Google

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Unlocking the UK's AI Potential

Foreword

The UK has a rich tradition of science and technology leadership. With the groundwork of modern computer science laid at Bletchley Park over 70 years ago, British leaders have long pioneered major advances in the evolution of digital technology, and AI is no exception.

Today, the UK is home to world-leading AI research institutes. Strong academic and R&D leadership has meant that trailblazing AI companies, like Google DeepMind, continue to grow and thrive here.

AI's transformative potential means that we are at an early but critical juncture of policymaking. AI-powered innovation could create over £400 billion in economic value for the UK by 2030[1], deliver enormous productivity gains across all sectors of the UK economy, help to solve pressing societal issues and advance progress in fundamental sciences.

But these benefits will not come automatically. To realise AI's full potential, a comprehensive AI opportunity agenda will be required. Our paper outlines how investment in AI infrastructure, a thoughtful workforce strategy and universal access to AI, will be critical to success.

Harnessing the opportunities of AI must be a collective endeavour. The Government, public sector, private companies and civil society must work together to shape AI's trajectory. Without concerted action, the UK risks being left behind in the global race. In 2023, the US and China developed 50% and 40% of the world's Large Language Models (LLMs) respectively[2]; Singapore is leading efforts to build a nationwide AI talent pool[3]; and France has made AI a strategic priority, dedicating €2.5 billion of its France 2030 budget to AI[4]. The UK needs to develop a comprehensive and thoughtful strategy that ensures it can stay ahead.

Safety and responsibility should of course underpin AI innovation and, in a decade from now, we want to have developed AI boldly and responsibly. We have learned from prior waves of technological developments that unless people understand and trust technology, it will not be adopted at scale. As the first company to develop strong AI principles[5], Google has sought to be an industry leader in responsible AI development and governance.

But, as we continue major efforts to drive AI governance, we must focus our attention on what we want to achieve, not just what we want to avoid.

We have a once in a generation opportunity to grow our economies, create new jobs and drive breakthroughs in health and science. To do so, we need the right policy agenda and we believe that this paper provides a comprehensive pathway. We look forward to working with our partners in its delivery.

Debbie Weinstein
Vice President and Managing Director, Google UK & Ireland

An agenda to unlock the UK's AI opportunity: recommendations

Invest in infrastructure and innovation: Creating a supportive framework that drives AI R&D and converts ideas and data into new discoveries, products, and services.

- **Develop a National Research Cloud** to enhance the National Data Library proposals by democratising access to AI technology, computing power, and collaboration tools for researchers.
- **Invest in the infrastructure critical for AI development** by ensuring the right conditions for data centres.
- **Maintain a pro-innovation regulatory framework to support a healthy AI ecosystem,** by maintaining a risk-based and context-specific approach to AI regulation that supports AI researchers and innovators.
- **Facilitate international alignment of AI frameworks** and advance an AI Opportunity Alliance. The UK should adopt an affirmative strategy to promote development and deployment of AI with global partners. This would ensure that countries at all stages of development work together to achieve major public objectives around health, scientific research, climate, cybersecurity, and economic growth.

Develop a thoughtful AI workforce strategy: Investing in British communities, students and workers, to make sure they can use and benefit from AI.

- **Establish a National Skills Service** to offer a new platform and accreditation system of lifelong learning for UK employers and workers.
- **Enable and enrich workers by focusing on AI literacy and skills-based learning models.** Encourage the uptake of short conversion courses, accreditation, and a more flexible use of the apprenticeship levy.

Promote widespread adoption and universal accessibility: Harnessing AI across government and all sectors to address major societal and economic challenges and ensure the benefits of AI are widely shared.

- **Accelerate public sector adoption of AI** to help deliver Government's five key missions by investing in more AI expertise and exploring private-sector training and tools for key units.
- **Improve private sector adoption of AI** through AI training resources, partnerships, and improved access to capital.

02 Introduction

The UK has played a central role in technological innovations and AI development. Over seventy years ago, Alan Turing and Thomas Flowers laid the groundwork of modern computer science at Bletchley Park, marking a leap forward in the evolution of digital technology. Fast forward to today, and the UK is home to world-leading AI research institutes. Strong academic and R&D leadership is the foundation that British technology and AI companies like Google DeepMind are built on. Indeed, two of Google DeepMind's founders met at the UCL's Gatsby Computational Neuroscience Unit.

That's why we have called the UK home for over 20 years and are proud to be fueling UK innovation. In 2023 alone, Google's tools contributed an estimated £118 billion in economic activity in the UK, fuelling innovation, productivity and growth. To fulfil our mission of making the world's information universally accessible, we have trained over one million people through our free digital skills programme since 2015 - and are continuing to adapt this work for the AI era.

AI has the potential to fundamentally change the way we live, work, and learn, through its capacity to assist and empower people in almost every field of human endeavour. An AI-assisted future can boost public-private productivity and drive economic growth in the UK - Google and Public First's 2023 UK Economic Impact Report[6] found that AI-powered innovation could create over £400 billion in economic value for the UK economy by 2030, the equivalent of 2.6% annualised GDP growth.

The Promise of Artificial Intelligence

In the UK, Google's AI is already enabling businesses and individuals to solve a variety of problems: for example, making communication efficient and accessible for individuals with motor disabilities[7], helping communities stay safe with fire and flood forecasting[8], reducing energy emissions[9], and improving our ability to detect and treat cancer via our partnerships with the NHS and Imperial College London[10].

AlphaFold[11], Google DeepMind's AI system that uncovered the 3D structure of 200 million proteins – the building blocks of life - is one AI solution that has already made a notable impact. Experimental protein-structure prediction would ordinarily take about the length of a PhD and cost hundreds of thousands of dollars. Using AlphaFold, we managed to fold all 200 million proteins known to science in one year. This represents a billion years of PhD time saved. This single initiative is accelerating research in nearly every field of biology, speeding up progress on important real-world problems including developing fully effective malaria vaccines with researchers from the University of Oxford[12] and breaking down single-use plastics at the University of Portsmouth[13].

Generative AI models can increase productivity by assisting with routine or administrative tasks, including in public services. Heavy workloads and excessive hours are a significant factor in people leaving the health or education workforce, exacerbating staff shortages. AI could be part of the solution to these problems, as it could save over 700,000 hours a year in administrative work for GPs and teachers, as well as freeing up over £8 billion in public sector resources[14].

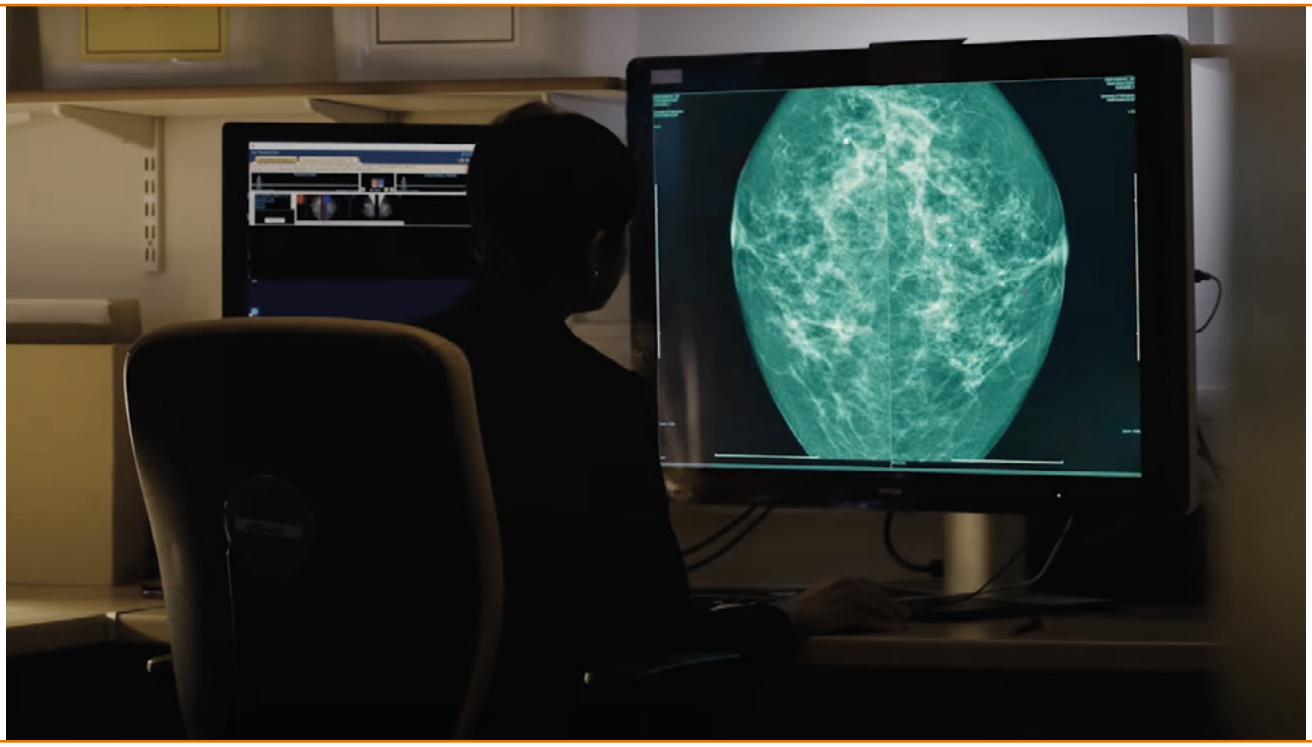
We have been encouraged by the new Government's action to create the conditions for successful AI-enabled digital services and digital adoption across the economy and public sector. This has included machinery of government changes to make the Department for Science, Innovation and Technology the new digital centre of government, to the launch of the AI Opportunities Action Plan. Initiatives such as the forthcoming National Data Library (NDL) have the potential to improve public service delivery.

We believe AI will be a vital tool to address the great challenges of our time. It will support the UK to identify and respond to major public health challenges, it will present new avenues to boost living standards and re-invigorate economies struggling with productivity growth or demographic challenges. We're just scratching the surface of what's possible; but what is clear is that investment and policy will be major determinants of whether the UK succeeds in harnessing AI to take on these challenges.

This paper proposes a three-part agenda for policymakers to support the effective deployment of AI in the public and private sector, and to ensure it benefits as broad a range of people as possible.

03 AI Opportunity in Action: Pioneering Examples in the UK

Google's innovations are already demonstrating the use cases of AI in addressing challenges, including delivering on the Government's five missions and wider policy goals across the UK



Delivering better and more efficient public services and healthcare – and help build an NHS fit for the future

AI can help public services and the health sector be more efficient and effective, with the potential benefits felt by UK citizens across the country.

AI can support problem solving and analytical thinking, helping public sector workers innovate to better serve people in the UK.

The Department for Transport employs Google Cloud to improve and enhance its data analysis capabilities on rail data (such as ticket sales and franchise earnings)[15]. Now rail IT workers can receive accurate data in seconds instead of hours.

Google Health has been working in partnership with NHS Foundation Trust and Imperial College London to build an AI system to improve the accuracy and efficiency of breast cancer screening. Existing evidence suggests that in the UK, breast screening reduces the number of deaths from cancer by about 1,300 a year. Better and more accurate breast cancer screening can be life-saving[16].

Advancing net-zero transition and energy security, and mitigating climate risks – helping to make Britain a clean energy superpower

AI can help unlock insights from data, which will be critical to building a greener future for the UK, unlocking economic opportunities and societal benefits along the way.

A report[17] by Google and Boston Consulting Group (BCG) shows that AI tools have the potential to help mitigate 5-10% of global greenhouse gas emissions by 2030 — the equivalent of the total annual emissions of the European Union.

Teaming up with Transport for Greater Manchester for Project Green Light, using Google AI and Maps data to alleviate traffic pressure at traffic lights and reduce stop-and-go carbon emissions[18].

Google's FloodHub platform uses AI to identify and give hyperlocal and immediate alerts for areas at risk of flooding in the UK.

Expanding access to quality education - supporting breaking down barriers to opportunity

AI can help educators boost their creativity and productivity, giving them time back to invest in themselves and their students. It can also enable innovation in teaching and learning.

AI can help free up time for more strategic and rewarding elements of teachers' work, while modernising the learning experience of students, building a shared confidence in the opportunities that AI presents. Quality education should also include exposure to AI as part of learning, helping students gain confidence and develop the skills needed for their future.

Experience AI[19] is a new educational programme that offers cutting-edge resources on artificial intelligence and machine learning for teachers and their students in Key Stage 3 (ages 11–14). Developed in collaboration between the Raspberry Pi Foundation and Google DeepMind, the programme supports teachers in the exciting and fast-moving area of AI, and gets young people passionate about the subject.

LearnLM[20] is our new family of models fine-tuned for learning. Grounded in educational research to make teaching and learning experiences more active, personal and engaging. For example, on YouTube, a conversational AI tool makes it possible to figuratively "raise your hand" while watching academic videos to ask clarifying questions, get helpful explanations or take a quiz on what you've been learning.

Tackling economic crimes and keeping people and businesses safe online, enhancing the UK's cyber resilience

AI can significantly enhance cyber security, protecting key institutions and vulnerable users in need.

AI can reverse the 'defender's dilemma' by allowing security professionals and defenders to scale their work in threat detection, malware analysis, vulnerability detection, vulnerability fixing and incident response[21].

Google's products such as Gmail have long used AI to filter out spam, phishing and malware, before they reach users' inboxes. We have developed a security-specific large language model and AI-enhanced versions of our leading security products to help security practitioners use AI to deliver new levels of protection[22].

HSBC has adopted Google Cloud's Anti Money Laundering AI (AML AI), an AI solution that can more effectively detect suspicious activity across financial transactions passing through the bank[23]. This has significantly reduced the number of 'false positives' (incorrect flagging of trustworthy transactions), leading to considerable efficiency gains.

Helping businesses of all sizes and across industries innovate, grow and compete – helping to kickstart economic growth.

AI can help businesses and individuals be more productive.

We are helping to transform how customer service agents operate by providing a Google AI assistant by their side through live customer phone calls, retrieving information, monitoring sentiment and making sales suggestions. loveholidays has used Google Cloud's Contact Centre AI to help increase their contacts from 1,000 to up to 3,000 per day[24].

The creative company WPP is collaborating with Google Cloud to drive efficiency and boost the effectiveness of its marketing campaigns[25]. WPP is deploying Google's Gen AI tools to support creative tasks like writing headlines and converting sketches into images, and using the tools' analytics capabilities to assess the likely success of campaigns before they are launched.

Making the digital world more accessible for people with disabilities

AI is opening up access to the digital world and enhancing digital and tech tools to ensure everyone can enjoy the benefits.

Our London Accessibility Discovery Centre (ADC)[26] has been built in consultation with local partners like the Royal National Institute of Blind People, the Royal National Institute for Deaf People and Everyone Can, and Google's internal Disability Alliance employee resource group. The ADC is a workshop for research and assistive product development, and a space for collaborating, co-designing and learning with the accessibility and disability communities.

One example of such technology is Project Relate[27], an app created to help people with non-standard speech make their voices heard. One user said she went from having less than 10% of what she says being understood by people she's just met to having more than 90% of her speech understood.

04 Investing in AI Infrastructure and Enabling Innovation

The UK has a strong history and enormous potential in science and technology. To maintain this competitiveness, it is vital that the government invests in long-term R&D and new public-private approaches to building out AI infrastructure.

Countries have historically excelled when they support technological change and harness it to improve living standards. For societies to harness the benefits of AI, it is important to have the right policy conditions in place to allow AI to be built and developed.

Governments can support scientific and technological competitiveness by investing in long-term R&D and standing up new public-private approaches to build out AI infrastructure. Policymakers should tailor these efforts to make AI tools accessible to as many entrepreneurs and scientists as possible, allowing more developers to propel AI technology itself and to leverage AI to accelerate discoveries in other fields.

The 2023 Government AI Readiness Index[28] places the UK third overall, but ranks the UK seventh in the data and infrastructure pillar, putting it behind Singapore, US, South Korea, Switzerland, Japan and Australia, and highlighting the need for continued investment in this area.

There are three key areas that Government should focus on to ensure that the UK has the right policy conditions for AI to be built:

- Investing in R&D and AI infrastructure including cloud infrastructure, compute capacity, and data. This will ensure that researchers, technologists, and businesses have access to the tools needed to research, build and deploy AI. Initiatives such as the AI Opportunities Action Plan, and the announcement of the National Data Library can support this.
- Policymakers must continue to champion pro-innovation strategies and regulatory frameworks to spur dynamism and enable researchers and innovators to convert ideas into new products and services. The newly announced Regulatory Innovation Office (RIO) can play an important role in ensuring that regulation and legislation are kept under review and are fit for purpose.
- Policy efforts must be tethered to strong trade and investment policies and new types of AI alliances that support trusted international collaboration on AI, and facilitate the trusted cross-border data flows essential to AI development and deployment.

Driving data sharing and compute capabilities

The next generation of AI research and its diffusion through the economy will be central to creating economic growth and breakthroughs in societal issues such as climate change and medicine. Access to the right computational tools, as well as good public datasets that are interoperable will be critical.

Datasets enable researchers, developers, and businesses to experiment and innovate, driving advancements in AI technology, and improving processes. The OECD's 2023 Open Data Index[29] shows that the UK now falls below the OECD average for open government data, ranking far behind countries like Korea, France, Poland and Estonia. The UK currently sits in the category of "middle performance", and the OECD notes that the UK (alongside a handful of other countries) was once one of the top performers but changes to policy priorities have "undermined sustained policy implementation at the national level".

This was also recognised by the Minister for Science, Sir Patrick Vallance, who previously recommended[30] greater industry access to public data and wider data sharing across the public sector. We welcome the government's plan for a National Data Library; it is crucial that the UK Government delivers on its commitment to data availability and accessibility, reclaiming its global leadership position, as open data is the bedrock of sustainable AI R&D.

The independent 'Future of Compute' review[31] sets out important recommendations for the UK to drive and bolster its compute capabilities. This includes making immediate investments in public exascale capability, improving access to public compute via the cloud, through improved interoperability and better procurement and promptly increasing compute capacity for AI research. We would urge the UK to remain committed to supporting the UK's compute capacity, especially for AI and machine learning - and to consider how access to computational capabilities and tools could be delivered through other avenues, such as through the cloud.

The UK must not risk falling behind global competitors. The United States has already taken important steps, with the launch of the National AI Research Resource pilot[32] (NAIRR), a partnership joined by 10 federal agencies and 25 non-governmental partners; Europe is making major investments in AI compute capacity[33]; and Singapore's National Research Foundation provides funding to anchor national capabilities in AI research[34].

Data sharing & AI development: the story of AlphaFold

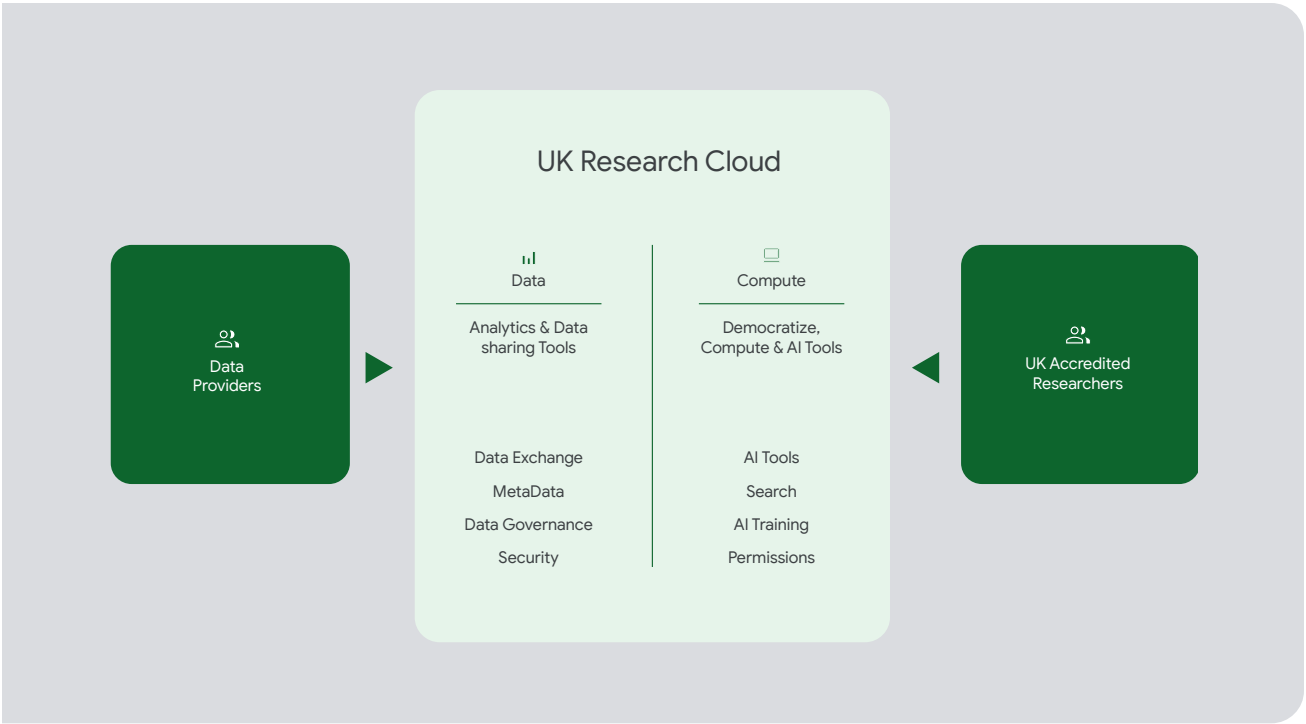
Successful sharing of data through public-private partnerships is also crucial to AI. Google Deepmind's AlphaFold was developed and trained using data that the scientific community had shared in open resources, co-hosted at the Cambridge-based European Bioinformatics Institute (EMBL-EBI). These resources were built on decades of public and private collaboration across the global scientific community, as well as sustained public investments from governments, including the UK. To continue to support open science and research, Google DeepMind released AlphaFold's predictions for over 200 million protein structures, and AlphaFold predictions have been accessed by more than 1.8 million users in 190 countries. This highlights the virtuous cycle of public-private research and open data. The EMBL—EBI is a strategic asset for the UK and it is important that the Government continues to support it.

The UK should continue to tailor its efforts to make AI tools for computation, public data sets and supportive infrastructure accessible to as many entrepreneurs and scientists as possible. This will enable many more developers to advance AI technology itself and to leverage AI to accelerate discoveries in other fields.

To achieve the Government's goals in access to both computational and data resources, we believe there is much more that the UK can do.

Policy recommendation:
The UK should create a National Research Cloud[35] (NRC). Similar to the NAIRR in the US, this could be the initiative for delivering the National Data Library, as well as providing critical access to computational tools. Researchers, academics, and government data scientists would have access to cutting edge AI tools and high-end computational resources, and be able to host large-scale government-held machine-readable datasets in a secure cloud environment. Research institutions across industry and academia would also be able to collaborate more easily. To compete as a global tech leader, it's vital the UK develops a comprehensive compute strategy, both in terms of capacity and delivery focus, and that this is managed by senior Government leadership.

AI has the capability to create opportunities across disciplines and scientific fields and this increased breadth is necessary for building the foundational knowledge that underpins AI development.



Investing in fundamental infrastructure

To reap the benefits of AI innovation, the UK must invest in building the infrastructure that is critical for AI development.

Sufficient access to and supply of data centre facilities is the bedrock of such infrastructure. Data centres will power the next wave of digital growth, including AI, and the demand in the UK is there, both from public and private sectors. The UK currently struggles to compete with other countries for data centre investment and we continue to explore how we can meet UK demand.

A well-integrated data infrastructure supports the scalability and performance required for AI applications, making it possible to handle large-scale computations and complex algorithms. Together, datasets and strong data infrastructure create an enabling environment that accelerates AI development and realises its opportunities.

Investment in data centres is also an investment in jobs and the UK workforce, as well as the UK's sustainable future. The physical location of data centres and sovereign capabilities matter as the investment and economic spillover in the region could contribute to the UK's economic growth. Analysis[36] indicates that data centre development can create thousands of jobs in a range of areas from construction to data centre engineering.

On average, a Google data centre is 1.8 times as energy efficient as a typical enterprise data centre and compared to five years ago, our data centres deliver nearly four times as much computing power with the same amount of electrical power. But we are not stopping our progress here. We've also set a goal to run our data centres on 24/7 carbon-free energy by 2030, which means matching our electricity consumption on an hourly basis with carbon-free energy from the same grid. In 2023 we maintained a global average of approximately 64% hourly carbon-free energy match across our data centres and offices.

We welcome the Government's commitment to reforming planning rules for new data centres and look forward to seeing the Planning and Infrastructure Bill. Measures to accelerate upgrades to the national grid and boost the deployment of carbon-free energy will also be essential.

However, there remain issues with competitiveness. For example, grid connection timelines for connecting new data centre sites are too slow to meet the growing demand for digital services. Furthermore, the UK's electricity costs are the third highest in the EU, in part due to the multiple levies included in consumer's bills. Bringing down electricity costs is crucial to support electrification of heating, transport and industry, as well as enabling the growth of the UK's digital infrastructure. While the Government mitigates the competitiveness impact for physical goods through the Energy Intensive Industries Scheme (EIIS), this does not extend to service-based electro-intensive sectors including cloud computing.

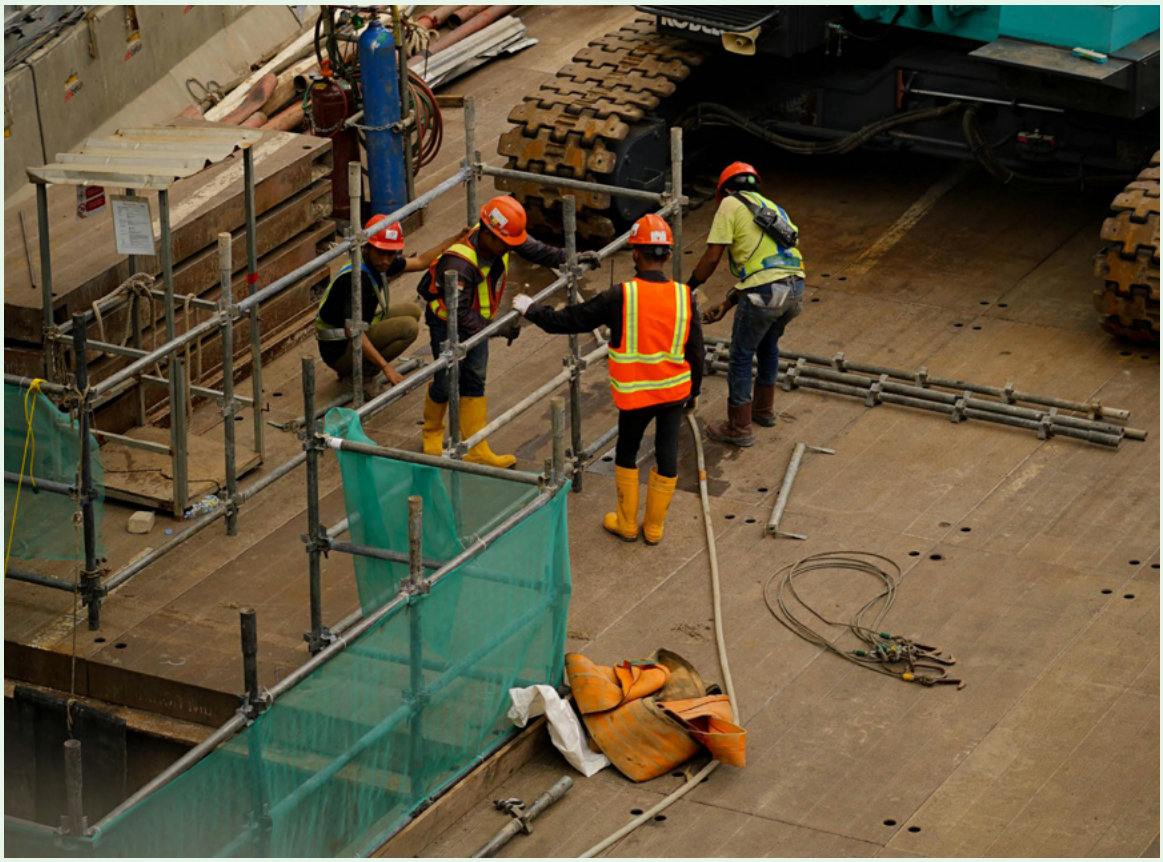
Policy recommendation:
Ensuring the right framework conditions for data centre investment via competitive energy policies and faster grid access will power AI opportunities. Working with the Department for Energy to accelerate access should be an essential priority, as well as addressing energy costs by reviewing electricity levies and extending the Energy Intensive Industries Scheme to service-based electro-intensive sectors.

Google's investment in AI infrastructure - UK data centres and subsea cables

Our infrastructure helps give everyone reliable and secure access to AI tools and technologies. Google UK has announced our $1 billion investment in a new data centre[37] in Waltham Cross, Hertfordshire. This new data centre will help meet growing demand for our AI and cloud services and bring crucial compute capacity to people and businesses across the UK.

We're also exploring new and innovative ways to use the heat generated by data centres. Our new UK data centre will also have provisions for off-site heat recovery, which presents an opportunity for energy conservation that benefits the local community. It allows us to capture the heat generated by the data centre so that it can be used by nearby homes and businesses. The data centre is also set to deploy an air-based cooling system.

This is in addition to Google's subsea cable – Grace Hopper[38] – which connects Bude in the UK to Bilbao in Spain and New York. The cable is one of the first new trans-Atlantic cables to connect the US and the UK since 2003 and it has improved the resilience of the Google network that underpins our consumer and enterprise products.



Pro-Innovation Regulatory Frameworks

AI is too important not to regulate – and too important not to regulate well. The challenge for policymakers is how to govern AI to maximise the benefits while mitigating risks. We must continue to ensure that the UK supports AI researchers and innovators to convert ideas and data into new discoveries, products, and services.

The UK AI regulation should focus on outcomes. Doing so would empower innovators and enable regulators to strike the right balance, avoiding overbroad regulations that could short-circuit broadly beneficial AI advances.

It is worth noting that the Digital Regulation Cooperation Forum (DRCF) has acknowledged that regulators are already empowered to address areas such as generative AI and the same is true for many other regulators outside the DRCF.

A copyright framework that supports innovation and creativity is one strong predictor of whether a country will be a leader in AI. This issue was noted by Sir Patrick Vallance's past review, where he recommended that the previous government announce a clear policy position on the relationship between intellectual property law and generative AI and to create an environment in which TDM is expressly enabled in the UK, providing confidence to innovators and investors.

Policy recommendation:
Continue to invest in sector-led AI regulation. The UK's existing sector-specific approach to AI regulation for products and services, that empowers existing regulators to use domain-specific expertise, is a very helpful global blueprint and we would encourage the UK to continue down this path.

Policy recommendation:
Ensure the UK's approach to frontier AI regulation is proportionate and continues to support cutting edge AI work. The UK has an opportunity to differentiate itself from the EU and accelerate, not hinder, innovation, growth and societal benefits. Any new binding rules for frontier AI labs should be considered carefully so that they don't risk losing investment and talent. Progressing innovation requires intervention at points of actual harm, not blanket research inhibitors. And given the international scope of these scientific advances, regulation should reflect truly national approaches, aligned with international standards wherever possible.

Policy recommendation:
The UK should take swift action to catch up with other markets such as the US, Singapore and EU by adopting the right legal framework for TDM. To ensure the UK can be a competitive place to develop and train AI models in the future, they should enable TDM for both commercial and research purposes.

Strong Trade and Investment Policies

Given the cross-border and data-intensive nature of AI, enabling trade and investment frameworks will be essential for the development, deployment, and governance of the technology. The UK must connect its longstanding trade principles to the lawful and free flow of data, regulatory interoperability, least-trade-restrictive regulation and non-discrimination to new trade principles, such as responsible and ethical standards governing the use of AI and emerging technologies across jurisdictions. Moving away from open digital trade norms could result in sharp fragmentation between different national AI models, while damaging the ability of countries to cooperate on the development of resilient and interoperable AI systems.

Data flows enable partners to work together to ensure AI systems are trained on demographically and geographically diverse datasets, helping mitigate potential bias and making models and applications useful to users around the world.

Policy recommendation:
Maintain the UK's commitment to cross-border data flows. The UK should uphold and renew the UK-EU data adequacy decision and maintain its associate status in the Global Cross Border Privacy Rules system to ensure seamless data flows to advance R&D partnerships and innovations, while working with the US and other allies to progress data flow commitments at the G7 and in trade fora. Importantly, we would like to see progress made on data flow commitments in the WTO Joint Initiative on E-commerce.

In addition to driving international alignment on AI safety and security, the UK should also seek to use its leadership to adopt an affirmative strategy and promote development and deployment of AI with key foreign partners. This work should seek to address some of the biggest challenges and opportunities around AI, including: building up infrastructure and research capacity; ensuring access to AI skills and training; encouraging AI adoption by small businesses and traditional industries; and leveraging AI to make progress on the UN's sustainable development goals (eg, flood forecasting, earthquake alerts, and food security).

This initiative would ensure that countries at all levels of development are working together to achieve major public objectives around health, scientific research, climate, cybersecurity, and economic growth.

Policy recommendation:
Advance an AI Opportunity Alliance. This could take the form of an AI Opportunity Summit or Dialogue, or a new AI Opportunity Alliance. One initial partner for this alliance would be the US, which recently outlined its digital solidarity strategy[39] focused on building AI with allies while combating "digital sovereignty and protectionism."

05 Empowering Workers: Developing a Thoughtful AI Workforce Strategy

Like other general-purpose technologies, such as the steam engine or electrification, AI presents immense opportunities to catapult economies forward through increased productivity and economic activity. The potential economic transformation from AI tools will present unique challenges requiring unique solutions, when compared to prior waves of technology.

We believe the UK can harness AI so that it empowers workers, helps them become more productive and makes their skills more valuable, while also mitigating impacts on workforces through partnerships between governments, industry, trade unions and civil society.

While the UK's public awareness of AI has increased over the years – 72% of adults now possess a partial understanding of AI[40] – having a basic awareness of the technology is far from enough for UK workers to confidently use AI in the workplace. Research conducted by Hays[41] shows that more than half of employees (51%) believe that they do not have the right skills to do so. This risks exacerbating a pre-existing digital skills gap in the UK workforce: a report by FutureDotNow[42] found that more than half of workers feel unable to do the full list of (non AI) digital tasks that are essential for work (like sending emails and using online collaboration tools).

The UK needs to take a collaborative approach and deploy a comprehensive, thoughtful workforce strategy that considers a wide range of perspectives. This will require a shared vision and a shared responsibility to ensure that AI democratises access to skills and expertise and creates a ladder of opportunity for workers from all backgrounds and everywhere in the UK.

- **Industry** has a critical role to play in developing new skilling programmes that focus on AI preparedness. Given the transformative impact of AI across all sectors of the economy, individual company efforts should be bolstered by a joined up approach bringing together employees, industry and government to ensure workers in all industries are ready to harness AI.

- **Trade unions, civil society, foundations and academics** can play an important role in developing new research to understand what has and hasn't worked in the past in terms of workers utilising new technologies, and then work with industry and Government to ensure lower-wage workers or underserved communities are at the centre of empowered adoption of AI.

- Most importantly, **policymakers** must help scale up AI training programmes so that they reach all communities, including those from traditionally underserved communities. We need to help workers of all backgrounds learn to use AI effectively.

Enriching and Empowering Career Growth with New Skills

AI is already helping democratise access[43] to valuable skills and expertise such as coding, language and business writing skills, and promises to empower more people with skill sets that could help them get high-value jobs, more competitive pay and better working conditions. The use of AI tutors and coding assistants could make it easier for everyone to upgrade their digital skills, boosting UK productivity by over £4.8 billion a year[44]. AI can help a broad range of people — from nurses to knowledge workers, teachers or people in the trades — to increase their capabilities, get more done with their resources, build deeper knowledge and expertise, and prepare them for future-focused jobs.

AI could also enhance new assistive technologies, which could help over one million people with disabilities at work, boosting the economy by over £30 billion per year. It could help to uplift the UK's employment rate and offer opportunities for workers to explore new opportunities in the workplace.

It is not necessarily inevitable that all workers will realise the economic benefits from new technologies. We are still in the process of understanding the new skills that AI-supported work will require. We know some things already, such as the importance of workers having basic AI literacy, and how eminently human talents - like critical thinking, cross-disciplinary problem-solving, effective collaboration, and empathy - are likely to increase in value.

But there are other open questions about AI's impact on work that will need further study, such as how AI can best be used to support re-skilling, and how to minimise the risk of "skill atrophy" as routine tasks, which previously provided training opportunities for novice employees, are increasingly automated.

Google Digital Garage and AI-focused New Fundamentals

Google has been running the Google Digital Garage since 2015 and has trained one million people in the UK, online and in person, for free. Google now offers a combination of online and in-person free digital skills training to help people gain in-demand digital skills in growing career areas of IT support, project management, UX design, data analytics and digital marketing & e-Commerce. All are designed to meet the needs of individuals and businesses looking to increase their opportunity and productivity.

Our internal research found that 78% of respondents reported Google Career Certificates as having a positive impact on their career. And our training was of benefit to lower earners - 69.4% of 'career certificates' take-up were in the lower wage band of up to £24,000.

We continue to update our offer to meet with the changing needs of people, small businesses and the wider economy. Last year, we launched our newest training series, the AI-focused New Fundamentals[45], to help people and businesses across the UK learn foundational AI-related skills. Google has designed 10 modules, which can be taken flexibly depending on need and interest. The modules cover topics such as how to improve productivity with AI, or where and when to apply machine learning in business.

We've already trained 7,000+ workers and businesses on AI through this new training via webinars and in person events. For the first people that took part in this training, nearly half said that their motivation was to develop their own skills and around 20% were small businesses.

We have also recently launched a new Google Career Certificate[46] course for those looking to enhance their skills further and certify their accomplishments in a way that is recognised by several companies. AI Essentials[47] is a self-paced course created by AI experts at Google, and is designed to help people across roles and industries with no prior AI experience get essential AI skills to boost their productivity. Composed of 5 modules, the course is short and accessible. In under 10 hours, it gives learners guidance on how to use AI tools in their day-to-day work, including how to write effective prompts, and on how to use AI responsibly by identifying AI's potential biases and avoiding harm.

Understanding how to help Brits make AI work for them

We recently launched AI Works to help Brits make AI work for them. This research project, with insight from government leaders, economists, and think tanks, will seek to understand and provide recommendations on how to build an AI-empowered workforce and to prepare all workers for the new opportunities created by AI.

Our first-of-its-kind initiative will see Google work with Community Union, Enterprise Nation and their network of small businesses including Grind Coffee, as well as multi-academy trusts Academies Enterprise Trust and Leo Academy Trust, to shape and test different approaches involving almost 1,500 people. It will aim to encourage more Brits to get working with AI.

Throughout these pilots, Google will identify ways to empower groups who may have higher barriers to adopting AI. Additional research from Public First reveals the early signs of an AI uptake gap. Women, older generations and those with less formal education are less likely to use generative AI tools at work, regardless of their roles. Closing this divide is crucial to enabling everyone to benefit from the opportunities created by this fast-evolving technology.

Policy recommendation:
Policymakers should encourage the private sector, government and civil society to establish best practices for in-house AI training and support programmes to give workers hands-on experience in applying AI to solve new tasks on the job, and to create programmes that reflect the full spectrum of skills needed for an AI-supported future.

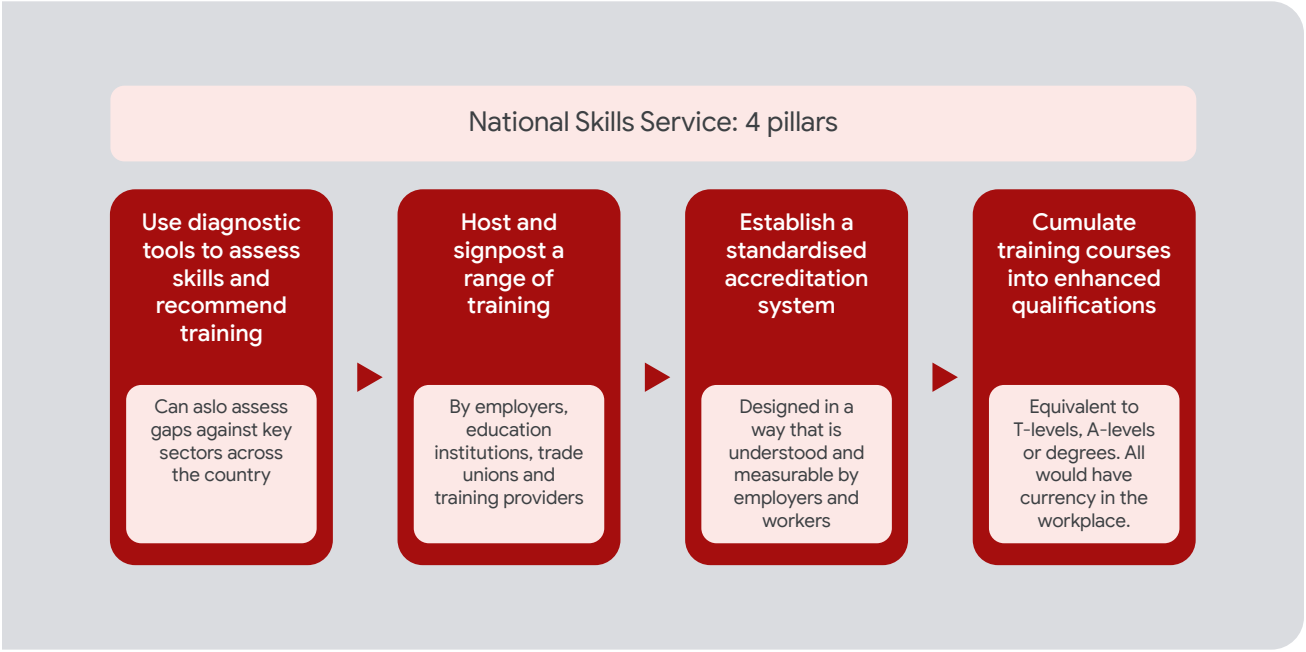
To deliver these new skills and build a thriving, AI literate workforce, it is imperative that we collaborate to ensure new opportunities for skill advancement and career development. This must extend beyond the secondary education system – AI requires a lifelong approach to education that equips all students and workers with foundational AI skills, treating it as a core component of professional development systems. This includes building out broader and more fundamental competencies through short conversion courses, accreditation, and a flexible use of the apprenticeship levy.

We are therefore glad to see the establishment of Skills England, the new arms-length body, that will adopt the functions of existing skills bodies and have a broader remit to consider the demand for skills in the economy. Skills England will bring together government, trade unions, training providers, and businesses to determine the demand for skills and allocate funding, including the training for which the new Growth and Skills levy will be accessible.

Nonetheless, there are additional important steps that UK policymakers could consider to build an inclusive AI-empowered workforce, including:

Policy recommendation:
Create a National Skills Service (NSS), which offers a new platform and accreditation system of lifelong learning for UK employers and workers. This could be a key component of Skills England's work.

Many courses would be offered free as they are now, for example via Google Digital Garage, with additional paid for courses, either available through individual payment or redeploying some of the Growth and Skills levy.



06 Promoting Widespread Adoption and Universal Access to AI

In addition to building AI infrastructure and developing a thoughtful workforce strategy, we ultimately need to ensure that AI is applied and deployed in a universally accessible and useful way. We must harness AI to help solve real world problems and for public good – in government buildings, schools and hospitals. The biggest impact of technology is often felt in those countries where technology is deployed widely across the society and sectors.

To do so, the UK should remain focused on two key goals:

- Adopt AI to make people's lives easier and better address major public priorities. This should include thorough assessments of the biggest opportunities and most significant barriers to adoption. The scale of government deployment and investment can ultimately help catalyse a domestic AI ecosystem.

- Ensure that small businesses and traditional industries are able to adopt AI applications. Policymakers and AI developers must work together to develop outreach strategies to traditional industries and small businesses – who have much to gain from AI adoption in terms of their competitive posture if they are quick to harness and deploy AI.

Governmental Adoption of AI

The UK can leverage AI to transform the delivery of public services to citizens, enhancing accessibility and personalisation of services. AI-enabled public services will help familiarise people with the underlying technologies, building trust that AI can be used in helpful ways. It is clear that UK policymakers and politicians are aware of AI's potential to maximise its benefits for civil servants and government organisations. We have been encouraged by the new Government's action to create the conditions for successful AI-enabled digital services and digital adoption across the economy and public sector – to making the Department for Science, Innovation and Technology the new digital centre of government, to establishing the i.AI[48] to help departments realise the opportunities AI creates for digital transformation. However, progress must not stop here.

Google Health's collaborative research[49] with the NHS Confederation illustrates that emerging technologies like AI will transform the future of care. People want to use technology to interact with the health system, to access health information and to keep themselves well; but they lack the confidence and the tools to do so. To clear these barriers, the UK should promote the uptake of AI in these sectors, and adopt transparent procurement rules and consistent standards and guidelines to encourage innovation.

Cloud computing is also a major enabler[50] of AI adoption for governments and industries. Governments should consider how to use its own data combined with computing power to find ways to drive efficiency savings and improve service delivery.

Early screening for Diabetes: Google Health and the University of Sheffield will pilot a feasibility study called PUMAS[51] — Phones for Undetected Diabetes Mellitus And Hypertension Screening. This first-of-its-kind research will assess whether, in the future, these signals could provide a reliable, non-invasive alternative to current screening methods, facilitating early disease detection and freeing up valuable NHS resources. The opportunity here is huge: optimal treatment for everyone known to have high blood pressure could avert up to 9,710 heart attacks and 14,500 strokes, saving the NHS up to £274 million.

Assisting radiologists amid labour shortage: Through the NHS AI Award[52], Google is also working with Imperial College London and three NHS trusts[53] to understand whether the research model can act as a "second independent reader" in UK double read screening systems and allow radiologists to focus on high priority cases while improving consistency and quality of screening for diseases such as Breast Cancer.

Google DeepMind and Google Health have been collaborating with Moorfields Eye Hospital for almost a decade, building AI algorithms, powered by Google Cloud[54], that can diagnose sight-threatening conditions including diabetic retinopathy and macular degeneration. Google has licensed the technology to Moorfields, and the latter is now in the process of commercialising the product for the benefit of UK citizens and the NHS.

The Office for National Statistics 2021 Census: In 2021, we helped the ONS to rapidly and efficiently deliver the first truly digital census, which was scaled across over 25 million households in England and Wales in the span of six weeks. The use of cloud architecture allowed nearly half a million census submissions to be made per hour at peak without any disruptions. This shows that large government digital services can be securely delivered in-house using cloud architecture and agile development.

The Department for Transport's Data Centre Transformation programme: We have supported the DfT to migrate a large portion of their applications onto the cloud. This has helped the department to use data to better support decision making, policy-making, reporting and governance, as well as provide new digital services to engage with citizens on transport related initiatives.

By continuing to drive progress to adopt AI, the UK Government can model a forward-looking approach for our domestic technology sector, and help other sectors understand the importance of AI. The UK Government can use its purchasing power to encourage responsible innovation and adoption in the broader economy and to set public procurement standards. AI productivity is an increasingly important public spending priority[55]. The Government can help set clear use cases for the wider economy by showcasing its own deployment in a set of transferable domains: AI-enhanced search tools; customer service AI; or AI-powered document summary tools.

The UK could benefit from a systematic review of the opportunities to scale up, and public investment to show progress on AI-enabled solutions, which will also help to build public confidence in the use of AI. As the government, industry, and civil society identify new areas of AI opportunity, they should work together to plan and execute implementation of AI adoption programmes in these sectors, and monitor the performance of AI-augmented services to make continuous improvements.

Policy recommendation:
The UK Government should conduct AI adoption assessments as part of its commitments to use AI in public services, particularly in sectors such as health, education, transportation, and other services that most immediately impact people's lives. As part of this, government agencies should identify barriers to the deployment of AI in key sectors and industries such as the health and social care industry.

Policy recommendation:
Empower and upskill procurement teams on the importance of AI adoption. Procurement roadblocks are often one of the most significant challenges that governments and industries face when it comes to adopting new technologies like AI. It is crucial that procurement teams understand the opportunities from AI, adopt an AI-first approach, and have the necessary skills to leverage AI's potential.

Policy recommendation:
Finally, governments can work with industry to leverage cloud computing to ensure the efficiency of these services and the security of their AI systems.

Helping Businesses Small or Large Use AI

Whatever the industry, the same two imperatives exist: to drive top line revenue for their businesses either via new and existing customers or developing new routes to market; and improving the bottom line through improved productivity. AI can help with both. Research from Public First[56] found that AI could add a staggering £400 billion to the UK economy by 2030 – the equivalent of 2.6% annualised GDP growth. For the average worker, implementing AI tools could save over 100 hours a year – freeing up two full work weeks.

While the UK ranks third[57] globally in 'AI readiness' behind just the US and China, KPMG's 2023 global research AI study[58] reported that only 20% of UK respondents report the use of AI in their employing organisation, meaning the UK ranks second last and behind emerging economies such as China, India and Brazil. Similarly, another YouGov[59] survey on AI's impact on productivity highlights that workers in European countries, including the UK, are far more pessimistic about AI's benefits in the workplace, compared to those in India, Indonesia, UAE and Mexico.

One factor of these findings is that UK SMEs and traditional industries lack training resources and expertise in technological innovations[60] and have too often lagged behind their peers in adoption of innovative technologies. UK policymakers and AI developers must work together to develop coordinated and thoughtful outreach strategies to traditional industries and small businesses – who have much to gain from AI adoption in terms of their competitive posture if they are quick to harness and deploy AI. Adopting AI may not be the first priority for small business owners or industries that are accustomed to taking a "wait-and-see" approach to new technologies.

To address this gap, UK policymakers must continue to explore ways to ensure that industries have trust in AI uses, understand its benefits, and encourage AI adoption and diffusion.

Policy recommendation:
Target and promote AI training resources towards small businesses and traditional industries via collaboration with the private and third sector, to advance the skills agenda set out in the 2022 UK Digital Strategy[61]. Give small businesses a "digital jumpstart" through new models of technical assistance and engagement, including digital coaches who can help businesses understand and leverage AI to capitalise on new opportunities. The UKRI's Hartree Centre SME hubs[62] in partnership with Cardiff University, Newcastle University and Ulster University, is a key initiative that illustrates how this could be done.

Policy recommendation:
Stimulate the development and adoption of AI technologies in high-potential, lower-AI-maturity sectors: Having identified industries with low adoption rates such as real estate, hospitality, retail and health in the Office of AI 2022 report[63], the UK Government needs to work with UKRI and these sectors on "proof of concept" initiatives to model effective AI deployment.

How we're helping others adopt AI and realise its benefits

- **Boosting retail & customer service agents' productivity:** Customer service agents are key to ensuring better and more profitable consumer experiences; retailers are looking at how they can reinvent their customer contact centres. We are helping to transform how customer service agents operate by providing a Google AI assistant by their side through live customer phone calls, retrieving information, monitoring sentiment and making sales suggestions. For example, loveholidays has used Google Cloud's Contact Centre AI to help increase their contacts from 1,000 to up to 3,000 per day[64].

- **Facilitating community and social care:** Google.org's Social Innovation Fund on AI[65] aims to allocate £1 million worth of funding to UK-based social entrepreneurs that are driving forward projects that use AI to help their communities. The selected social entrepreneurs will receive cash grants, mentoring, as well as acceleration support from Google for Startups Accelerator teams to help ensure that their innovative ideas are given the opportunity to drive meaningful change.

- **Driving growth in digital advertising:** AI can prove transformational in advertising too, helping marketers grow their businesses and ensure that money spent on advertising generates the value that customers expect. Google's Performance Max (PMax) product[66] uses AI to find new customers across all of Google's channels and inventory and help businesses to optimise their spending. Regus, the flexible workspace provider, implemented PMax to find new leads - they were able to drive 40% more conversions at the same cost per acquisition.

- **Transforming cultural experiences:** AI can be the growth engine for the creative sectors. But it will not replace the need for human creativity. It will allow us to imagine and create what could not have been achieved before now. Working with partners like the University of Oxford and the British Museum, we are using AI and machine learning to restore and attribute ancient texts, create virtual tours to ancient heritage sites and broaden access to arts and culture for UK citizens[67].

07 Towards an AI Future

As the UK seeks to unlock the potential of AI to establish itself as a global science and technology world leader, and to help everyone benefit from AI's economic and societal opportunities, policymakers have a critical role to play in developing AI policy frameworks that emphasise that innovation and opportunity and safety and security can and must go hand in hand.

As an industry leader, Google shares the UK's vision and responsibilities and we look forward to partnering with the UK Government, industries, and civil societies to build an AI-supported future that benefits everyone.

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