Unlocking the UK's AI Potential:

Harnessing AI for Economic Growth

Microsoft

PublicFirst

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Public First is an independent consultancy that works to help companies and organizations develop new policy proposals, better understand public opinion, and model their economic and social impact. Public First is a member of the Market Research Society.

T: +44 (0) 2036 872 761
E: info@publicfirst.co.uk
www.publicfirst.co.uk

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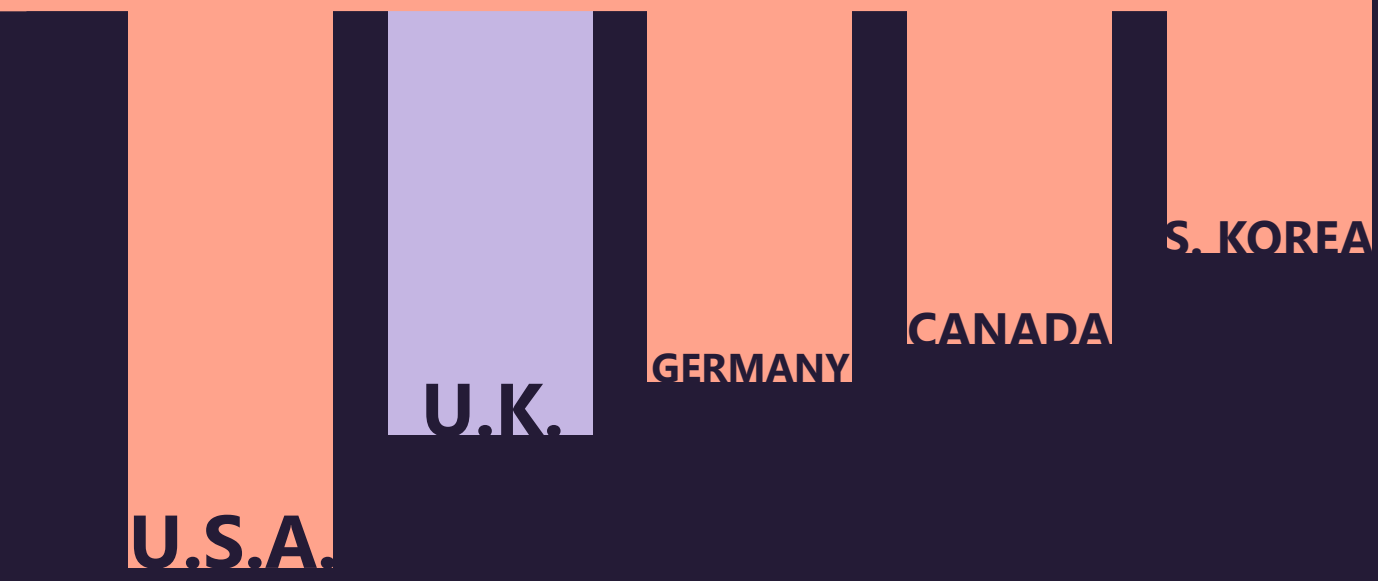
Executive Summary

£550 Bn

Over the next decade, digital technologies such as AI and cloud have the potential to create a half a trillion opportunity for the UK economy, increasing GDP by over £550 billion by 2035. AI could help make individual workers more productive, level up skills across the workforce, reduce waste, speed up scientific innovation and enable entirely new types of products and services.

The UK has the most advanced tech sector in Europe and is second behind only the US in its ability to take advantage of AI - however, this lead is relatively slight over other leading economies such as Germany, Canada or South Korea.



The UK could be held back from achieving its full potential by three core bottlenecks:

The UK does less well at providing the basic infrastructure needed to enable the build of datacentres.

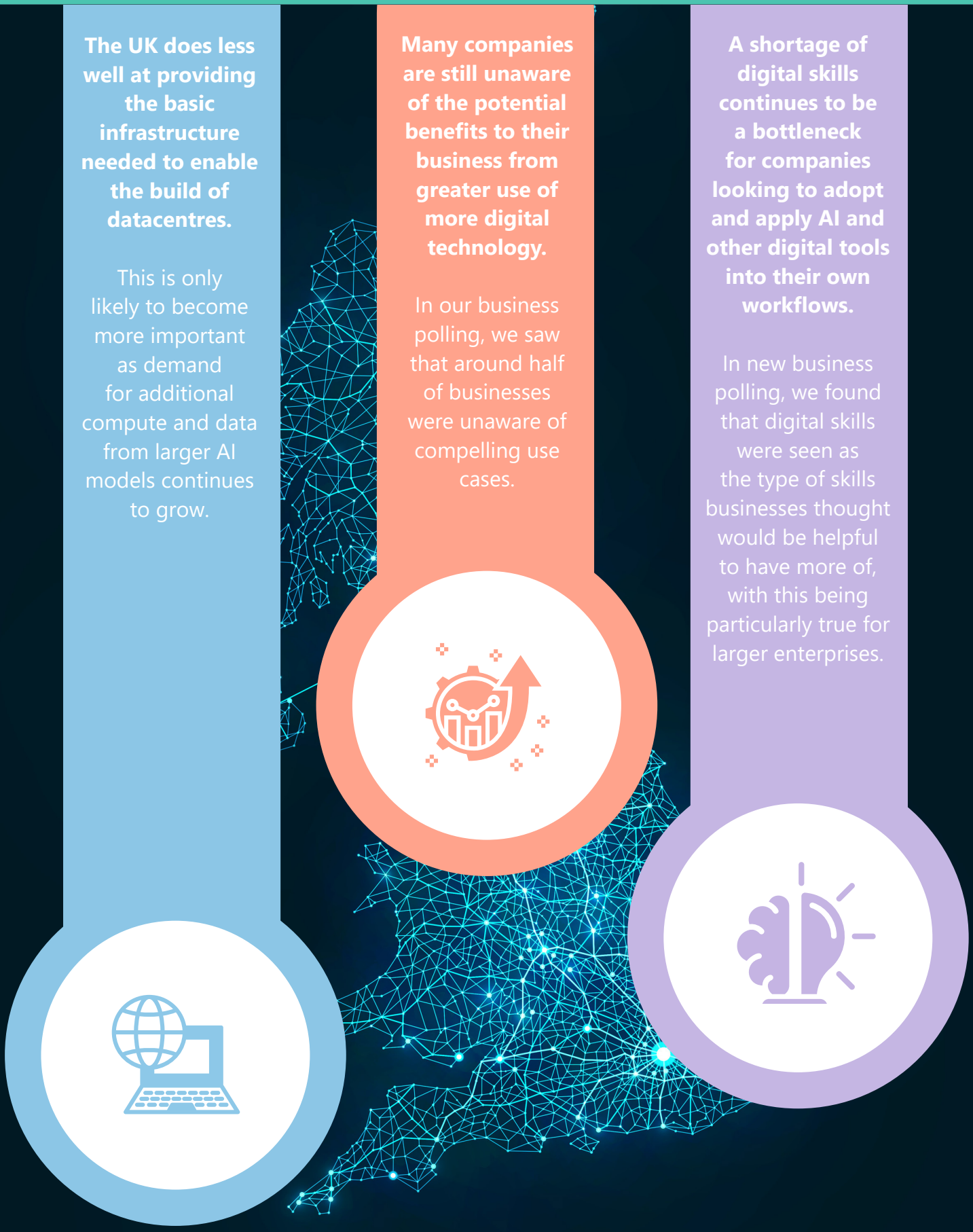
This is only likely to become more important as demand for additional compute and data from larger AI models continues to grow.

Many companies are still unaware of the potential benefits to their business from greater use of more digital technology.

In our business polling, we saw that around half of businesses were unaware of compelling use cases.

A shortage of digital skills continues to be a bottleneck for companies looking to adopt and apply AI and other digital tools into their own workflows.

In new business polling, we found that digital skills were seen as the type of skills businesses thought would be helpful to have more of, with this being particularly true for larger enterprises.



The next five years could be particularly crucial ones for putting in place the right enablers to ensure the UK can take full advantage of AI. Adding an additional 5 years to the time it takes for AI to fully roll out would **reduce the size of the economic impact in 2035 by over £150 billion.**

Investing more in infrastructure, cloud, AI and digital skills could help overcome these obstacles. In total, we estimate that investment in digital technologies and skills could have an average societal **Return on Investment (ROI) of over 5:1 in the next decade.**

Microsoft, who commissioned this report, has committed to investing £2.5 billion over the next three years in the UK, more than doubling its datacentre footprint and training more than one million people for the AI economy.

Alongside its impact in the private economy, digital technology could play an equally powerful role in the public sector. In our modelling, we found that the average augmentation potential for public sector occupations was only 15% less than that in the private sector.

Introduction

The promise of technologies like AI are coming into sharper focus for businesses, citizens, and public services. The UK Government's National AI strategy **sets out a 10-year plan** to ensure all parts of the country can reap the benefits of this technological opportunity.

In this short report, Microsoft commissioned independent consultancy Public First to explore:

The opportunities created by digital technology for the UK

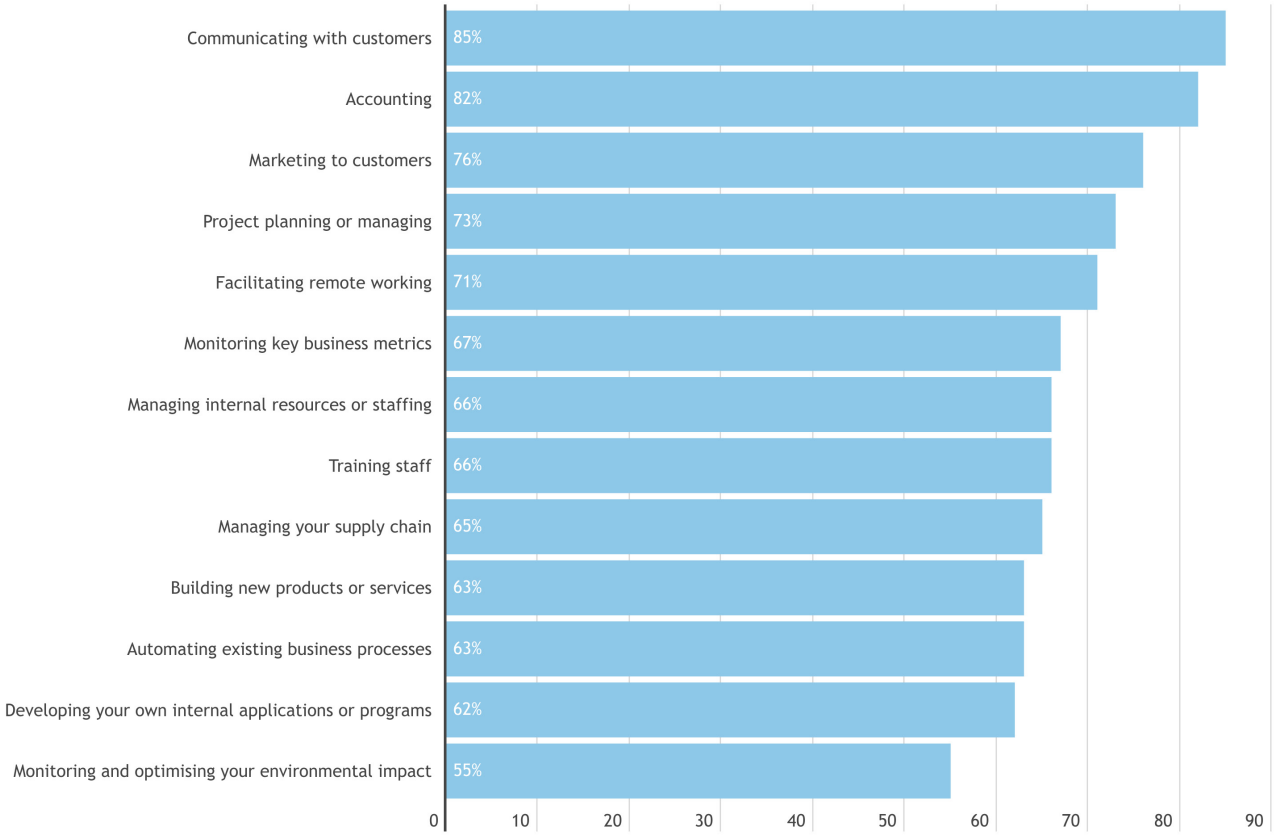
The supporting investments that will be needed in infrastructure, skills and business support

The current barriers to adoption, leading to unequal take up

As part of our research, we ran a new extensive survey of over 1,000 senior business decision makers in the UK, and created new modelling of the potential returns from AI, cloud, data centres and digital skills.

Digital technology is already one of the most important drivers of growth in the UK. In our polling, a majority of businesses told us that they were using digital technology in most of their core processes, from communicating with customers to monitoring key business metrics. In total, we estimate that in the era of the PC, digital technology has created over £400 billion for the UK economy.[1]

My business uses digital technology for this



1 Public First modelling based on the Conference Board's Total Economy Database, looking at the aggregated impact of ICT capital since 1990.

Looking forward, AI and the cloud could have an even larger impact on growth. In our polling, 59% of senior decision makers expected digital technology to have a greater impact on their business in the next five years than it had in the last five - compared to just 2% who thought it would be lower.

In total, we estimate that cloud and AI could create a half a trillion-pound opportunity for the UK, increasing GDP by over £550 billion by 2035. That's the equivalent of raising annual growth rates by 2% a year.

However, as this report reveals, the UK risks foregoing this opportunity. The next five years are likely to be the most important for putting in place the right enablers to ensure the UK can take full advantage of AI. Already, the UK suffers from relatively low levels of compute capacity, significant delays in building new infrastructure, a long tail of SMBs who have not yet fully adopted key background technologies such as cloud and growing demand for both basic and advanced digital skills.

In the rest of this report, we look at how the UK can ensure it doesn't miss out on this growth opportunity and explores some of the investment that will be needed to bring it about.

How AI will support the economy

As part of the research for this report, we produced new modelling of the potential from AI, using GPT-4 to classify to what extent AI can support workers in different tasks across the economy.

While significant uncertainty remains over the pace of potential future AI adoption - and to what extent the technology will continue to develop - we think a plausible central estimate is that with the right enablers in place, AI has the potential to increase the size of the UK's GDP by £550 billion by 2035.

AI will impact the economy in multiple ways, including:

Saving time for individual workers.
For many tasks, AI will help workers get more done more quickly, with early studies showing it can often produce productivity improvements of around 20-30%.

Levelling up the skills of individual workers.
AI tools seem to be particularly impactful for workers at the bottom or middle of the wage distribution: helping them catch up their skills and expertise with the leaders in their field.

Reducing waste and increasing efficiency.
AI can help organisations in both the private and public sector triage their resources: identifying emerging problems earlier, and using both economic and environmental resources more efficiently.

Enabling entirely new types of products and services.
Just as the PC enabled the spreadsheet and the Internet the search engine, the rise of AI is likely to create entirely new types of tools and entertainment that would not have been possible before.

Speeding up the development of new science and technology.
AI based simulations are already speeding up the time it takes to develop or understand new biological and chemical materials. For example, recent work by Microsoft and scientists at PNNL used a combination of AI and high-powered computing to help discover a new type of battery material in just weeks, rather than years.

While many people have expressed concern about the potential impact of AI on unemployment, our modelling finds that this is overstated. The vast majority of occupations are made up of a combination of tasks: some which AI can help with, and others where it can't. **In our modelling, less than 4% of the occupations we looked at saw a majority of their tasks able to be automated.**

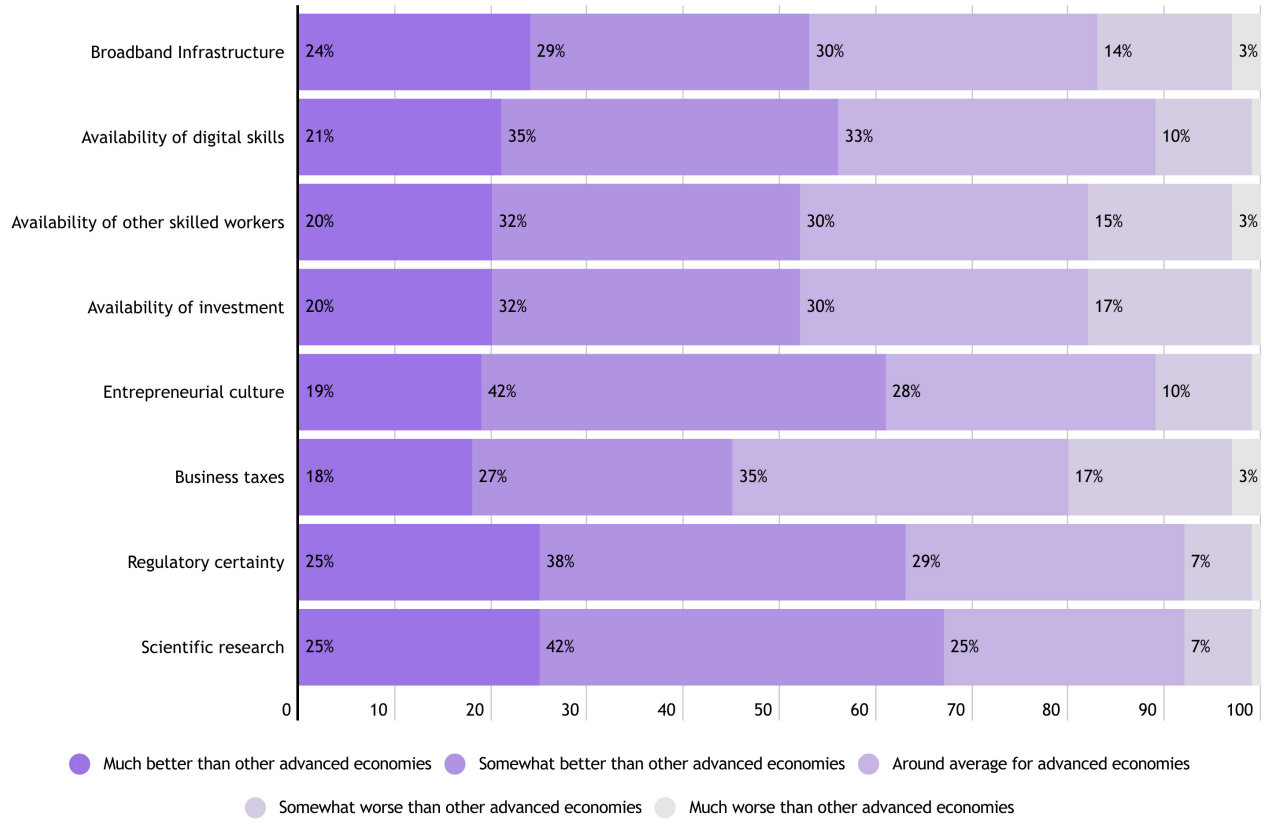
The potential gains from AI will not happen automatically, however - and a slower adoption curve would significantly reduce the potential. Adding an additional 5 years to the time it takes for AI to fully roll out would reduce the size of the economic impact **by over £150 billion.**

The UK's Digital Advantage

The UK has the most advanced tech sector in Europe, with the highest level of private investment, the most mature consumer digital market and globally leading companies such as Wise, Sage and Builder.AI. Since 2016, the UK has already attracted over £20 billion of private investment in AI, including £2.5 billion of investment announced by Microsoft in November 2023.[2] In total, the UK's digital economy and online retail sector directly contributes £227bn in GVA and supports over 2.6 million jobs in the UK.[3]

Beyond its tech sector, the UK has other structural advantages in research, culture and skills that make it well placed to take advantage of AI and data. In our business poll, senior decision makers from companies that operated internationally pointed to the UK's scientific research, regulation system and entrepreneurial culture as particular advantages.

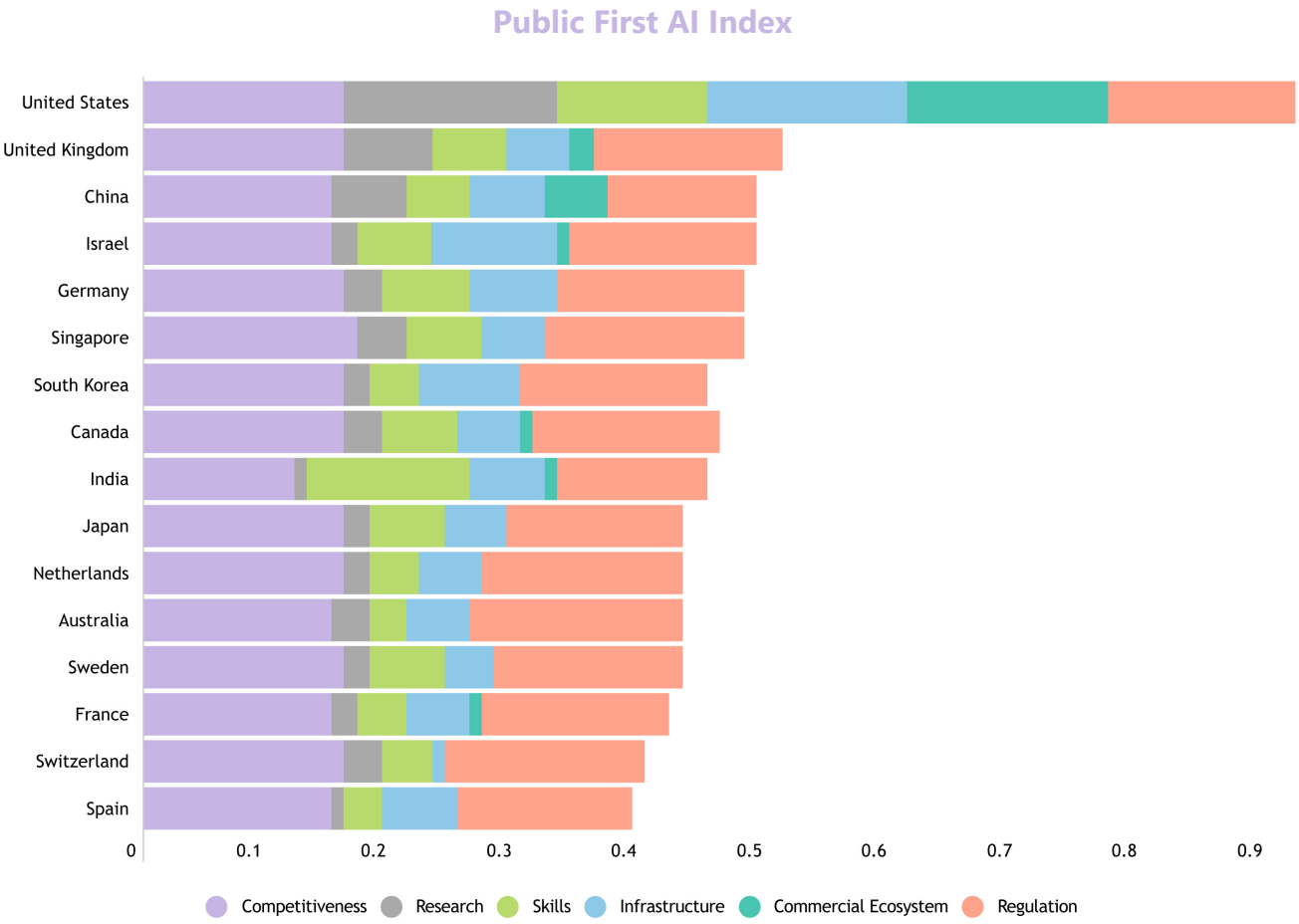
Compared to other advanced economies (eg the US, Canada, EU, Japan), how would you say that the UK compares? (internationally operating companies only)



2 https://assets.publishing.service.gov.uk/media/641d71e732a8e0000cfa9389/artifical_intelligence_sector_study.pdf

3 Public First modelling for the CCIA, https://ccianet.org/research/reports/uk-digital-economy/

More systematically, we compiled a new index looking at the UK's relative strengths and weaknesses in underlying economic competitiveness; research; skills base; infrastructure; commercial ecosystem and regulation.[4] **We find the UK is second behind only the US in its ability to take advantage of AI** - however, this lead is relatively slight over other leading economies such as Germany, Canada or South Korea.



With countries such as France, Israel and Germany amongst others all making significant investments in AI, the UK will need to keep its foot on the pedal to not fall behind.

4 Public First AI index drawing on data from the World Bank's Global Competitiveness; Heritage Foundation's Index of Economic Freedom; Tony Blair Institute; Statista; Stanford's AI Index Report; Tortoise's Global AI Index

'The UK has the most advanced tech sector in Europe, with the highest level of private investment, the most mature consumer digital market and globally leading companies'

Infrastructure & Compute

Over the past 13 years, the amount of computing power used to train AI models has increased by a factor of 350 million.[5] Moore's law has been beaten – with the amount of computing power devoted to AI doubling somewhere between every 3-6 months. The more we scale up our AI models, the more powerful they become - and this trend is expected to continue to drive increased demand for compute power for at least the next decade.

Having access to ample compute within the UK can be crucial to enabling low latency applications, scientific research, maintaining confidence in data security and allowing new start-ups to experiment. In our business poll, **over two-thirds (68%) of senior business decision makers - and four-fifths (79%) of cloud infrastructure users - told us that they thought it was important to have the option to choose data centres located within the UK.** The most important reasons they gave for this were legal or compliance (81%), trusting the UK's data privacy laws (80%) and ensuring low latency or fast access to their data (78%).

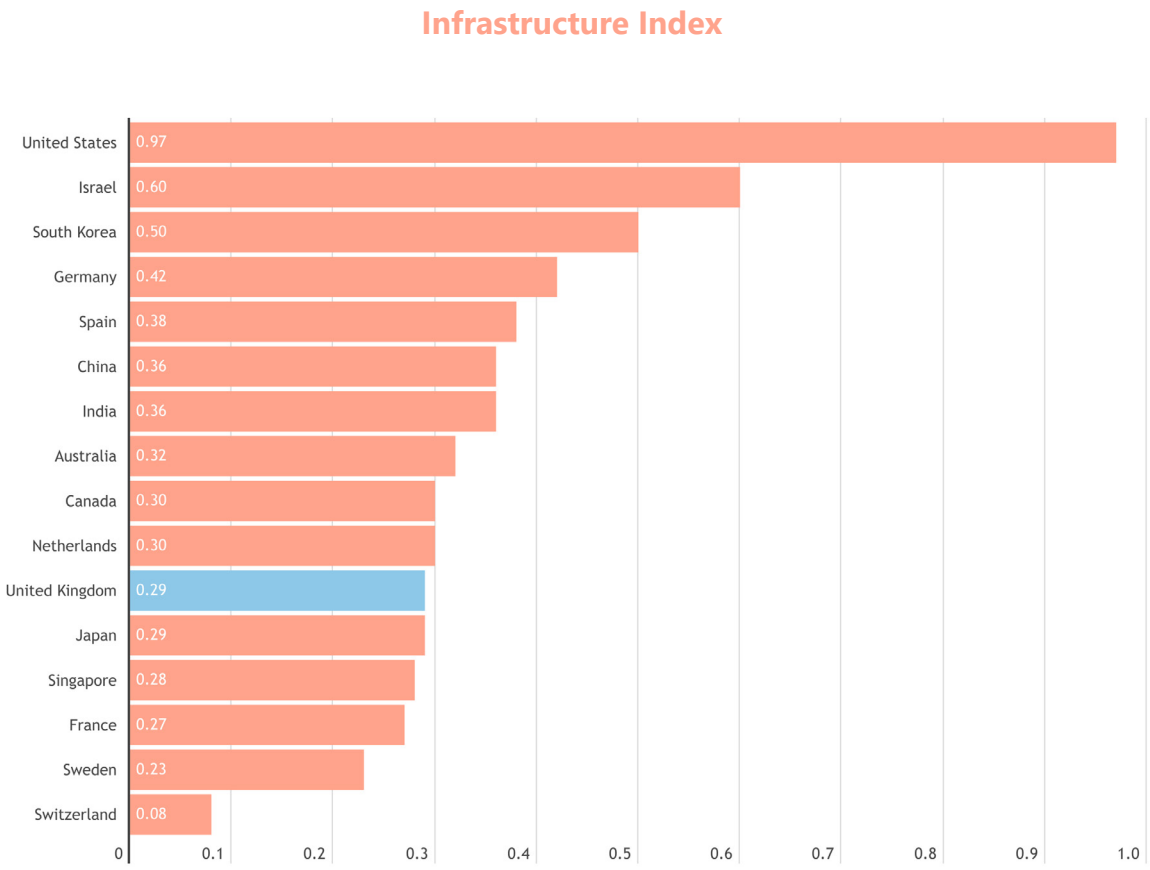
However, in 2022 the UK had only 1.3% of global compute capacity,[6] and on our sub-index for infrastructure the UK came only 11th. London and the Southeast continue to dominate the market with approximately 70% of data centres clustered in the region.

5 https://www.governance.ai/post/computing-power-and-the-governance-of-ai

6 https://www.gov.uk/government/publications/future-of-compute-review/the-future-of-compute-report-of-the-review-of-independent-panel-of-experts

The Go-Science report and subsequent independent review of the Future of Compute outlines seven challenges that have held back investment in compute, including a lack of national coordination, skills and concerns over energy usage. In addition to this, many other commentators have pointed to the UK's planning system as a key barrier to delivering faster investment. While private companies such as Microsoft continue to invest heavily and the Government has committed to three new supercomputers by 2025, still more will be needed to meet demand for use cases such as AI, edge computing and other low latency applications.

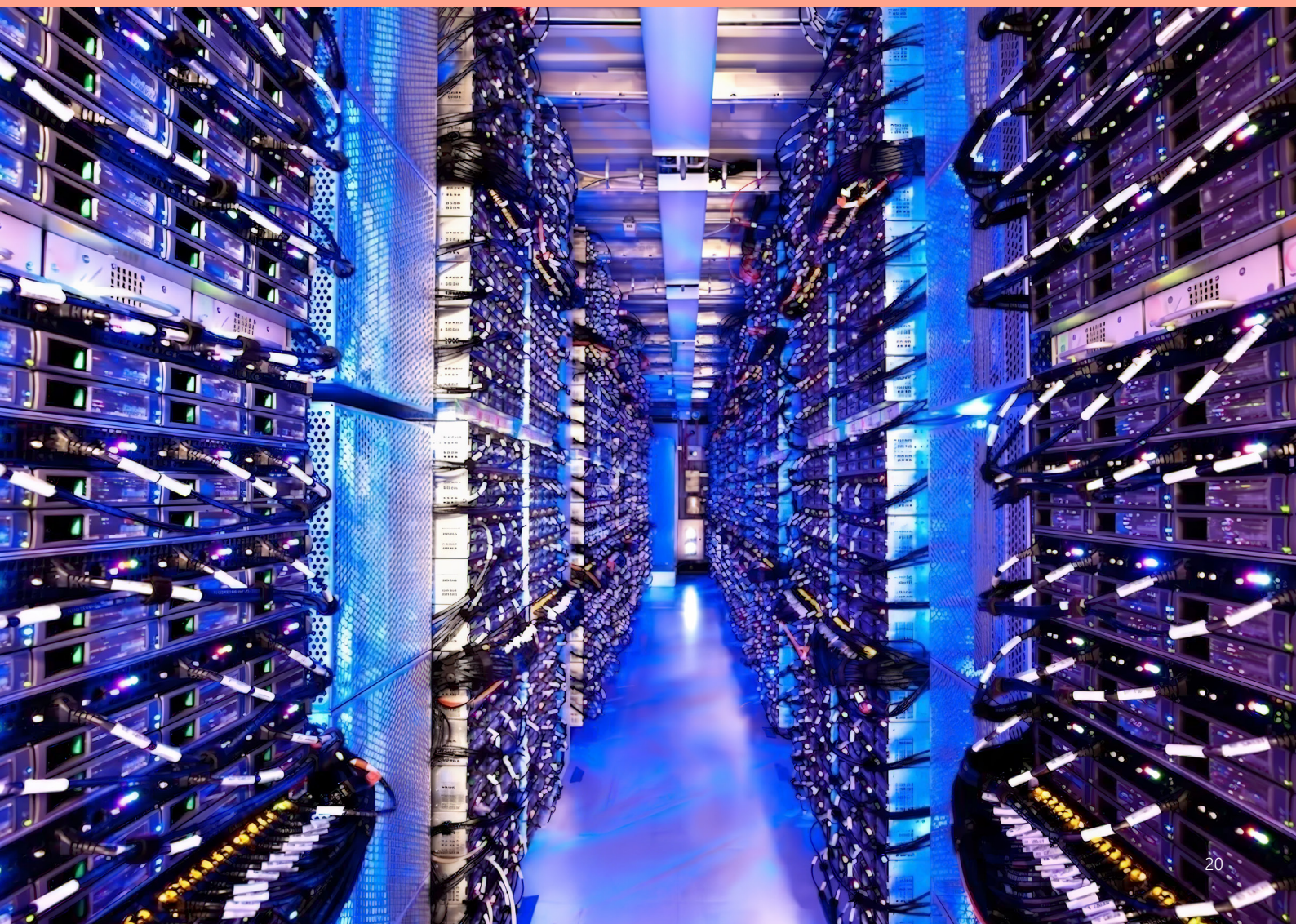
If the UK wants to meet accelerating demand for compute, it will need to do more to unblock current planning barriers and delays, speed up energy connection times and increase zero carbon energy supply to meet electricity demand from new data centres.



Microsoft's Investment in Datacentre Infrastructure

In November 2023 Microsoft committed to investing £2.5 billion over three years, to expand its next generation AI infrastructure in the UK, bringing more than 26,000 GPUs to the UK by 2026. The single largest investment in its 40-year history in the country, Microsoft will grow its datacentre footprint across sites in London and Wales and potentially expand into northern England.

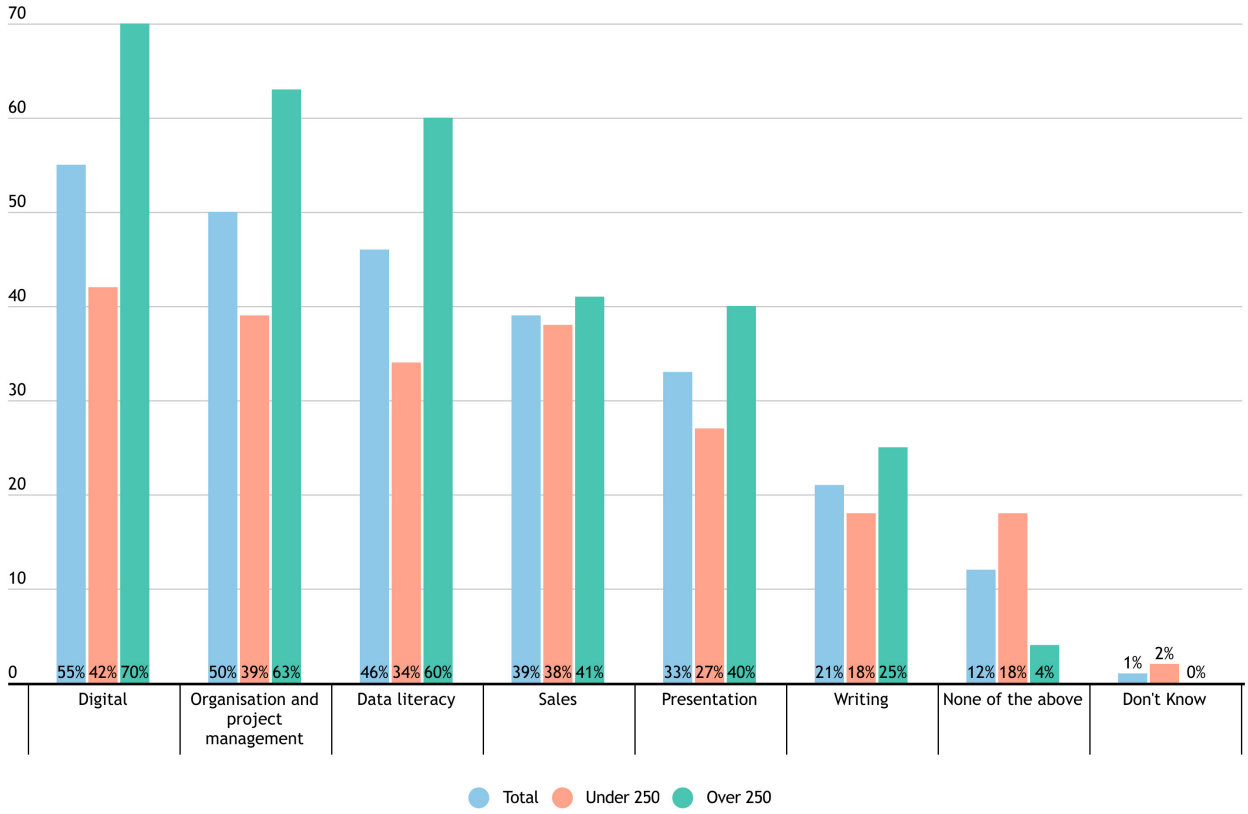
This infrastructure investment will help to meet the exploding demand for efficient, scalable and sustainable AI, cutting-edge compute power, and the needs of the private and public sector waiting to take advantage of the latest cloud and AI breakthroughs.



Digital Skills

In our polling, digital skills were seen as the type of skills businesses thought would be helpful to have more of, with this particularly true for larger enterprises.

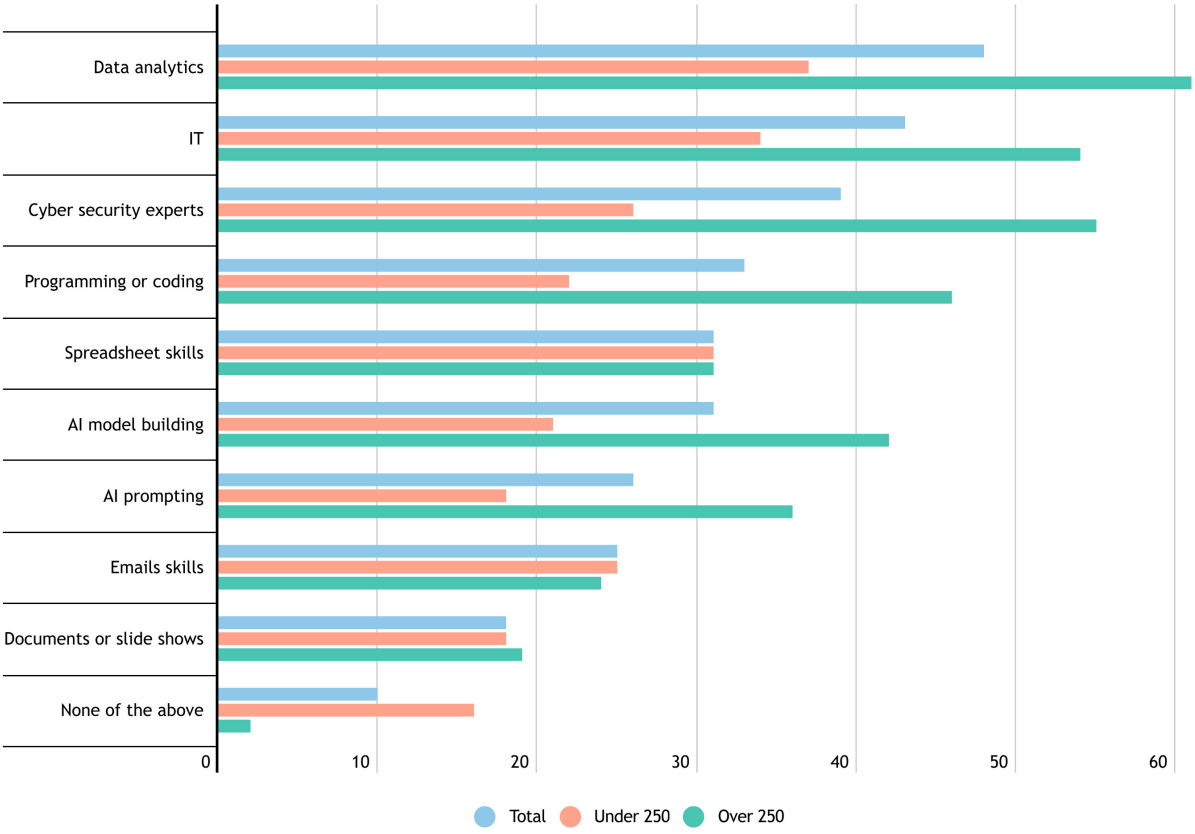
Which, if any, of the following general types of skills would you say that your business would find most helpful to have more staff with?



AI skills were seen as important by around 40% of larger enterprises, but the most pressing current skills shortages were seen to be in more traditional areas such as data analytics or IT. In the next few years, demand for AI specific skills is likely to grow significantly faster as AI workflows move increasingly from a prototype to deployment stage. Between 2020 and 2023, demand for AI roles has grown by twice as much as average labour demand.[7]

7 https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID4739071_code4196853.pdf?abstractid=4603764&mirid=1&type=2

More specifically, which of the following types of digital skills would you most want to have more of in your business?



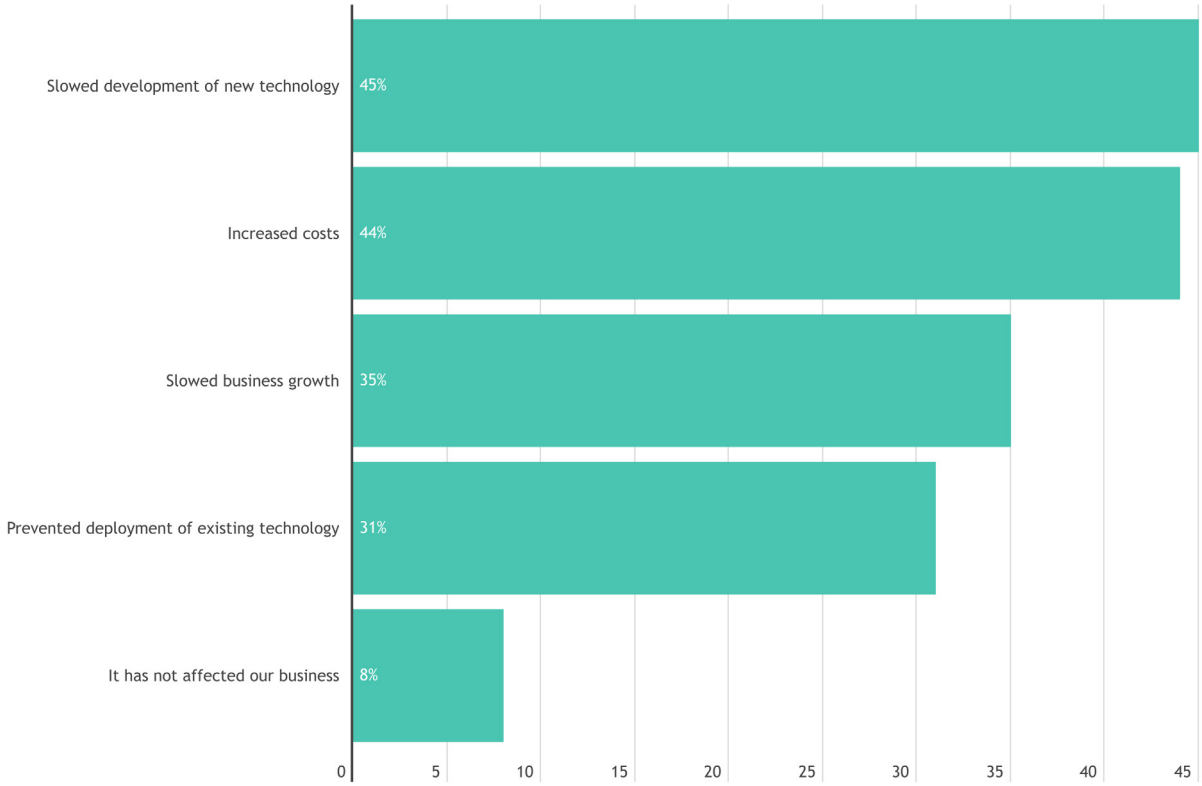
Microsoft's AI Skills Commitment

By 2025 Microsoft will support one million people to gain the AI skills they need to start, or move into, a career in technology.

The expansion of the Get On programme builds on Microsoft's five-year initiative. To date it has trained 1.1 million people in digital skills and helped over 30,000 people build careers in tech. Microsoft's expanded AI resources will focus on three key areas:

- **Building AI fluency:** Enable workers, job seekers and AI-curious self-learners to build AI knowledge and understanding including responsible deployment. New non-profit partnerships with Generation, Catch22 and The Prince's Trust will support individuals who face greater barriers to employment opportunity.
- **Developing AI technical skills:** Enable those with AI knowledge to develop their technical skills and achieve certification through free, online self-learn training on modules including machine learning and data analysis.
- **Supporting AI business transformation:** Support business leaders to manage AI transformation and worker upskilling across new AI products and services in order to take advantage of growth opportunities.

Over two-thirds (69%) of senior decision makers told us that digital skills were either essential or very important to the running of their business - but 40% of businesses reported finding it difficult to find staff with good digital skills, leading to slower deployment of new technology.



Microsoft and Catch22: Digital Edge

Digital Edge is a tech employability programme, delivered by Catch22 in partnership with Microsoft, which supports individuals aged 18+ into their first digital job. Paired with an industry expert career coach, participants are offered six months of free coaching, following tech employability workshops, where they work together to learn all about the industry and gain valuable digital and AI skills for their CVs. Since the start, nearly 1,000 participants have started the programme with over 300 progressing into employment or apprenticeships.

Naomi Hulston, CEO of Catch22, said: "The application of AI across all sorts of aspects of our lives is hugely exciting and filled with potential. But for some people, this potential is tinged with fear; a fear of the unknown, a fear of being left behind and a fear of not having the right skills to be part of the AI revolution. By empowering people to embrace this new wave of technology, we'll make sure nobody — whatever their age, background or challenges — is left behind."

The Returns from Digital Investment

In our business poll, senior decision makers told us about the many benefits they had already enjoyed from digital technology, specifically utilisation of the cloud:

84%

of cloud users told us that it had **increased efficiency in their business**

85%

of cloud users told us that they had **found it easier to keep software up to date**

81%

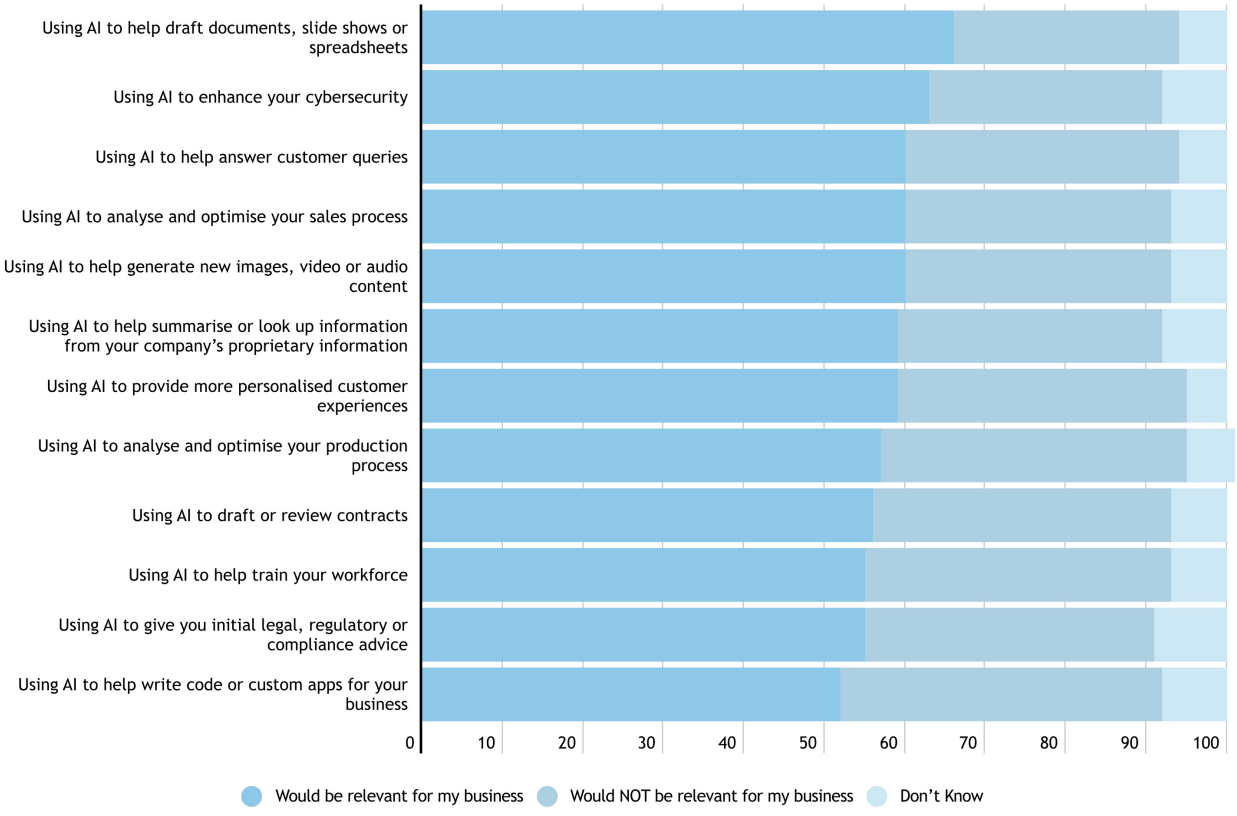
of cloud users told us that it had helped **support flexible working**

78%

of cloud users told us that it had helped **improve worker collaboration**

Looking forward, the majority of businesses reported believing a variety of use cases could be relevant for their business, including AI supported drafting (66%), cybersecurity (63%) and to help answer customer queries (60%.)

Which, if any, of the following potential future use cases of AI do you think could be relevant for your business?



In total, we estimate that investment in digital technologies and skills **could have an average societal Return on Investment (ROI) over 5:1 in the next decade** - that is, for every extra £1 spent by companies, the economy could grow by £5.[8]

8 Public First estimate based on a weighted average ROI of investment in AI, cloud, data centres and digital skills.

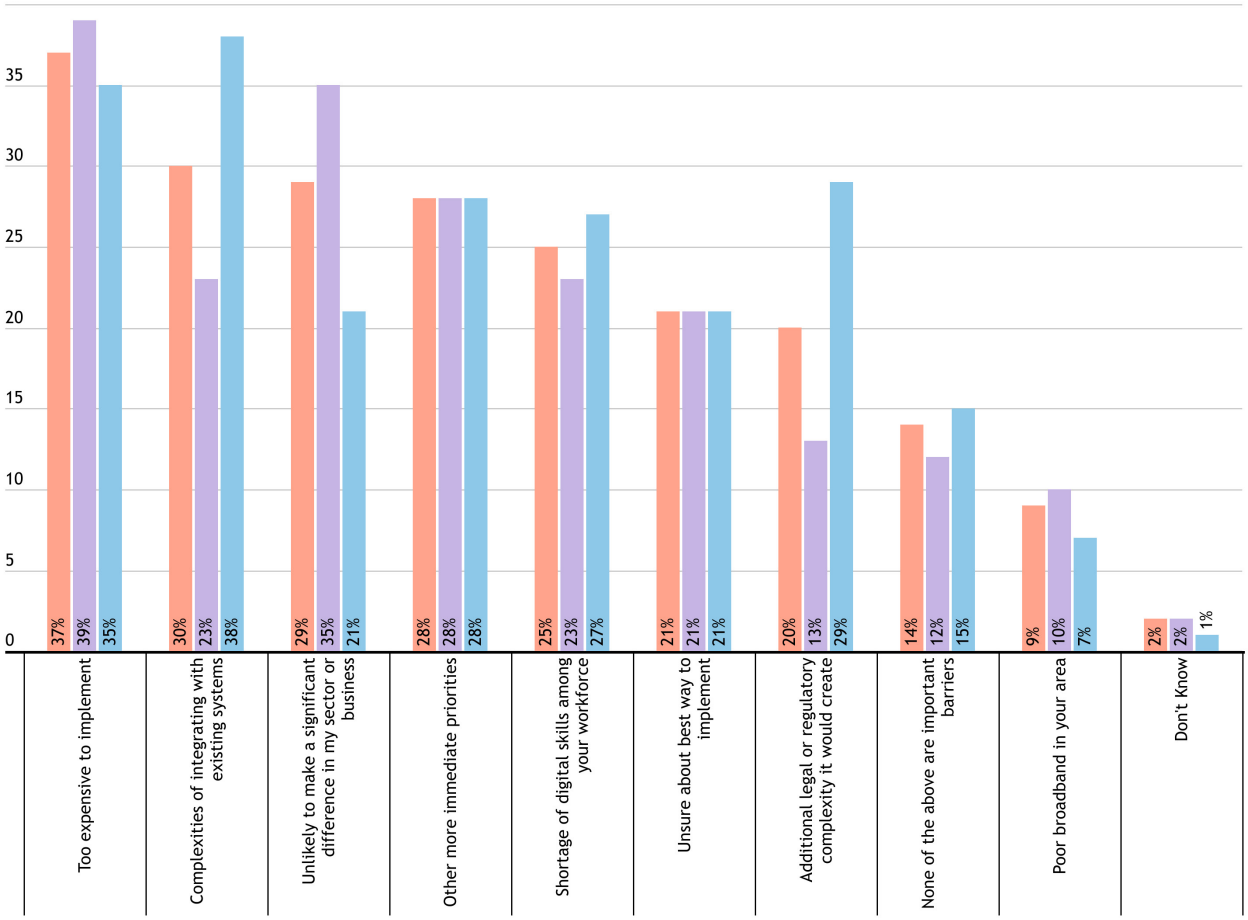
Reducing Barriers to Digital Adoption

Despite the potential of digital technology, we continued to see significant variation in the uptake of key technologies. While over 90% of large businesses in the UK have adopted the cloud, almost a third (31%) of SMEs said that currently they don't use it. The story is even more stark when it comes to using AI tools, with almost half of UK SMEs (47%) saying they use neither dedicated AI tools, AI features built into existing applications nor AI driven robotics or machinery.

On average, we found that companies whose revenue had grown by more than 10% in the last year were using over 50% more digital technologies than companies whose revenue had stayed the same or shrunk.

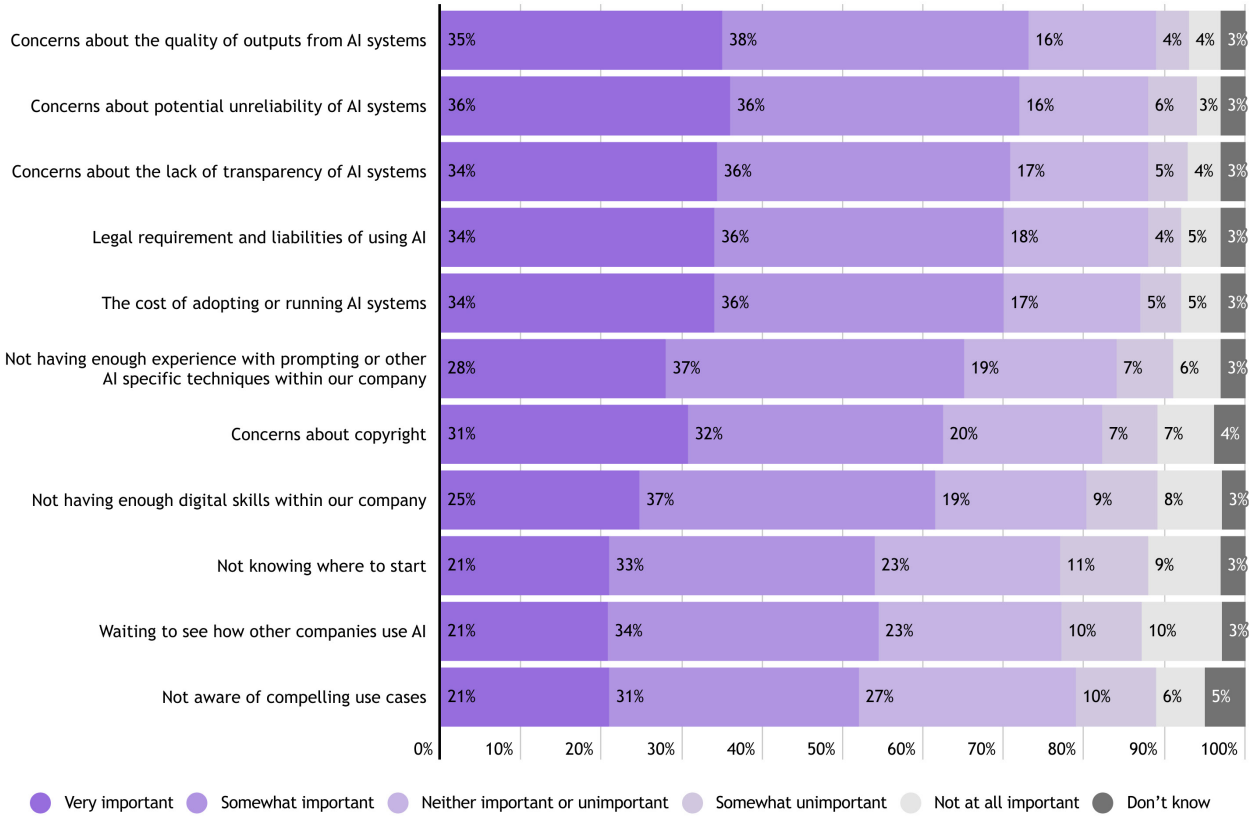
When we asked companies what the most important barriers were to them using digital technology, the most significant reason **was a lack of awareness - with half of companies saying they did not know of any compelling use cases to invest in further digital technology.**

And which, if any, of the following are important barriers which explain why your company doesn't use more digital technology?



When we asked about the barriers to adoption to AI more specifically however, we found that more concrete obstacles were seen as important: concerns about the quality of outputs (73%), the potential unreliability of AI systems (72%) and their lack of transparency (71%).

How important or unimportant do you think the following are likely to be as barriers to your business making more use of AI tools?



These concerns are likely to fade as AI systems become more mature: becoming more reliable, and with best practice established in how to integrate them into other systems and processes. Like any new technology, it will take time to understand where AI can be most helpfully deployed. However, this nervousness suggests there is also potentially a role for other partners and guidance to support with and teach best practice in how to deploy AI.

Joos uses Copilot for Microsoft 365 to grow

Joos, a supplier of mobile charging stations, is using Copilot for Microsoft 365 as it expands in North America and Europe.

With team members across Europe, North America, Ghana and China working with colleagues across time zones is part and parcel of life at Joos. Using Copilot has been a game-changer for collaboration and sharing across the company.

"The fact that Copilot quickly generates meeting recaps with notes and action items has actually changed the way we structure our meetings" says Jeannette Ikonga, Head of Client Success and Customer experience at Joos.

Joos is also using Copilot right across the Microsoft 365 toolset – from using Copilot in PowerPoint to create branded sales pitches to summarising long documents in the onboarding process helping to cut down the time for both onboarding meetings and trainings.

Unlocking Value in the Public Sector

AI could be as significant a boost to productivity in the public sector as it will be in the private sector. In our modelling, we find that the average augmentation potential of public sector occupations is only around 15% less than that of those in the private sector. In total, we estimate that greater use of AI to support the completion of routine tasks and administration in the public sector could create over **£12 billion in savings for the public sector by 2030. By 2035 greater use of AI could save the UK's public sector £17 billion**. That would be enough to pay the salary for over 330,000 additional nurses.[9]

This is broadly welcomed by the British public. Take healthcare - in recent consumer polling by Public First:

63%

of the UK public agreed that **adopting AI tools in the NHS would improve the quality of health services**

61%

of the UK public said that they would **support the greater use of AI in healthcare**

65%

of the UK public agreed that **adopting AI tools could help GPs to become more efficient in their day-to-day jobs**

One area where AI could be particularly powerful is helping with earlier detection of emerging illnesses. **We estimate that the use of AI in the NHS to support earlier detection could save an additional £500 million by 2030.**

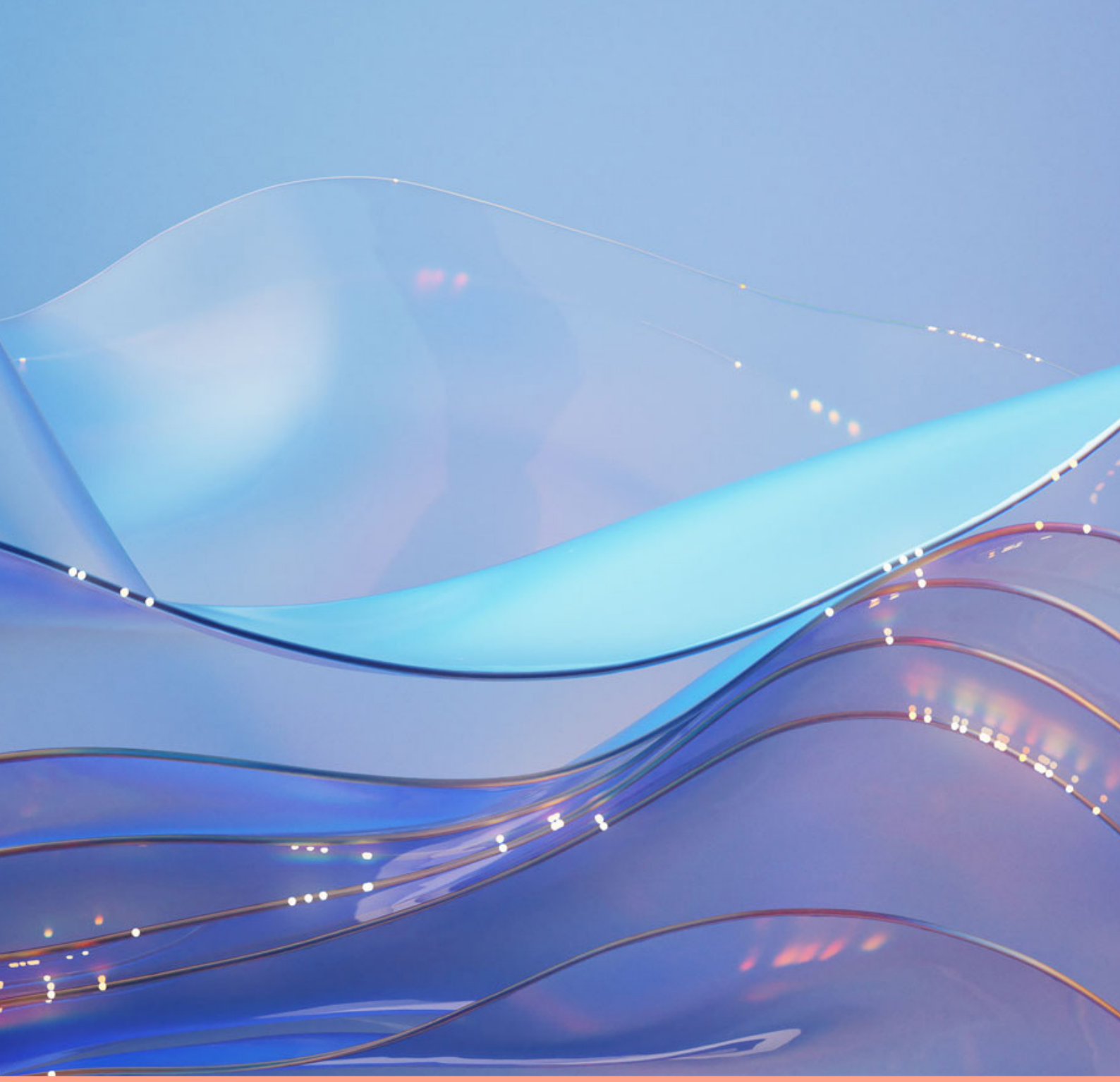
Microsoft Azure supports NHS Grampian in trialling AI for breast cancer detection

NHS Grampian in Scotland is trialling Mia, an AI solution developed by Kheiron Medical Technologies and supported by Microsoft Azure, to advance breast cancer screening. Instead of requiring two specialists to read each scan, the trial seeks to demonstrate that AI working with one highly trained radiologist delivers faster results, addresses the mammogram backlog and enhances detection.

Mia analysed over 220,000 mammogram images over a three-year cycle, identifying 271 cancers compared to the 261 that would have been detected by just one radiologist. It also detected 47 additional 'interval' cancers than would not have been identified by two specialists together.

AI screening promises scalability through Microsoft's cloud. Deployments are underway at 14 additional NHS sites, meaning over 500,000 women a year could be screened by Mia. Mobile mammogram units can also be used across remote areas, with images transferred via the cloud (with patient data de-identified) and quickly read by Mia before being shared with radiologists.

9 Based on https://www.kingsfund.org.uk/insight-and-analysis/data-and-charts/key-facts-figures-nhs



Methodology

Estimated Return on Investment from Digital Technologies and Skills

In order to estimate the potential societal return on investment from digital technology and skills, we took a weighted estimate of the estimated societal ROI from investing in AI, data centres, cloud services and digital skills:

- For **AI**, we first calculated the potential productivity increase from AI tools, drawing our main AI model (see below) and the estimates from Mollick et al (2023). We then applied this to a worker on the average UK wage, assuming they would need to invest in at least 3 AI tools.
- For **data centres**, we drew on a literature review of public estimates or financial statements on average return for data centre providers. We then added to this additional employee compensation, drawing on ONS Annual Business Survey data on the labour share for data processing, hosting and related activities and telecommunications.
- For **cloud services**, we combined estimates from Public First's internal dataset on average cost savings, revenue increases and ROI for cloud users, with a wider review of other published estimates.
- For **digital skills**, we drew on a new literature review of the average wage impact of digital skills training, combined with an assumption that around 40% of this impact was additional, based on previous survey work on digital skills students.

Economic Opportunity from AI

In order to calculate the size of the potential economic opportunity from generative AI for the UK we:

- Building on the methodology of Eloundou et al (2023), we use GPT-4 to classify the probability that a multimodal LLM, or tools built on top of it, could significantly reduce the time it takes for workers to complete over 17,000 combinations of tasks and occupations drawn from the US O*NET database.
- For our prompting strategy, we followed the structure of Halawi et al (2024), asking GPT-4 to think step-by-step about reasons about why or why not individual tasks could be affected before making its final judgement.
- We then aggregated tasks up to occupation level, and used our own developed crosswalk to convert to ONS occupations at a 4 digit level.
- We aggregated up to look at the impact for the economy as a whole, based on each occupation's share of the total economy wage bill, drawing on ONS Annual Survey of Hours and Earnings data from 2023, and the UK economy's labour share of income, again taken from the ONS.
- Based on the experience of previous General Purpose Technologies, we assume that generative AI will take around 20 years to fully diffuse across the economy, and apply a standard S-curve adoption model, starting from 2022.
- For our public sector estimate, we look instead at a subset of occupations that are primarily based in the public sector, and then apply the same approach as above.

Public First AI Index

Our headline AI index is based on six equally weighted pillars:

- **Competitiveness**. We draw on data from the World Bank's Global Competitiveness Index.
- **Research**. We draw on data from Stanford University's 2023 AI Index Report and Tortoise Media's Global AI Index.
- **Skills**. We draw on data from Stanford University's 2023 AI Index Report and Tortoise Media's Global AI Index.
- **Infrastructure**. We draw on data from the Tony Blair Institute for Global Change's State of Compute Access report and Statista data on the number of data centres per country.
- **Commercial Ecosystem**. We draw on data from Stanford University's 2023 AI Index Report.
- **Regulation**. We draw on data from the Heritage Foundation's Index of Economic Freedom Business Freedom index.

For each pillar, we give each country a normalised score between 0 and 1, with the best performing country in each dataset receiving 1 and the worst 0. Where we have more than one dataset to draw on, we report an average.

Potential NHS Savings from Greater Use of AI in Cancer Detection

To calculate the estimated savings to the NHS from AI we first estimated the cost savings from early treatment as a result of earlier detection, drawing on

- estimates on cost per patient by Laudicella et al
- data on AI cancer detection rates
- NHS data on the number of cancer cases diagnosed by stage each year.

We then took into account potential labour force savings given the potential reduction in workload for a radiologist using The Royal College of Radiologist's census reports data on outsourcing expenditure.

Finally we drew on data on the number of radiology departments and estimated costs to set up the required artificial intelligence technology us to estimate the potential net savings to the NHS from AI early cancer detection.

Microsoft

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