisations in the four selected sectors that are struggling with the following barriers:

1. Awareness

10 per cent of all employers surveyed stated that a barrier to providing training to employees was a lack of awareness. They stated that they were unaware of any available training provision. Now, they can signpost their employees to the Hub. It will provide collated, relevant training materials in one place and create tailored training pathways for their workforce. Employees will also be free to explore other resources and training materials collated on the Hub.

2. Content

27 per cent of organisations surveyed said that existing AI-skills training covers the wrong type of AI skills and capabilities and therefore does not meet their business needs. To combat this, the Hub has been designed in part through stakeholder engagement across the four selected sectors, which has heard directly from them about the level and type of AI skills that would be most helpful. This is supplemented by our research with businesses into the existing training provision, which has focused on uncovering specific types and levels of skills gaps.

3. Access

23 per cent of employers surveyed said that a barrier to providing training to their employees is that the appropriate training was not available locally. All curated training materials on the Hub can be accessed virtually, ensuring upskilling can happen anywhere. The Hub also signposts users to relevant local training, and users can inform other users of relevant local training on the forums available.

4. Cost

27 per cent of organisations surveyed were concerned that AI skills training was too expensive. The Hub curates some *pro bono* training materials, as well as those that require payment. Users can also filter through curated training materials by level of cost, so that only the options that they can afford are shown whilst searching.

5. Time

Time was recognised as the biggest barrier to providing training, with 44 per cent of employers in the four selected sectors stating there was not enough time for training. As existing training materials and tailored training pathways - specific to the user's current level of AI fluency, role, sector, and technology stack - are already collated on the Hub, employers can signpost their employees to the Hub, rather than spending time identifying or creating training themselves.

Next steps

Step 1: Delivery of a national AI outreach strategy for selected sectors

We are executing a national outreach strategy designed to raise awareness, drive adoption, and create long-term engagement with AI skills development across the UK economy. At its core is a structured “4-3-4” framework that engages 4 key stakeholder groups — employers, technology partners, training providers, and individual learners — through 3 primary communication channels: the Hub platform, virtual/in-person events, and social media. These are underpinned by 4 thematic content pillars: sector-wide insights, practical AI integration, lifelong learning, and workforce impact stories. This strategic alignment aims to have outreach that is demand-driven, inclusive, and relevant across the Hub’s four selected sectors: Construction, transport and logistics, Creative Industries, and agriculture.

We are actively deploying this strategy through a blend of in-person events, thought leadership content, and digital campaigns. The pre-launch programme alone includes campaigning at a national series of Regional Roadshow Events hosted by Innovate UKin cities like Bristol, Belfast, and Swansea, which serve to connect regional actors and surface local demand for AI skills. Simultaneously, the Hub platform will be hosting thought-provoking blogs on topics such as “Skills-First Hiring,” and “Building a Future-Ready Workforce,” — that translate complex trends into practical insights for users. Complementing these are targeted *LinkedIn* polls, infographics, and hackathons, which offer hands-on support for business strategy and AI team development.

This multi-touchpoint, high-frequency approach is aimed to reach all stakeholders — regardless of sector, region, or AI maturity — and help them identify ongoing opportunities to engage with the Hub. Every interaction, whether a blog post or a conference stand, contributes to a broader ambition: to embed AI capability across the UK’s industrial base, close regional and sectoral skills gaps, and create a self-sustaining ecosystem of innovation and talent. By continuously gathering feedback and surfacing employer needs, our outreach is not only promoting the Hub but also shaping it to deliver lasting, measurable impact.

Step 2: Refining content on the Hub

We will focus on several critical enhancements to enrich the platform's capabilities and user experience. This next phase of development will refine and expand the Hub’s content and functionality to better align with the skills needs identified through our research. Firstly, we will introduce a comprehensive talent map that visually represents the supply and demand for AI skills across the country. This feature will provide valuable insights for both learners seeking to understand the job market and employers looking to identify talent pools.

As engagement with the Hub grows, we will expand our offerings by adding more learning pathways and courses. This will ensure that we cater to the diverse interests and needs of our growing user base, providing them with a wide range of learning opportunities. Additionally, we plan to embed further blogs, including a series of extracts from the white paper. These blogs will offer in-depth knowledge and perspectives on various AI-related topics, helping users stay informed and engaged.

To continuously improve the platform, we will conduct further user testing and gather feedback. This iterative process will allow us to refine and enhance the web functions, ensuring that the hub remains user-friendly and effective. Moreover, we will open a forum where learners can discuss courses directly on the hub. This interactive space will foster a sense of community, enabling users to share their experiences, ask questions, and support each other in their learning journeys.

Together, these enhancements will help ensure the Hub evolves into a targeted, responsive, and inclusive platform that supports learners and employers across the UK's AI ecosystem.

Step 3: Engagement with stakeholders and additional research

We will conduct further desk research and stakeholder engagement to validate findings from this White Paper and gain deeper insights into the current demand, supply, and gaps in AI skills and training, including:

- **Stakeholder engagement and research:** We will continue to engage with employers, training providers and technology partners via the three channels of engagement:
    - **Additional One-to-Ones and Focus Groups:** We will organise one-to-one discussions and additional focus group sessions to gather more qualitative data. These engagements will create a larger sample size to validate current findings and facilitate further in-depth conversations that reveal nuanced perspectives on skills needed.
    - **Targeted Survey:** To supplement qualitative findings, we will conduct additional targeted surveys for employers, training providers and technology partners aimed at collecting both qualitative and quantitative data. This will help to build upon the insights from the employer survey and provide a clearer picture of future training needs across the four sectors.
    - **Natter Sessions**: Using the Natter AI platform, we will conduct large-scale virtual discussions that can engage thousands of stakeholders simultaneously. This technology will enable us to analyse and summarise vast amounts of qualitative input to validate our findings.

If you would like to be engaged as part of this ongoing work, please contact the team at uk_ai_skills_hub@pwc.com.

- **Predicated future demand for AI skills once AI is fully adopted:** Through desk research and further engagement we will create detailed use cases to demonstrate how different sectors will evolve with widespread AI adoption. By modelling real-world applications and market requirements, we can project skills needs and illustrate the anticipated future demand for AI skills once AI technologies are fully integrated across the key sectors.
- **AI/technology landscape:** We will examine the broader AI and technology landscape, including recent developments and emerging trends. This analysis will encompass advancements in AI methodologies, technologies, and their implications for skill requirements, thus ensuring that we are keeping up with the pace of developments.
- **Cross-country comparison:** We will conduct a comparative analysis of AI job postings and requirements from multiple countries. This cross-country comparison will highlight differences and similarities in AI skill demands, helping to identify best practices and innovative approaches to training across regions.

- **Additional recommendations:** We will compile tailored recommendations based on our research findings, specifically addressing the needs of employers and employees in the four sectors. Our recommendations will provide policy recommendations and emphasise strategies that enhance the effectiveness of the training and AI ecosystem.

These findings will be included in the second White Paper, to be published in the next six months.

Annexes

Annex A. Sector and sub-sector definitions

Sub-sector	Description
Agriculture and Food Processing	
Livestock	Involves the breeding, raising, and management of animals such as cattle, poultry, and sheep for meat, dairy, and other products.
Agroforestry	Integrates trees and shrubs into agricultural landscapes to enhance biodiversity, improve soil health, and provide additional income sources.
Fishing & Aquaculture	Encompasses the harvesting of fish and other aquatic organisms from natural or controlled environments for food and other uses.
Farming	The cultivation of crops and rearing of animals for food, fibre, and other products.
Agritech	The application of technology and innovation to improve the efficiency and output of agricultural practices.
Food Processing	The transformation of raw agricultural products into consumable food items through various processes, including cleaning, sorting, cooking, packaging, and preservation.
Cross-cutting: all sub-sectors	Stakeholders that operate within all sub-sectors.
Construction	
Residential buildings	The Construction of residential buildings, including single-family homes, apartments, and multi-occupancy buildings.
Commercial buildings	Encompasses the Construction of commercial, industrial, and institutional buildings.
Infrastructure	Involves the development of essential public works such as roads, bridges, water supply systems, and energy facilities.
Cross-cutting: all sub-sectors	Stakeholders that operate within all sub-sectors.
Creative Industries	
Architecture	The art and science of designing and constructing buildings and other physical structures.
Arts & Craft, Culture and Heritage	Encompasses traditional and contemporary crafts, cultural heritage preservation, and artistic expressions.
Design	Includes graphic design, product design, interior design, and other creative design disciplines.
Fashion	The design, production, and marketing of clothing, footwear, and accessories.
Film & TV	The production, distribution, and exhibition of films, television programmes, and related media.
Gaming	The development and distribution of video games and interactive entertainment.
Media	Encompasses various forms of communication, including print, digital, and broadcast media.
Music	The creation, production, and performance of music across various genres.

Sub-sector	Description
Photography & Videography	The art and practice of capturing images and videos for artistic, commercial, and personal use.
Podcast	The production and distribution of audio programmes available for streaming or download.
Radio & Audio	The creation and broadcasting of audio content, including radio shows, podcasts, and audiobooks.
Publishing	The production and dissemination of books, magazines, newspapers, and digital content.
Theatre & Performing Arts	The production and performance of live theatrical, dance, and musical performances.
Writing & Journalism	The creation of written content for various media, including news articles, books, and online publications.
Visual Effects & Animation	The creation of visual effects and animated content for films, television, and digital media.
Cross-cutting: all sub-sectors	Stakeholders that operate within all sub-sectors.
Transport, Warehousing and Logistics	
Aviation, Bus & Coach	The operation of air transport services, as well as bus and coach transportation for passengers.
Light Rail	The operation of urban rail transit systems, including trams and metro services.
Tram & Metro Services, Rail	The operation of tram and metro services, as well as regional and national rail transport.
Taxi & Private Hire	The provision of taxi and private hire vehicle services for passenger transport.
Water Transport	The operation of vessels for the transportation of goods and passengers over water.
Personal Vehicles	The use and maintenance of privately owned vehicles for personal transportation.
Micro-mobility	The use of small, lightweight vehicles such as bicycles, scooters, and e-bikes for short-distance travel.
Cross-cutting: all sub-sectors	Stakeholders that operate within all sub-sectors.
Cross-cutting across all identified sectors	

Note: The categories and definitions were based on information provided to us as the beginning of *this* study by UKRI.

Annex B. Additional information on methodological approach

Literature scan

To develop a comprehensive understanding of the current landscape surrounding skills and training within our four selected sectors, we conducted an extensive literature scan comprising a total of 120+ documents and sources. The findings from this supported our understanding of the existing context of each sector and facilitated the generation of initial hypotheses for subsequent testing via job posting data analysis, employer surveys, and stakeholder engagement.

A thorough search was executed using a combination of keywords and phrases related to each sector, AI, skills development, workforce challenges, and technology adoption. The search utilised a variety of sources, including academic databases, government publications, and reports from think tanks. Additionally, relevant reports were gathered from newsletters to which we subscribed, as well as from sector specialists who shared relevant resources. A breakdown by sector of the documents is shown below.

Sector	Number of reports
Agriculture and Food Processing	22
Construction	19
Creative Industries	22
Transport, Warehousing and Logistics	11
Cross-cutting	54
Total	**128**

Selected documents were systematically organised, with relevant information extracted and categorised according to sector-specific challenges and key themes. A summary table was created to facilitate the comparison and synthesis of findings. The extracted data was analysed to identify common trends, challenges, and opportunities within each selected sector. The synthesised information was organised into coherent sections, providing a narrative for each sector. The information is primarily documented in the ‘Overview of Four Selected Sectors’ section of this White Paper.

To draw insights relevant to a global context, we also analysed data from the *PwC* Global CEO Survey, the AI Jobs Barometer, and the Global Investor Survey. These resources served as benchmarks against which the four selected UK sectors could be assessed relative to global sector trends.

To enhance reliability, preliminary findings from the literature scan were validated through collaborative discussions with subject matter experts and stakeholders from each sector. This process not only reaffirmed the accuracy of the identified challenges but also enriched the analysis with practical insights from sector professionals.

AI taxonomy

Introduction
To support a workforce that is equipped to thrive in an AI-enabled economy, it is critical to establish a shared language around the skills required. This includes both *technical AI skills*

and *behavioural skills* essential for responsible, ethical, and effective AI adoption. Our methodology builds on existing frameworks and thought leadership, bringing coherence to a fragmented skills landscape through three key steps:

Step 1: Setting the foundation

The first step in building our taxonomy involved collating and reviewing existing frameworks and literature on AI skills to form a solid foundation. Rather than beginning from scratch, we sought to build on the extensive work already undertaken across academia, government, and industry. Key reference points included the *UK Government Office for Science's* AI Skills Taxonomy, *PwC's* AI Barometer Skills Taxonomy, and *Innovate UK Bridge AI* Business Competency Framework — led by *The Alan Turing Institute*. The behavioural and AI skills were extracted from the Competency Framework to form the foundations of the taxonomy.

These frameworks provided a range of perspectives — from technical and occupationally focused competencies to broader behavioural and ethical capabilities. Reviewing these sources enabled us to identify commonalities, gaps, and conceptual groupings that would inform the structure of our own taxonomy. This step was critical in ensuring our taxonomy remained consistent with existing expert thinking, while also being grounded in practical relevance for application to real-world job data.

Step 2: Cross-referencing and expansion

Our second step draws on the granular list of AI-related skills from the *PwC* AI Barometer Skills Taxonomy. This taxonomy is based on *Lightcast's* global AI skills database but has been refined through an internal review process involving PwC subject matter experts from across its global network.

Lightcast is a global leader in labour market data and analytics, with 2.5 billion current and historic jobs postings, across over 150 countries and 1900 unique occupations. By scraping global job postings, *Lightcast* can identify the granular skills that employers describe and demand in their job advertisements. The *Lightcast* data set is standard within data analytics used by academics (Acemoglu et al., 2022) and organisations from the *European Commission Joint Research Centre (JRC)* to the *Department for Culture, Media and Sport* (DCMS).

From *Lightcast's* broader library of over 32,000 unique skills, we considered a subset of these skills to create a focused list of 385 AI-specific skills. These skills became the most granular aspect of the taxonomy and the starting point for our categorisation process.

Simultaneously, we identified behavioural enablers of AI adoption — skills such as Critical Thinking, Ethical Reasoning, and Systems Leadership — by reviewing leading external research and literature. Key sources included *BridgeAI, British Council, O*Net (Occupational Information Network), Harvard Business Review, (MIT) Sloan Management Review,* and *WEF*. These behavioural skills are vital in shaping working environments where AI technologies can be deployed responsibly, inclusively, and at scale.

Step 3: Categorisation and standardisation

The final phase involved synthesising the findings into a unified taxonomy. We consolidated the extensive list of technical and behavioural skills, removing redundancies and aligning the entries to a consistent level of granularity and hierarchy. Each skill was clearly defined to enable application across workforce planning, education, and talent development systems.

By following three distinct principles, we were able to create a three-tiered structure to our taxonomy ensuring clarity and precision:

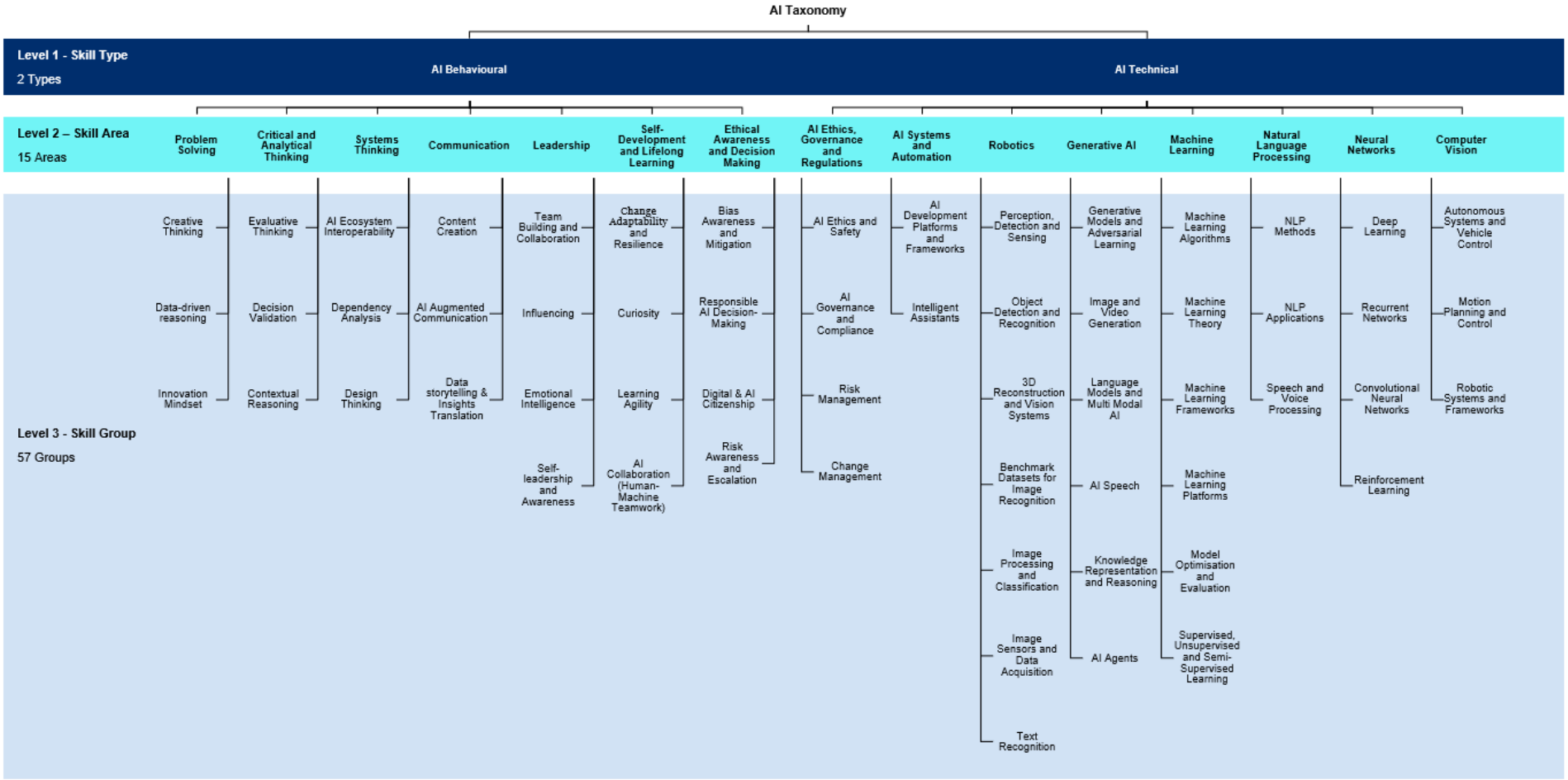
- *Distinct and non-overlapping:* Each skill should be clearly defined, avoiding duplication across various categories to maintain consistency.

- *Hierarchical clarity:* The relationship between Level 1, Level 2, and Level 3 should follow a structured and logical progression.
- *Granularity balance:* Ensuring that skills/categories/sub-categories maintain a comparable level of specificity to enhance the coherence of the taxonomy

This process enabled the mapping of the granular *technical AI skills and supporting behavioural skills* to be organised in a coherent and standardised structure. A detailed breakdown of the AI Taxonomy is provided in the subsequent section. This taxonomy is designed as a living resource — one that can evolve in step with emerging technologies and societal expectations, ensuring organisations and individuals remain future-ready in the age of AI.

Breakdown of the AI taxonomy

The AI Skills Taxonomy is organised into a three-tier hierarchical structure, progressing from broad categories to granular, actionable skill groupings.


AI Taxonomy
Level 1 - Skill Type
2 Types
AI Behavioural
AI Technical
Level 2 – Skill Area
15 Areas
Problem Solving
Critical and Analytical Thinking
Systems Thinking
Communication
Leadership
Self-Development and Lifelong Learning
Ethical Awareness and Decision Making
AI Ethics, Governance and Regulations
AI Systems and Automation
Robotics
Generative AI
Machine Learning
Natural Language Processing
Neural Networks
Computer Vision
Level 3 - Skill Group
57 Groups
Creative Thinking
Data-driven reasoning
Innovation Mindset
Evaluative Thinking
Decision Validation
Contextual Reasoning
AI Ecosystem Interoperability
Dependency Analysis
Design Thinking
Content Creation
AI Augmented Communication
Data storytelling & Insights Translation
Team Building and Collaboration
Influencing
Emotional Intelligence
Self-leadership and Awareness
Change Adaptability and Resilience
Curiosity
Learning Agility
AI Collaboration (Human-Machine Teamwork)
Bias Awareness and Mitigation
Responsible AI Decision-Making
Digital & AI Citizenship
Risk Awareness and Escalation
AI Ethics and Safety
AI Governance and Compliance
Risk Management
Change Management
AI Development Platforms and Frameworks
Intelligent Assistants
Perception, Detection and Sensing
Object Detection and Recognition
3D Reconstruction and Vision Systems
Benchmark Datasets for Image Recognition
Image Processing and Classification
Image Sensors and Data Acquisition
Text Recognition
Generative Models and Adversarial Learning
Image and Video Generation
Language Models and Multi Modal AI
AI Speech
Knowledge Representation and Reasoning
AI Agents
Machine Learning Algorithms
Machine Learning Theory
Machine Learning Frameworks
Machine Learning Platforms
Model Optimisation and Evaluation
Supervised, Unsupervised and Semi-Supervised Learning
NLP Methods
NLP Applications
Speech and Voice Processing
Deep Learning
Recurrent Networks
Convolutional Neural Networks
Reinforcement Learning
Autonomous Systems and Vehicle Control
Motion Planning and Control
Robotic Systems and Frameworks

Level 1: Skill Type

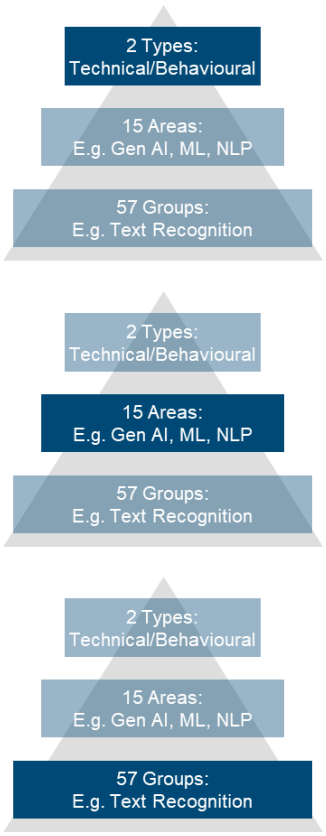
The foundational layer categorises skills by their nature and function, distinguishing between broad domains such as *technical* and *behavioural* skills. These types serve as macro-level classifications that underpin AI capability development across sectors. Examples: Technical Skills, Behavioural Skills

Level 2: Skill Area

This intermediate layer groups related skills into high-level capabilities that are not specific to a single job or industry but are essential for *AI readiness and adaptability*. These clusters reflect cross-cutting capabilities that underpin effective performance in AI-influenced environments. Examples: Systems Thinking, AI Ethics, Communication

Level 3: Skill Group

At the most detailed level, skills are organised into skill groups—coherent sets of related skills that reflect how knowledge and competencies are practically applied. These groupings are functionally specific while retaining relevance across roles and sectors. Examples: Machine Learning Algorithms, Risk Awareness and Management, Creative Thinking



This tiered approach allows for the granular skills to be structured and organised with consistency. It also offers a flexible yet robust framework that can scale across applications — from national-level labour market analysis to individual training and curriculum design.

It is important to provide an indication for some limitations of our taxonomy. Some examples include:

1. The individual skills included in our taxonomy are built with interoperability with *Lightcast* in mind and as such, might not have full coverage when used with other data sets.
2. We use *Lightcast's* skills taxonomy which, although extensive, is not exclusive and as such, some skills which relate to AI may not be included.
3. It is important to highlight that when working with *Lightcast* we are looking at job postings data and not pure jobs data and so outputs do not consider unfilled and reposted job postings, sectors with high turnover and vacancies that are not advertised.

Job posting data analysis

Introduction

To investigate employer demand for AI skills and to provide a robust quantitative complement to the qualitative insights derived from the surveys and interviews conducted as part of this broader study, we analyse job postings data. *Lightcast*, a market-leading provider of job postings analytics widely cited across academic literature, serves as the foundation for our analysis (OECD, 2024). We examine over 66 million unique UK job postings spanning from 2018 to 2024 to identify and assess trends in employer demand for AI-related skills. This includes evaluating which occupations are experiencing the fastest and slowest growth in AI-related demand, understanding regional variations in AI skill demand across the UK, and analysing how employers' preferences for qualifications and skills have evolved over time (Deming and Noray, 2020). We also assess the net change in skill demand — a metric that captures the evolution in the number of skills employers seek (Frey and Osborne, 2017). One key feature of our analysis is looking at trends in AI jobs. An AI job is defined as a job posting that explicitly requires a technical AI skill, such as Machine Learning, Deep Learning, NLP, Computer Vision, or AI Model Deployment, based on our structured AI skill taxonomy (Squicciarini and Nachtigall, 2021). Each of the analytical components is discussed in more detail in the subsequent sections of the methodology.

Data Inputs

Our analysis is based on *Lightcast's* job postings dataset, which offers access to detailed, granular labour market information across the UK. *Lightcast* aggregates and deduplicates job advertisements from thousands of sources, providing a structured view of employer demand over time. This level of granularity is critical for our analysis, as it enables us to move beyond headline occupation trends and examine the specific skills that employers are seeking when recruiting for AI-related roles. In essence, the *Lightcast* dataset provides a proxy for surveying millions of employers, offering insight into hiring behaviours, evolving qualifications expectations and skill requirements across sectors and regions (Lightcast, 2017). Fundamental to our analysis is the identification of AI jobs, which we define as any job posting that requires at least one AI-related skill. These skills are drawn from an AI technical skills taxonomy developed in collaboration with PwC subject matter experts and based on *Lightcast's* existing classification. The taxonomy reflects a broad and representative range of technical AI capabilities. *Lightcast's* granular skill tagging allows us to detect and track these AI skills over time, enabling detailed trend analysis across regions, occupations, and industries.

Additionally, to support structured analysis, job postings are categorised using standard classification frameworks. Occupations are classified using the International Standard Classification of Occupations 2008 (ISCO-08), industries and sectors are coded according to the UK Standard Industrial Classification (SIC-UK), and regional analysis is conducted using Nomenclature of Territorial Units for Statistics Level 1 (NUTS1) codes. These established coding standards allow for consistent comparison and robust analysis across different dimensions of the labour market.

Detailed Methodology

Our analytical process involves several key stages to ensure the robustness and accuracy of insights derived from the job postings data. Below, we outline the methodology in sequential steps.

Step 1: Data Ingestion and Cleaning

We begin by importing job postings data from *Lightcast* into our analytical environment. During this step, we clean and structure the data to ensure consistency across occupations, sectors, and skills. This ensures that subsequent analyses are based on complete and reliable records.

Step 2: Integration of Supplementary AI Data
In addition to *Lightcast* job postings, we integrate supplementary data sources such as our curated AI skills taxonomy (used to identify AI-related job postings) and external AI exposure scores (used to assess how occupations are affected by AI). These inputs enable AI-specific insights and allow us to perform targeted comparisons and exposure analysis (Felten et al., 2021).

Step 3: Sector Reclassification
We align job postings to four *UKRI* selected sectors: Agriculture and Food Processing; Construction; Creative Industries; and Transport, Warehousing, and Logistics. While two of these align with existing SIC sectors, Agriculture and Food Processing and Creative Industries require bespoke definitions. We create these sectors by remapping four-digit SIC codes to the appropriate new categories, ensuring that each sub-sector is uniquely assigned to avoid duplication. The four selected sectors were defined by the sub-sectors set out in Annex A.

The colours in the table illustrate the movement of sub-sectors between broader sector categories. A green box indicates that sub-sectors previously classified under other sectors have been reclassified and incorporated into the highlighted sector. In contrast, a red box denotes that certain sub-sectors have been removed from the sector and reassigned to other sectors.

Original Sector	New Sector	Notes
Agriculture	Agriculture and Food Processing	To create this new sector, all the sub-sectors which related to food processing were reassigned. These were mainly from the Manufacturing sector.
Mining and Quarrying	Mining and Quarrying	No Change
Manufacturing	Manufacturing	Several food processing related sub-sectors were reassigned to the Agriculture and Food Processing sector
Energy, Administrative, Support Service, Water and Waste	Energy, Administrative, Support Service, Water and Waste	No Change
Construction	Construction	No Change
Wholesale and Retail Trade	Wholesale and Retail Trade	No Change
Transport, Warehousing and Logistics	Transport, Warehousing and Logistics	No Change
Accommodation and Food Service Activities	Accommodation and Food Service Activities	No Change
Information and Communication	Information and Communication	Several sub-sectors which fell in the definition of ‘Creative Industries’ were reassigned from the Information and Communication sector

Original Sector	New Sector	Notes
Financial and Insurance Activities	Financial and Insurance Activities	No Change
Real Estate Activities	Real Estate Activities	No Change
Professional, Scientific and Technical Activities	Professional, Scientific and Technical Activities	Several sub-sectors which fell in the definition of 'Creative Industries' were reassigned from the Professional, Scientific and Technical Activities sector
Public Administration and Defence	Public Administration and Defence	No Change
Education	Education	No Change
Human Health and Social Work Activities	Human Health and Social Work Activities	No Change
Arts, Entertainment and Recreation	Arts, Entertainment and Recreation	Several sub-sectors which fell in the definition of 'Creative Industries' were reassigned from the Arts, Entertainment and Recreation sector
Other Service Activities	Other Service Activities	No Change
Activities of Extraterritorial Organisations	Activities of Extraterritorial Organisations	No Change
-	Creative Industries	To create this new sector, all the sub-sectors which related to Creative Industries were reassigned. These were mainly from the Information, Professional services and Arts and Entertainment sectors.

Step 4: Calculating the metrics
The table below summarises the metrics we calculate, along with the methodology used for each.

Metric	Methodology
Metric 1a: Change in relative demand of AI skills versus non-AI skills (2018-2024)	We measure and compare the growth in the number of AI skills mentioned with non-AI skill mentions year on year between 2018 and 2024.
Metric 1b: Change in relative demand of AI skills versus non-AI skills by 2-digit occupation	We further breakdown the trend in metric 1a to investigate the trend between AI and non-AI skill mentions in each 2-digit ISCO08 code.

Metric	Methodology
Metric 1c: Change in relative demand of AI skills versus non-AI skills by sector	We further breakdown the trend in metric 1a to investigate the trend between AI and non-AI skill mentions in each sector.
Metric 1d: Change in relative demand of AI skills versus non-AI skills by region	We further breakdown the trend in metric 1a to investigate the trend between AI and non-AI skill mentions in each NUTS_1 region.
Metric 2: Change in the number of skills demanded by occupation against AI exposure	We take the number of skill mentions for each occupation in 2018 and 2024 and compare the net change in demand for these skills between the two periods. We plot this against Felten's AI exposure measure.
Metric 3a: Top and bottom skills demanded by employers by level 2 skill category	We take the number of mentions of each skill in each category (in 2018 and 2024) and divide by the total postings in that specific category (in 2018 and 2024) to arrive at relative demand values (for both 2018 and 2024) for each skill in each category. From there we compute the percentage change between the 2018 and 2024 relative demand values to ascertain the final growth for each skill in each category. We filter the dataset to include only skills that have greater than 10 mentions in 2024, and we categorise skills that have 0 mentions in 2018 but positive mentions in 2024 as 'emerging skills.
Metric 3b: Top and bottom skills demanded by employers by occupation	We take the number of mentions of each skill in each occupation (in 2018 and 2024) and divide by the total postings in that specific occupation (in 2018 and 2024) to arrive at relative demand values (for both 2018 and 2024) for each skill in each occupation. From there we compute the percentage change between the 2018 and 2024 relative demand values to ascertain the final growth for each skill in each occupation. We filter the dataset to include only skills that have greater than 10 mentions in 2024, and we categorise skills that have 0 mentions in 2018 but positive mentions in 2024 as 'emerging skills.
Metric 3c: Top and bottom skills demanded by employers by sector	We take the number of mentions of each skill in each sector (in 2018 and 2024) and divide by the total postings in that specific sector (in 2018 and 2024) to arrive at relative demand values (for both 2018 and 2024) for each skill in each sector. From there we compute the percentage change between the 2018 and 2024 relative demand values to ascertain the final growth for each skill in each sector. We filter the dataset to include only skills that have greater than 10 mentions in 2024, and we categorise skills that have 0 mentions in 2018 but positive mentions in 2024 as 'emerging skills.
Metric 4: Proportion of job postings by sector (2018-2024)	We calculate the proportion of job postings in each sector for each year between 2018 and 2024.
Metric 5: Proportion of AI job postings by sector (2018-2024)	We calculate the proportion of AI job postings in each sector for each year between 2018 and 2024.

Metric	Methodology
Metric 6a: Demand for AI jobs versus non-AI jobs	We track the number of total job postings and AI job postings in each year between 2018 and 2024
Metric 6b: Demand for AI jobs versus non-AI jobs by sector	We further breakdown the trend in metric 6a to investigate the trend in the number of AI/non-AI job postings by sector.
Metric 6c: Demand for AI jobs versus non-AI jobs by region	We further breakdown the trend in metric 6a to investigate the trend in the number of AI/non-AI job postings by region.
Metric 7: Wage premium associated with AI Jobs (2024 only)	We calculate the wage premium for AI skills for each occupation by comparing the average salary of the job posting which requires an AI skill with the average salary of the job postings (for the same occupation) which do not list an AI skill.
Metric 8: Qualifications trends	For both 2018 and 2024, we can examine the proportion/percentage of job postings that have a degree requirement tagged to it. We do this for both all job postings, and for AI job postings. We compare the proportions in 2018 to those in 2024.

Metric 2 follows a more complex methodology and therefore a more detailed explanation of the methodology for the metric is summarised below.

1. 4-Digit ISCO08 Codes and AI Occupational Exposure

The 4-digit ISCO08 occupation codes from the International Labour Organisation (ILO) are taken as the building blocks of the analysis. Every unique ISCO08 occupation code is tagged with an AI Occupational Exposure (AIOE) value, assigned beforehand by Felten et al (2021). AIOE evaluates the potential for AI to perform key job functions in each occupation, where occupations more exposed to AI have higher and more positive AIOE values, while occupations less exposed to AI have lower and more negative AIOE values.

2. Net Skill Change

Net Skill Change (NSC) quantifies how the skill composition of job postings have evolved for every 4-digit ISCO08 occupation from 2018 to 2024. For every occupation in the job postings data, the relative frequency of every skill (skills mentions per posting) is compared between 2018 and 2024, with the absolute change across all skills reflecting the raw shift in skill composition. The raw change is then scaled by the ratio of total skill mentions in 2018 versus 2024 to adjust for the fact that some occupations may have become more or less skill-intensive overall.

3. NSC versus AIOE

With every 4-Digit ISCO08 occupation code having been assigned both an AIOE value and a NSC value, NSC can then be plotted against AIOE for all occupation codes to arrive at the final result. Examining the correlation coefficient and the overall trend in the analysis will enable for conclusions to be made around whether occupations more exposed to AI experience greater NSC.

Limitations of our analysis

While job postings data provide a powerful lens into employer demand for AI skills, there are important limitations that should be acknowledged when interpreting our findings.

Firstly, job postings reflect the external hiring behaviour of employers — that is, what organisations choose to advertise publicly. They do not capture the full scope of activity occurring within a sector. For example, internal staff redeployments, training initiatives, or upskilling programmes are not visible in the data. As such, our analysis cannot account for AI capability being developed internally within firms unless it is explicitly linked to external recruitment. This means our results are likely to under-represent sectors that invest in in-house development of AI talent rather than hiring for it in the open market.

Secondly, while we analyse job postings by sector, it is important to note that the postings themselves do not represent the full composition or employment structure of that sector. Certain industries are more likely to advertise online, while others rely on informal recruitment methods or internal mobility. As a result, sectors with high digital intensity or turnover may be over-represented, while those with low external hiring visibility may be under-represented. This introduces a potential bias in the sectoral distribution of AI skills demand.

Additionally, a key limitation of job posting analysis is the tendency for employers to list an excessive range of skills, often without a clear understanding of what is truly required for the role. This can lead to inflated perceptions of demand for certain AI skills, as job postings may suggest that many competencies are necessary when only a few are critical. This exaggeration may result in candidates overestimating the need for diverse AI skills, thus distorting our understanding of genuine employer requirements. As such, our findings should be viewed with caution, as they may not accurately reflect the true skill demands within the AI job market.

Considering these factors, our findings should be understood as a reflection of how employers signal demand for AI-related capabilities in the public labour market — not a complete account of all AI-related workforce activity within each sector.

Employer survey

Survey Design and Structure

A targeted survey was designed and disseminated to employers within the four selected sectors to source data on skills needs at scale. Aimed at HR and technology leads, it supplemented one-to-one interviews and provided quantitative insights to highlight macro-level views on sector skills gaps. By focusing on these key stakeholders, the survey aimed to capture a comprehensive view of the current and future skills landscape, ensuring the data collected would be relevant and actionable for addressing industry needs.

The survey methodology included questions to support segmentation, enabling cross-comparison across sectors, sub-sectors, regions, and organisation sizes. It covered AI-related topics such as adoption barriers, extent of use, and potential use cases within organisations. This approach aimed to identify common challenges and opportunities employers face when integrating AI technologies.

Additionally, the survey assessed AI skills needs, training provision, and Hub priorities. It evaluated current skills requirements, the impact of future AI adoption on roles and skills, and the challenges in recruiting and retaining talent. The survey also examined how well current training programmes align with industry needs and gathered feedback on how the Hub can best support employers in developing a skilled AI workforce.

To ensure effectiveness, the survey was designed to minimise respondent burden and maximise response rates. It started with an introduction explaining the project's purpose and how the data would be used, assuring respondents of confidentiality and anonymity. Demographic questions collected basic information, such as the role/function of the representative, their sector, sub-sector, organisation size, and region. The survey included multiple-choice, Likert-style, and open-ended questions to capture a comprehensive understanding of stakeholders' perspectives.

Once developed, the survey questionnaires underwent a thorough review and refinement process to improve efficiency. The internal research team tested the question sets for consistency, coherence, and bias, followed by a pilot with diverse stakeholder groups to test clarity and relevance. The survey was then built and deployed using *Qualtrics*, a platform enabling smooth and efficient data collection. Administered in full compliance with the Market Research Society Code of Conduct, the survey aimed to provide reliable and valuable insights into employer views, perceptions, and experiences regarding AI and their skills needs.

Sampling

To ensure a comprehensive and representative sample, we employed the following five channels to identify stakeholders for engagement:

- Bridge AI’s Existing Relationships: The project leveraged Bridge AI's established network of approximately 3 000 employers to source survey responses, facilitated through Bridge AI’s Business Connect.
- Existing PwC Relationships: PwC’s extensive networks of employers were also leveraged with a panel survey distributed to these stakeholders.
- Sector-specific BROs: One-to-one engagements with sector-specific trade bodies and industry associations that represented businesses within the relevant sectors resulted in them distributing the survey to their members through their newsletters, thus adding to survey participants.
- Cross-cutting BROs: Similar to sector-specific BROs, cross-cutting trade bodies and industry associations consulted agreed to distribute the survey to their members through their newsletters, further adding to survey participants.

- Existing Database of Online Job Posting Data: An analysis of Lightcast's online job posting data was conducted to gather insights into market demand for AI-related skills within the labour force. This enabled specific organisations to be identified and included in the database of stakeholders to be consulted.

Panel Survey

In addition to the above, surveys were also distributed using a reputable panel provider. This commenced with a soft survey launch being conducted to refine question clarity and ensure data reliability. Informed consent was obtained from all participants, with assurances of anonymity and confidentiality regarding their responses. Data was collected across the UK using a quota sampling method to ensure representation from diverse sectors and organisations of varying sizes. Quotas were based on sector, number of employees, and geographic region to explore employers' experiences and perceptions regarding AI adoption and skills development within their organisations.

A key challenge encountered during the data collection process was stakeholder unwillingness to participate, leading to fewer responses from the Agriculture and Food Processing sector initially. This challenge was overcome by running the survey longer, with a focus on sourcing responses from the Agriculture and Food Processing sector. Once a balanced response rate was achieved, quotas for the other sectors were reopened to reach the final completion targets.

In total, 2,071 participants were contacted to obtain 500 completed responses. The final sample included a balanced number of 125 or more responses from each sector (see table below) as well representation across all organisation sizes. Organisations not operating within the target industries, those based outside the UK, and respondents whose roles were unrelated to HR or technology leadership were screened out.

Sample Size and Response Rates

To ensure the reliability and validity of survey results, sample size and response rates were carefully considered for this project. In total, the survey received 515 responses. The following are breakdowns of the responses per sector, organisation size and region.

Response Rates by Segmentation

To ensure representation across different segments, response rates were monitored and reported by sector, region, and organisation size. This stratified approach allowed for more precise conclusions that accurately represent the target population.

#	Sector	Organisation Sise			Total
		Small (1 - 49 employees)	Medium (50 - 249 employees	Large (250+ employees)	
1	Agriculture and Food Processing	41	51	33	**125**
2	Construction	47	47	34	**128**
3	Creative Industries	39	57	38	**134**
4	Transport, Warehousing and Logistics	32	50	44	**126**

#	Sector	Organisation Sise			Total
		Small (1 - 49 employees)	Medium (50 - 249 employees	Large (250+ employees)	
Total		**169**	**205**	**149**	**513**

The following strategies were adopted to encourage stakeholder participation:

Snowball Sampling Approach

Throughout the engagement, a snowball sampling approach was adopted to identify additional stakeholders. This involved leveraging initial contacts to identify further participants, ensuring a comprehensive and representative sample.

Stratified Sampling Approach

To increase the precision of survey results, stratified sampling methodology was employed. This involved dividing the population into subgroups, or strata, based on specific characteristics such as sector, sub-sector, region, and organisation size. Response rates across these strata were then carefully monitored to ensure representation, thus allowing conclusions that more accurately represented the target population to be drawn.

Data Analysis and Interpretation

Before analysing the survey data, cleaning of responses was performed with inconsistent responses identified and removed, to confirm accuracy and reliability of findings. The following analytical methods were then adopted to interpret the survey data:

- Descriptive Statistics: To provide simple summaries of findings from the data.
- Cross-tabulation: To examine relationships between different variables and identify patterns across sectors, regions, and organisation sizes.

Data visualisation techniques, including graphs, charts, and tables, were then utilised to present the findings in a clear and accessible manner.

Stakeholder engagement

We conducted 31 interviews in total: 22 with employers and BROs, two with training providers, two with technology partners, one with an organisation classified as both employer and training provider, one with an organisation classified as both employer and technology partner, one with an organisation classified as both a training provider and a BRO, and two with organisations classified as either government department or 'Other'. In addition, we have attended five AI/Tech conferences and events to gather information on use cases, gather information on demand for skills and connect with sector stakeholders.

Sector	Stakeholder Type							Total
	Employer and BRO	Training Provider	Tech Partner	Employer/ Training Provider	Employer/ Tech Partner	Training Provider/ BRO	Govt. Dept./ Other	
Agriculture and Food Processing	9	1	0	0	0	0	0	**10**
Construction	2	0	0	0	0	0	0	**2**
Creative Industries	6	0	0	1	0	1	0	**8**
Transport, Warehousing and Logistics	3	0	0	0	1	0	1	**5**
Cross-cutting	2	1	2	0	0	0	1	**6**
Total	**22**	**2**	**2**	**1**	**1**	**1**	**2**	**31**

The following interview guides were utilised during the one-to-one interviews to elicit insights on workforce challenges and skills gaps associated with the adoption of AI across various stakeholder types, including employers, training providers, technology partners, and business representative organisations. Prior to each interview, extensive research was conducted on each organisation to better understand their specific context, needs, and challenges. This preparation allowed us to tailor existing questions and generate new, relevant inquiries that addressed the unique circumstances of each interviewee. While the interview guides served as a general framework, not all questions were posed to every participant, and they were encouraged to introduce other pertinent topics related to AI skills needs. This approach ensured a more tailored and meaningful dialogue, fostering richer insights.

Employer interview guide		
#	**Interview Question Theme**	**Interview Question**
1	AI / Tech Trends	Can you describe the current impact of AI in your organisation/sector? What potential opportunities do you see?
2	AI / Tech Trends	Can you tell us about any AI technologies your organisation is increasingly focusing on for developing and providing training within the sector(s)? What new AI/ML solutions is your organisation developing, and what are other technology partners working on?

Employer interview guide		
#	**Interview Question Theme**	**Interview Question**
3	AI Use Cases	Are you aware of any successful AI use cases within your sector? Which AI use cases do you believe would have the greatest return on investment within and across these four key sectors?
4	Current Demand	What is the impact of this on job roles and skills you need in your organisation?
5	Current Demand	Which of your AI/ML training programmes are in most and least demand?
6	Future Demand	To what extent have you thought about the future impact of AI on your organisation and opportunities to increase adoption? How do you think your skills needs will change aligned to these future plans?
7	Future Demand	As a gut feeling given your experience in the sector, how do you anticipate that the current demand for your AI/ML training programmes will change in the next 5 years in our four identified sectors?
8	AI Hub Activation Matrix	To what extent have you adopted AI in your organisation?
9	Barriers to Adoption	To what extent has a lack of skills been a barrier to AI adoption?
10	Barriers to Adoption	Can you describe the key barriers that employers face in adopting AI in general? (e.g. unclear return on investment, lack of skills to support adoption, complex regulations, high costs of products and services, cultural resistance)
11	Supply and Training Provision	What would be your preference for how you would bring these skills into your organisation? e.g. recruiting talent, upskilling existing staff, buying in expertise as part of AI adoption (e.g. support from AI tech supplier/vendor), other?
12	Supply and Training Provision	If you see a need to upskill staff, which parts of your workforce would you target?
13	Supply and Training Provision	What type of training formats are most appealing to your organisation? For example, do you prefer formal qualifications, on-the-job training, quick e-learning modules, or other methods?
14	Platform Requirements	What features or resources would you find most valuable in an AI Skills Hub?
15	Platform Requirements	The AI Skills Hub will signpost employers to relevant AI training/AI technology partners. Would you like your training courses/AI technologies to be accessible to employers using the hub? If so, what do you think would be helpful for you to showcase your technology on the hub (e.g. links to their website, factsheets uploaded onto the hub, ability to engage

Employer interview guide		
#	**Interview Question Theme**	**Interview Question**
		with sectors via the forum, demo events conducted)?
16	Signposting	What other employers/training providers/technology partners in the sector do you think we should talk to, or resources do you think we should look at?

Annex C. Detailed results from job posting data analysis

Demand for AI Job Postings and All Job Postings (Four Selected Sectors)

Construction (F)							
Grouping	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
AI Jobs	210	292	334	708	751	633	908
All Jobs	55,265	54,181	50,342	95,086	103,290	132,302	111,788
AI Share of All Jobs	0.4%	0.5%	0.7%	0.7%	0.7%	0.5%	0.8%
Creative Industries (JMR*)							
Grouping	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
AI Jobs	304	664	619	1,266	1,164	766	794
All Jobs	23,824	50,437	24,370	40,158	41,244	37,938	36,600
AI Share of All Jobs	1.3%	1.3%	2.5%	3.2%	2.8%	2.0%	2.2%
Transport, Warehousing and Logistics (H)							
Grouping	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
AI Jobs	588	1,069	1,223	1,593	2,211	689	1,291
All Jobs	40,582	40,256	33,633	69,021	86,383	77,038	77,774
AI Share of All Jobs	1.4%	2.7%	3.6%	2.3%	2.6%	0.9%	1.7%
Agriculture and Food Processing (A*)							
Grouping	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
AI Jobs	181	146	170	240	245	270	272
All Jobs	21,966	25,084	17,677	29,830	37,570	44,252	40,793
AI Share of All Jobs	0.8%	0.6%	1.0%	0.8%	0.7%	0.6%	0.7%

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast*. The figures show the trends in AI Job Postings and All Job Postings (Four Selected Sectors) between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Agriculture and Food Processing: AI Skill Mentions, Non-AI Skill Mentions, Level 2 AI Skill Clusters

Skill Group	2018	2019	2020	2021	2022	2023	2024
Total AI Skills	191	170	288	331	344	493	436

Skill Group	2018	2019	2020	2021	2022	2023	2024
Total non-AI Skills	171,954	189,667	167,084	270494	305,445	353,409	340,813
Robotics Cluster	3	6	19	11	17	7	13
GenAI Cluster	18	13	8	13	14	26	55
Neural Networks Cluster	4	9	25	10	19	43	18
Natural Language Processing Cluster	4	4	4	11	15	20	22
Machine Learning Cluster	139	88	122	153	145	171	124
Computer Vision Cluster	6	9	28	19	23	57	28
AI Systems and Automation Cluster	19	40	80	110	102	159	166
AI Ethics, Governance and Regulations Cluster	2	1	2	4	9	10	10

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast*. The figures show the trends in AI and non-AI skills mentions in Agriculture and Food Processing between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Agriculture and Food Processing: 10 Fastest and Slowest Growing Skills (2018-2024)

Fastest Growing Skills		Slowest Growing Skills	
Growth	**Skill**	**Growth**	**Skill**
4710%	Microsoft 365	-97%	Sales Support
4585%	Dicing	-96%	Cost Control
4208%	Electric Vehicles	-95%	Product Demonstration
3589%	Deboning	-93%	Delegation Skills
3292%	Event Operations	-93%	Civil Engineering
2959%	Mental Health	-93%	Consultative Selling
2539%	ISO 50001 Standard	-91%	Real Estate
2323%	Espresso Beverages	-91%	Product Support
2215%	Job Rotation	-91%	Feasibility Studies
2162%	Refurbishment	-90%	IBM Maximo

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast*. The figures show the 10 fastest and slowest growing skills in Agriculture and Food Processing between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Construction: AI Skill Mentions, Non-AI Skill Mentions, Level 2 AI Skill Clusters

Skill Group	2018	2019	2020	2021	2022	2023	2024
Total AI Skills	304	440	495	1215	1459	1045	1621
Total non-AI Skills	464,650	473,287	459,878	897,857	1,003,790	1,173,628	1,088,116
Robotics Cluster	13	33	21	84	57	72	55
GenAI Cluster	18	14	22	29	23	74	116
Neural Networks Cluster	38	61	49	130	134	64	110
Natural Language Processing Cluster	34	41	43	116	127	76	104
Machine Learning Cluster	127	169	199	515	705	389	620
Computer Vision Cluster	16	24	25	34	81	38	54
AI Systems and Automation Cluster	57	94	134	298	326	320	555
AI Ethics, Governance and Regulations Cluster	1	4	2	9	6	12	7

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast.* The figures show the trends in AI and non-AI skills mentions in Agriculture and Food Processing between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Construction: 10 Fastest and Slowest Growing Skills (2018-2024)

Fastest Growing Skills		Slowest Growing Skills	
Growth	**Skill**	**Growth**	**Skill**
18390%	Net Sero	-96%	Third-Party Logistics
15077%	Executive Coaching	-95%	Demand Planning
5931%	Electronic Prescription (eRx)	-95%	Category Management
4547%	Soom (Video Conferencing Tool)	-94%	Microsoft Windows 7
4448%	Asure DevOps	-94%	Strategic Sourcing
3806%	Panelling	-94%	Molecular Biology
3707%	Tridium/Niagara Framework	-93%	Global Procurement
3459%	Roofing Materials	-93%	Authentications
3212%	Groundskeeping	-92%	Total Cost of Ownership
3163%	Procore	-92%	Smart Device

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast.* The figures show the 10 fastest and slowest growing skills in Agriculture and Food Processing between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Transport, Warehousing and Logistics: AI Skill Mentions, Non-AI Skill Mentions, Level 2 AI Skill Clusters

Skill Group	2018	2019	2020	2021	2022	2023	2024
Total AI Skills	1269	1855	2509	3318	4313	1254	3009
Total non-AI Skills	360,395	360,988	348,771	617,376	822,827	638,937	776,042
Robotics Cluster	18	27	81	161	87	30	59
GenAI Cluster	87	37	61	139	97	84	445
Neural Networks Cluster	147	250	298	360	440	149	387
Natural Language Processing Cluster	278	350	421	407	349	79	206
Machine Learning Cluster	583	971	1227	1560	2347	582	1209
Computer Vision Cluster	33	48	87	240	391	69	119
AI Systems and Automation Cluster	119	172	334	448	589	247	568
AI Ethics, Governance and Regulations Cluster	4	0	0	3	13	14	16

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast.* The figures show the trends in AI and non-AI skills mentions in Transport, Warehousing and Logistics between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Transport, Warehousing and Logistics: 10 Fastest and Slowest Growing Skills (2018-2024)

Fastest Growing Skills		Slowest Growing Skills	
Growth	**Skill**	**Growth**	**Skill**
8370%	Ancillary Medical Services	-99%	Postman API Platform
7401%	Commercial Driving	-92%	Information And Communications Technology
4961%	Pre-Trip and Post-Trip Vehicle Inspections	-92%	System Operator Certification
4805%	Sustainability Initiatives	-92%	Service-Oriented Architecture
4022%	Setting Appointments	-92%	Continuous Monitoring
3396%	Navigational Instruments	-92%	Online Auctions
3083%	Product Adoption Strategies	-90%	.NET Framework
3031%	Investment Management	-90%	Transact-SQL
2979%	Digital Systems	-89%	AWS CloudFormation
2963%	Good Driving Record	-89%	Wireless Communications

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast.* The figures show the 10 fastest and slowest growing skills in Transport, Warehousing and Logistics between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Creative Industries: AI Skill Mentions, Non-AI Skill Mentions, Level 2 AI Skill Clusters

Skill Group	2018	2019	2020	2021	2022	2023	2024
Total AI Skills	470	1058	890	1932	1959	1143	1378
Total non-AI Skills	212,678	441,679	246,461	454,358	451,350	392,437	389,871
Robotics Cluster	31	42	41	63	47	43	36
GenAI Cluster	9	39	10	26	25	58	140
Neural Networks Cluster	30	101	139	389	356	95	91
Natural Language Processing Cluster	64	123	88	88	122	122	138
Machine Learning Cluster	253	530	362	833	899	437	470
Computer Vision Cluster	25	62	57	112	99	45	69
AI Systems and Automation Cluster	58	161	188	417	403	342	407
AI Ethics, Governance and Regulations Cluster	5	5	5	4	8	1	27

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast.* The figures show the trends in AI and non-AI skills mentions in Creative Industries between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B.

Creative Industries: 10 Fastest and Slowest Growing Skills (2018-2024)

Fastest Growing Skills		Slowest Growing Skills	
Growth	**Skill**	**Growth**	**Skill**
16043%	Collaborative Design	-92%	jQuery
8948%	Order Delivery	-91%	Visual Arts
6474%	Google Maps	-90%	Model View Controller
6084%	Design Assurance	-88%	Browser Compatibility
5563%	Rhetoric	-87%	Digital Photography
4912%	Product Promotion	-84%	Angular (Web Framework)
4229%	SAP Business Connector	-83%	Electronic Engineering
3936%	Environmental Consulting	-83%	Multimedia
3740%	Radio Equipment	-82%	ECMAScript 2015
3545%	Observability	-82%	Behaviour-Driven Development

Notes: This data is taken from PwC's analysis of 66 million job postings data provided by *Lightcast.* The figures show the 10 fastest and slowest growing skills in Creative Industries between 2018 and 2024. Further information on our approach to the job posting data analysis is provided in Annex B

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