ai@cam

ai.cam.ac.uk

Policy brief: Refreshing the UK's strategic approach to AI

December 2024

In partnership with:

MINDEROO CENTRE FOR TECHNOLOGY & DEMOCRACY

Bennett Institute for Public Policy Cambridge

Foreword

AI is at risk of following a well-worn path that results in technological innovations that fail to address real-world challenges. We have almost a decade of evidence showing what people want from AI. Public dialogues consistently call for AI technologies that tackle the challenges that affect our shared health, wellbeing, and prosperity, that help strengthen our communities and our personal interactions, and that support democratic governance. The last ten years have brought impressive technical advances in AI and intense policy activity. However, neither technology or policy development have been well connected to social need.

The AI Opportunities Action Plan has the potential to address the gap between technology and widespread public benefit, not only in what policy actions it recommends, but in how those recommendations are taken forward. This report starts a discussion about how to bridge between the UK's high-level policy ambitions for AI and the development and implementation of technologies and policy frameworks that can deliver on those ambitions.

The next phase of AI policy will need to consider how to centre public interests in AI development, how to strengthen governance frameworks that steward AI development towards shared public benefit, how to build a public infrastructure for innovation, and how to grow the UK's domestic AI base in a way that delivers real benefits for citizens. This report introduces the broad range of levers that government could consider as part of its policy agenda for AI. In many of these areas there is an existing evidence base about 'what works' in technology and policy that Government can draw from. Future work by ai@cam will consider these areas for action further.

Across these areas, the report highlights a need to focus on the practical barriers to delivering AI-enabled solutions to real-world challenges as part of policy design and implementation. The UK has strategic strengths in research and human capital. These strengths could be deployed to bridge the gaps between research and practice that affect how, where, and for whose benefit AI innovations develop. The call in this document is for innovative approaches to open policy development that embed stakeholder engagement across the policy lifecycle. By supporting those on the frontlines of innovating with AI to deliver public benefit, the UK can generate a productivity flywheel that scales AI innovation while closing the gap between technological progress and real-world benefit.

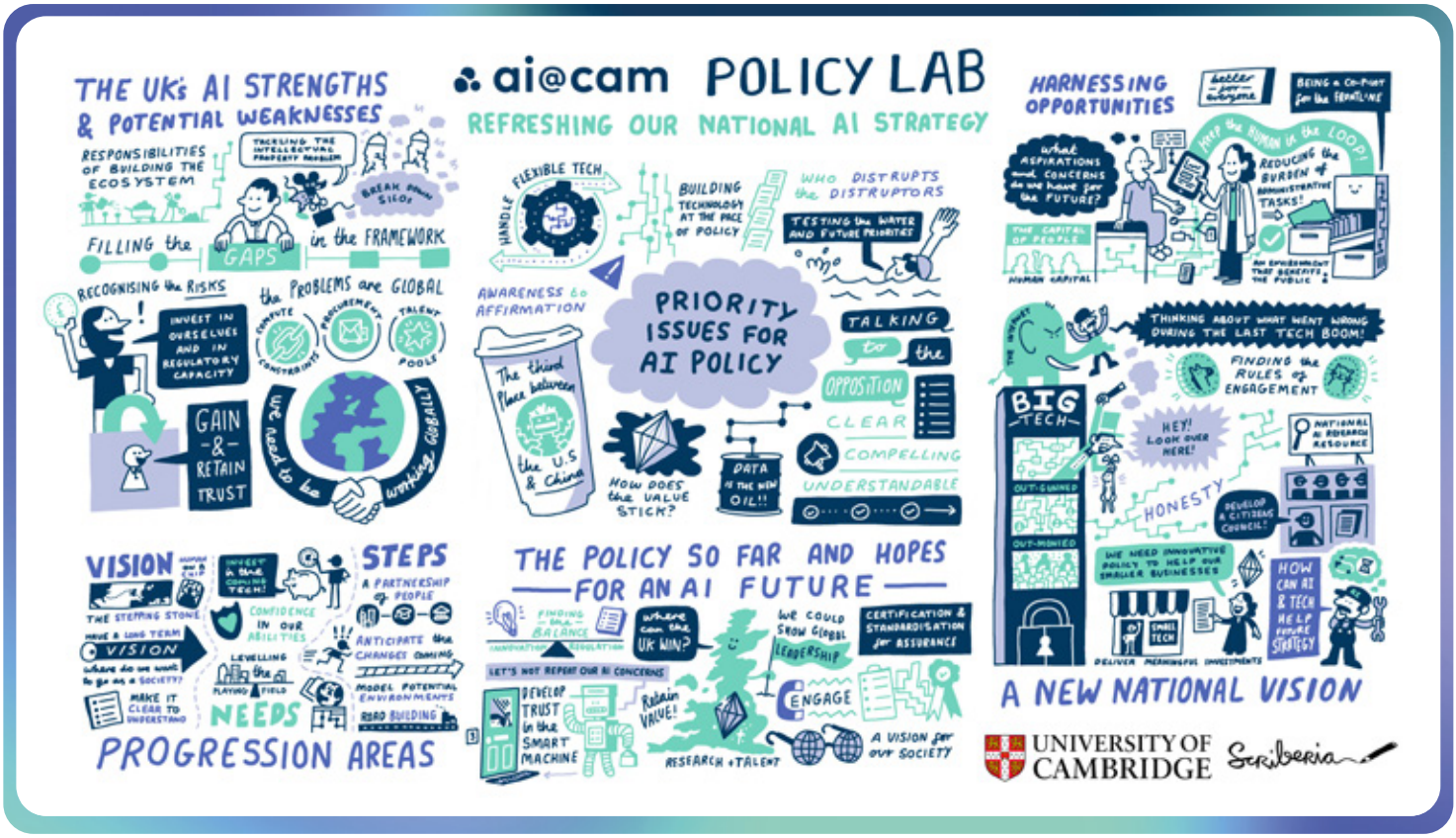
Jessica Montgomery, Director, ai@cam, University of Cambridge

Neil Lawrence, DeepMind Professor of Machine Learning, University of Cambridge

Diane Coyle,
Bennett Professor of Public Policy, University of Cambridge

Gina Neff, Professor of Responsible AI, Queen Mary University of London, Executive Director of the Minderoo Centre for Technology & Democracy, University of Cambridge, and Deputy CEO, Responsible AI UK

Summary



AI technologies and policy development are not addressing social needs in the way they should. The result is a growing gap between AI's technical capabilities and our ability to deploy these capabilities to deliver public benefit. Policy development to increase the 'supply' of innovative AI technologies is important, but needs to be complemented by interventions centred on areas of 'demand'. Policy implementation needs to connect the two.

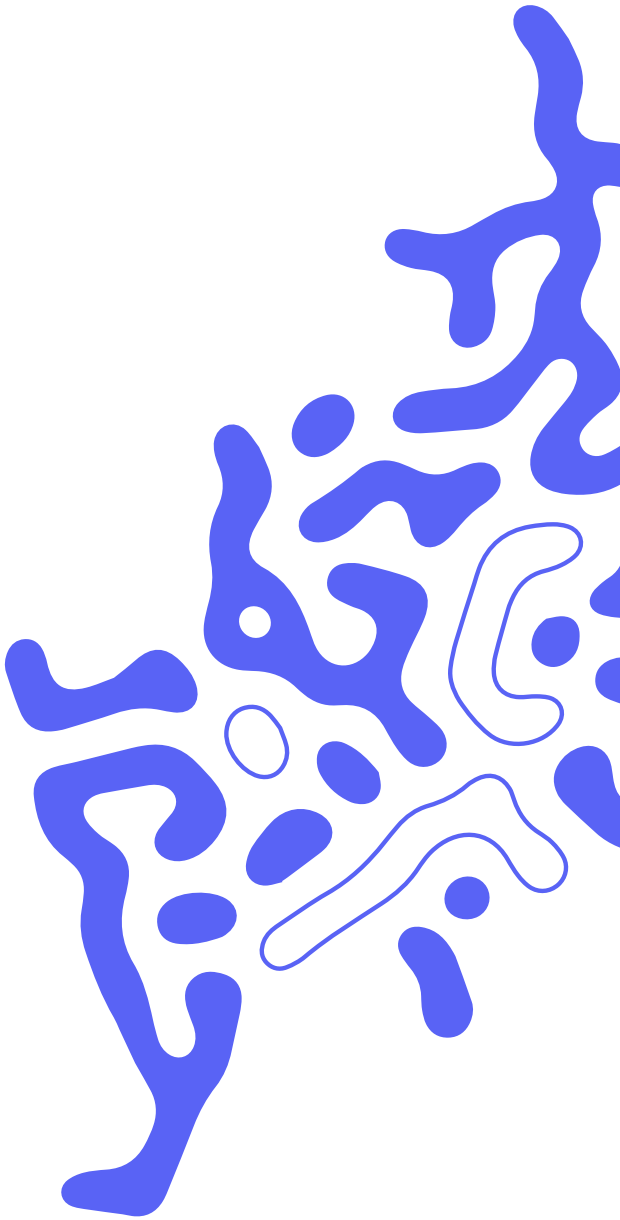
In its response to the AI Opportunities Action Plan, the UK has scope to refresh its national approach to AI. As discussions about that Action Plan continue, this policy brief starts by taking stock of where further action could help create a world-leading UK AI ecosystem. The next phase of AI policy development could provide an opportunity to:

- **Connect to public interests and concerns:** We benefit from having almost a decade of evidence about people's aspirations and concerns about the development of AI. This evidence base shows a demand for innovative solutions to the challenges that affect our health, wellbeing, and shared prosperity. It also shows a growing concern about the need for effective regulation and governance to support democratic oversight of technology development and ensure AI's benefits are shared across society. In response, we need to do more to connect public voices to AI R&D, and to rally efforts to drive progress in AI in areas of need.
- **Build regulatory capacity for innovation:** Regulation can be an enabler of AI innovation, giving innovators predictable frameworks to develop new AI applications and publics the confidence that those innovations are trustworthy. A lack of understanding of the gaps in current regulatory frameworks, or the overlaps between different regulatory remits, risks holding back research and investment. A gaps and overlaps analysis would be a starting point to giving clearer advice to innovators about the regulatory frameworks that apply to their work, and to helping regulators build capacity in areas of need.
- **Design our public innovation infrastructure to tackle real-world problems:** Investments in High Performance Compute (HPC) Facilities and policy initiatives such as the National Data Library offer a route to building a public infrastructure for AI innovation. Access to HPC could accelerate progress in AI, if these facilities can be made accessible to researchers working across diverse application areas and connected to secure data environments that respect concerns about data confidentiality, security, and intellectual property. The National Data Library could provide a focal point to unblock access to strategically important datasets, if its design is rooted in an understanding of the barriers to data access and aligned with public expectations around trustworthy data use. Delivering impact from these initiatives will require further effort to connect policymakers to the practical challenges associated with AI R&D.
- **Grow the domestic base:** A cluster of forthcoming policy initiatives are expected to focus on the challenge of building the UK's AI capabilities. In developing new policy agendas on support for business, skills and talent, and research funding or mission-led innovation, Government has an opportunity to work collaboratively with the AI R&D community to both build on established evidence bases and learn from on-the-

ground experiences of AI innovation. For example, one area of growing interest is the use of AI in public services. Previous efforts to promote technology adoption in the public sector show how top-down initiatives fail. When thinking about the role of AI in the public sector, Government today has an opportunity to work differently, focusing instead on service users and people working on the frontline of delivery.

No matter what path or priority is chosen, success will require a shift in how policy is implemented, so that interventions unblock the practical barriers to innovating with AI for societal benefit. Almost a decade of intense policy interest in AI has struggled to connect technology to widespread social and economic benefit. The next phase of policy development needs to grapple with the challenge of translating high-level policy ambitions into practical action that delivers those benefits.

The UK has strategic advantages in research, in the human capital to innovate with AI, and in regulatory institutions that can steward AI innovation. There already exists a wealth of evidence that Government can draw from in developing practical policy interventions in AI. There are also world-leading communities of research and practice in the UK that can be engaged to develop innovative policy solutions in areas of need. Government now needs mechanisms to engage this evidence and research base to drive progress through a new wave of open policy innovation.



Contents

Introduction

The UK Government's 2017 AI Review[1] was in the first wave globally of national government strategies for AI.[2] Since publication of that review, there have been other policy statements aiming to build the UK's AI capabilities. The AI Sector Deal[3] and National AI Strategy[4] set out frameworks to create an enabling environment for AI. The AI Regulation White Paper considered regulatory strategies to balance innovation and safety.[5] New legislation has provided data rights for citizens and powers for regulators.[6] In the past year, investments in safety research started an international conversation about the capabilities of frontier AI models.[7] Upcoming legislation is expected to bring new changes to the governance of data sharing in the private and public sectors.[8]

Over this period, technological and political changes have shifted the opportunities and risks associated with AI, with implications for the policies required to steward its development. Progress in generative AI has delivered systems that feel more accessible to a wider range of users. In the hype surrounding the launch of these new AI products, the hope has been they herald a new wave of implementation. Whether the huge investments being made in generative AI translate into economic benefit, however, remains a point of debate.[9] Experiences of AI over the last ten years demonstrate the difficulties of bridging the gap between technology development and real-world deployment.[10] The political landscape surrounding AI has also changed. Internationally, at least 34 countries now have national AI strategies,[11] AI features regularly on the agenda of meetings of G7 and G20 leaders, and there are new calls for global governance frameworks.[12]

Despite these advances in technology, policy, and practice, there remains a persistent gap between AI's technical capabilities and the ability to leverage these capabilities for widespread social and economic benefit. At a time when the UK is grappling with pressing social challenges – from increased demand for health and social care, to widening inequalities in educational outcomes for students from different backgrounds, to the cost-of-living crisis affecting everyday life for many families, and more – there is a pressing need for innovative interventions that enable economic growth and improve people's wellbeing. To date, AI has played little role in helping tackle any of the complex problems facing many societies.[13]

How AI progresses will be shaped by social, political, and economic forces – institutions, people, cultures – that influence who develops these technologies, for what purpose, and for whose benefit. Autumn 2024's AI Opportunities Action Plan[14] is expected to bring with it a new wave of policy development and implementation. The opportunity for this next wave of AI policy activity is to recentre societal interests and needs. Both 'what' and 'how' matter. This brief considers the policy levers that can help Government connect AI development to social and economic benefit, including collaborative development of a national vision for AI, action to build an infrastructure for public innovation, and support to grow the domestic AI base. Across these areas, it calls for further action to bridge between technology, policy, and social need, so that any new interventions tackle the practical barriers to delivering widespread public benefit from AI.

Developing a vision for AI

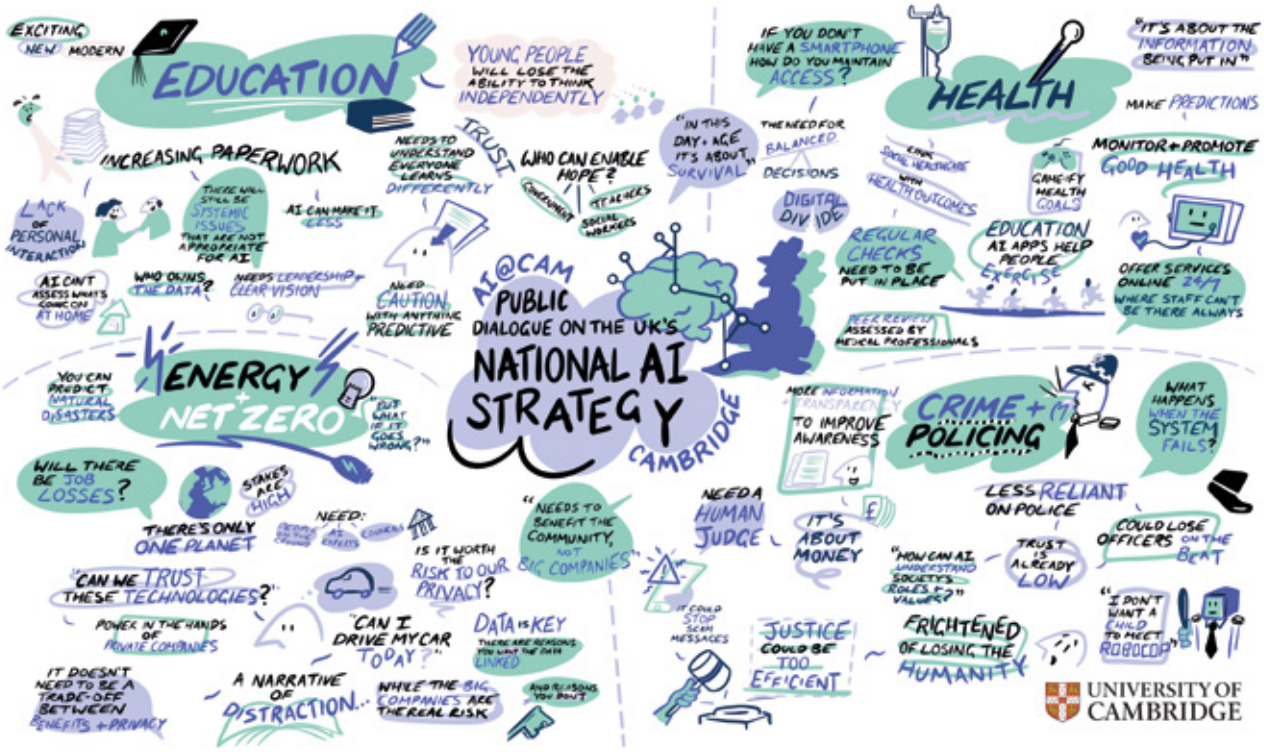


Figure 1: Graphic illustration of public dialogue on AI and the Missions for Government in Cambridge (September 2024)

The UK benefits from a world-leading research base that provides an engine for AI innovation and talent, from established legal systems and regulatory institutions, and from strengths in industries with high potential for AI adoption. These bolster the UK's international competitiveness in AI. For example, research, talent, and operating environment were identified as UK strengths in the Global AI Index 2024.[15]

These strengths could underpin a range of future pathways for AI in the UK, including:

- **Innovation:** the UK as a science superpower that leads the way in AI innovation and its use to accelerate scientific discovery.
- **Commercial development:** the UK as a hub for growing commercial AI systems or applications, linked to an industrial strategy that drives domestic development and growth in this sector.
- **Assurance:** the UK as a world-leader in the development of policies, frameworks, and tools for AI safety and assurance, securing market leadership in an emerging sector.
- **Diffusion:** the UK as an engine for AI diffusion, with AI tools adopted across sectors to increase productivity and translate AI innovation into real-world benefits for all in society.

As the UK Government considers its approach to AI, there is an opportunity to refresh our national vision for these technologies. A starting point for creating a vision for AI that benefits science, citizens, and society is understanding public views on how AI could deliver public benefit.

To help understand public views on the use of AI in public services – and the role of AI in delivering priority policy agendas in the next parliament – in September 2024, ai@cam convened public dialogues on AI and the Missions for Government. In collaboration with Hopkins van Mil and the Kavli Centre for Ethics, Science, and the Public, dialogue sessions in Liverpool and Cambridge asked participants about their aspirations and concerns for the use of AI in health, education, energy and net zero, and crime and policing.[16]

Participants expressed hope that AI could improve the efficiency and effectiveness of public services; that it could reduce administrative burdens on frontline workers and increase the time available for public servants to interact with service users, delivering positive, personalised experiences (Figure 1). They hoped AI could become a 'co-pilot' for human decision-makers, giving them access to insights from data that could help tailor advice and services. They also called for checks-and-balances to ensure that AI delivers beneficial outcomes. These included:

- Ensuring that AI did not reduce human interaction or depersonalise public services; that there is always a human-in-the-loop, who has the skills to intervene and who is empowered to use AI as a decision-support system.
- Establishing clear structures for accountability around the use of AI, including mechanisms to increase transparency around AI use, to allow challenge to its use, and to enable redress if things go wrong.
- Making sure AI systems are safe, secure, and protect the privacy of personal data used during development.

- Developing AI interventions in collaboration with users, giving affected communities a voice in AI development and designing AI to be accessible for all in society.
- Taking action to address power asymmetries surrounding the development and use of AI, through legal and regulatory safeguards that give independent bodies the power to govern the use of AI in different sectors, that act as a counterbalance to the dominance of technology companies in this area, and that ensure public benefit is prioritised over private profit.

These findings echo previous public dialogues exploring the application and governance of data and AI (Box 1). Despite these consistent messages, advances in AI consistently fail to deliver on these priorities, either in terms of progress towards the application of AI in areas of need or in their governance. If this disconnect is allowed to persist over the long-term, it creates a risk of widespread loss of confidence in AI, and in those institutions tasked with its governance.

Box 1: Insights from public dialogues about data and AI

Public views rarely mirror the binary framings – innovation versus regulation, for example, or international AI 'arms races'[17] – that have caricatured recent policy debates about AI. Dialogues consistently show that publics can see benefits from progress in AI, particularly in areas like health and science, and believe it is important to have guardrails in place to help bring those benefits into being. Context matters in determining the nature of the benefits and risks that people associate with AI.[18] "Who benefits?" is consistently raised as a question or concern when evaluating the use of AI in a particular area. This question is connected to an underpinning scepticism about AI – with some suggestions that this scepticism is turning into pessimism – that arises from concerns about:

- Whether it will be possible to deliver the infrastructure or resources to support the use of AI in areas where there is potential for public benefit;[19]
- The power of 'big tech' in shaping technology development, application, and regulation;[20] and
- The equitable distribution of the benefits arising from AI, or the likelihood of these technologies benefitting only 'the few'.[21]

Positive visions for AI propose scenarios where AI is deployed in the service of society; where AI helps people live healthier lives, increases shared prosperity, and enhances human connections. In these visions, AI is deployed to accelerate innovations that tackle wicked problems in health, sustainability, social inequality, and elsewhere. It becomes a tool that supports public sector workers to increase the efficiency, effectiveness, and accessibility of public services. It is deployed as an enabler of human activities, providing a decision-support tool that can enhance the objectivity and accuracy of decision-making.[22]

To deliver this future, public dialogues highlight a range of cross-cutting concerns that must be addressed in AI development and implementation. These include:

- **Security and privacy:** Dialogue participants express a variety of concerns associated with the use of data in AI, and its impact on their personal privacy and security. These include concerns about the level of security surrounding data management, whether data could be stolen or leaked, and the possibility of their personal data being sold to private companies without their consent.[23]
- **Impact on employment:** Fears of job losses from AI-enabled automation are a strong feature of most public dialogue exercises. People can already see how AI might affect their work and can imagine futures where advances in AI contribute to widespread economic disruption.[24]
- **Depersonalisation:** While people generally recognise the potential of AI to support decision-making, they express concern that it might become a replacement for human judgement. Dialogue participants consistently highlight a risk that AI could be used to replace human decision-makers – either through automation or through an over-reliance on technology – leading to a depersonalisation of people's interactions with private or public sector organisations. They warn that, no matter how much data it can draw from, AI cannot replace the empathy or understanding required to make decisions about people, particularly for vulnerable people or in contexts where decisions have a significant personal impact.[25]
- **Control and autonomy:** Connected to these concerns about replacement of human judgement are questions about how people can maintain their autonomy as AI-enabled automated decision-making systems are more widely adopted.[26]
- **Transparency and accountability:** Greater transparency and information about the development of AI is seen as a necessary countermeasure to help avoid a loss of individual autonomy in the use of AI. Dialogues show that people wish to have choices about whether or how they engage with AI, enabled by the provision of information, opt outs, or upstream decisions about how AI is used.[27]

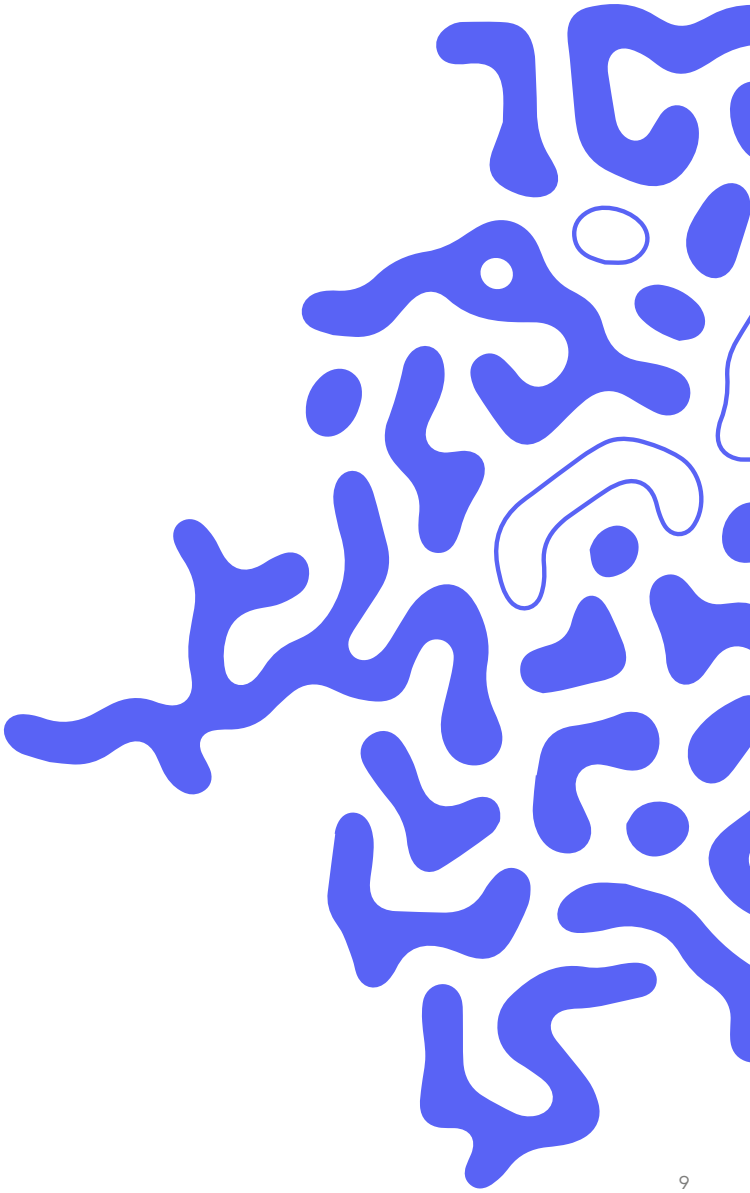
To help avoid these concerns, there is a demand for independent regulation that centres public benefit in AI development. There is little trust in the private sector to work in the public interest;[28] governments and independent organisations are seen as playing important roles in creating the guardrails that can hold technology developers to account.[29]

Underneath these aspirations and concerns, public dialogues suggest a wariness that AI might undermine the things that we – as individuals or society – hold dear. For example, conversations about autonomous vehicles connect to people's sense of freedom around being 'on the road';[30] discussions about data use in digital identity systems relate

to a desire for self-definition;[31] and debates about the use of AI in art surface the value placed on creativity and self-expression as a shared human pursuit.[32] Protecting – or enhancing – these human experiences is central to conversations about the role of AI in society, and the checks-and-balances required to deliver beneficial outcomes from AI.

In R&D communities, there is growing appreciation for the importance of public participation in ensuring AI systems are designed to reflect social priorities, helping identify potential harms in deployment, and increasing the perceived legitimacy of AI-enabled interventions. However, a range of barriers to bringing public and civil society voices to AI R&D persist. These include the resource intensity of convening dialogues, misalignment between the timescales for R&D and public deliberations, and the challenges associated with translating insights from dialogue into action. For such dialogue to be meaningful, it needs to take place early enough in the development pipeline to shape AI system design or implementation and in a way that brings diverse voices to the table.

Previous dialogues have delivered valuable insights about the desired trajectory for policy and technology development in AI. Their impact has been hindered by the absence of a mechanism for sustained engagement that connects to AI R&D or the development of policy frameworks. Longer-term Citizens Assemblies offer a potential route to fill this gap by providing a forum for continuing engagement, but need to be supported by mechanisms to bridge into the practices of research and policy. This type of sustained, meaningful engagement could provide a starting point for developing a shared vision for AI in the UK, and for articulating priority areas where AI could help create social and economic benefit. It could help bridge the gap between technological progress and public benefit, by bringing back into focus the opportunities for AI to deliver public benefit for the UK.



Creating the conditions for effective governance

In the context of concerns about the influence of large technology companies in AI, public discussions about AI governance have increasingly called for independent regulatory oversight. The UK's overarching position on AI regulation has been broadly the same since 2021's National AI Strategy.[33] Sectoral regulators are expected to develop regulatory frameworks that are appropriate for the domains in which they operate, supported by central government to ensure overall coherence of the regulatory landscape. 2023's AI Regulation White Paper re-stated this position, noting that sectoral regulators should consider five principles in developing their response: safety, security and robustness; appropriate transparency and explainability; fairness; accountability and governance; and contestability and redress.[34]

In the intervening period, progress in the development and implementation of sectoral regulations has been variable:

- In some areas, legislation has provided new powers for regulators to prevent harms arising from AI. For example, the Digital Markets, Competition and Consumers Act 2024 gave the Competition and Markets Authority enhanced powers from now on to intervene in strategic markets to protect consumer rights and competition; the Online Safety Act 2024 made companies that deliver a wide range of online services responsible for ensuring user safety, with new duties for Ofcom to oversee these responses. Upcoming legislation may bring further changes to how regulators govern data access and use.[35]
- Some regulators have trialled sandboxes to work through uncertainties about how existing regulations apply to AI. For example, in 2023 the Digital Regulation Cooperation Forum[36] (DRCF) launched an advisory service for businesses to engage with regulators as they create AI-enabled products and services.[37]
- Changing technical capabilities have brought new regulatory challenges, for example in relation to generative AI and Intellectual Property Rights. The policy response to this challenge remains in flux. This will be the focus of a forthcoming Policy Brief by the Bennett Institute for Public Policy, Minderoo Centre for Technology and Democracy, and ai@cam.

Box 2 summarises how 13 of the UK's regulators are responding to the challenge of governing AI. These share two common themes:

- The need for further work to understand how existing regulations apply to AI, where there may be gaps between regulatory bodies, and whether additional powers are needed to help fill these gaps. For example, a recent DRCF project considered regulatory responses to transparency as a shared concern across different sectors.[38]
- The need to respond to a complex, fast-moving technology in conditions of constrained resources. In 2023, the previous UK Government committed £10 million "to jumpstart regulators' AI capabilities".[39] This contrasts unfavourably with the £100 million committed that year to the AI Safety Institute to evaluate the technical performance of a subset of AI models.[40]

Box 2: Insights from regulator responses to the 2023 AI Regulation White Paper

In 2024, ministers wrote to selected regulators asking for an update on their strategic approach to AI.[41] By May 2024, 13 regulators had published responses to this call:[42] the Bank of England, Competition and Markets Authority (CMA), Equality and Human Rights Commission (EHRC), Financial Conduct Authority (FCA), Health and Safety Executive (HSE), Information Commissioner's Office (ICO), Legal Services Board (LSB), Medicines and Healthcare products Regulatory Agency (MHRA), Office for Nuclear Regulation (ONR), Office for Standards in Education, Children's Services and Skills (Ofsted), Office of Communications (Ofcom), Office of Gas and Electricity Markets (Ofgem), and Office of qualifications and Examinations Regulation (Ofqual).

These responses show the range of ways in which sectoral regulators are analysing the impact of AI on their sector and taking action to build capacity to respond. They also demonstrate the different levels of AI readiness in each sector:

- Some have already carried out extensive engagement with relevant industry stakeholders to understand relevant issues and regulatory gaps. For example, in 2021 the ONR published a report setting out the challenges associated with applying apply its safety regulations and quality standards to AI.
- Others are at an earlier stage in understanding the AI landscape in their sector, for example Ofgem is carrying out a consultation to inform the development of its regulatory approach.
- Many regulators have issued some form of high-level guidance relating to AI, including the LSB, FCA, ICO, HSE, EHRC, and CMA.
- Reflecting the new risks posed by advances in AI, some – for example, CMA and Ofcom – have already seen their regulatory powers and responsibilities change through recent legislation.
- To support innovators to develop AI applications, several regulators have convened 'sandbox'-style activities, including the MHRA's AI Airlock, ONR and Environment Agency sandbox pilot, FCA AI Lab, and Digital Regulation Cooperation Forum (DRCF) sandbox initiative.
- Less common were examples of enforcement to ensure regulation was implemented in practice.

These reports illustrate the challenge regulators face in resourcing their responses to AI. For example, the CMA points to the range of actions it has taken to recruit expert staff to its AI response teams, while the MHRA sets out plans to recruit further staff to support its AI workstrands, and the EHRC highlights the difficulties it faces in funding

such expansion.

Responses also give many examples of cross-regulator collaboration, through forums like the DRCF, working groups on issues like cybersecurity, the AI Standards Forum for UK Regulators, and Regulator's Innovation Network. They give less insight into the support provided by central government for developing regulatory responses, raising questions about the role of the proposed central government coordinating function. This function may find opportunities to reduce duplication of efforts or more rapidly share insights across these networks.

Public dialogues consistently call for democratic oversight that ensures AI development aligns with societies' values and needs. Over time, these dialogues suggest growing support for regulatory interventions to safeguard against power imbalances in AI development or misuses of these technologies. Responding to these concerns in the absence of additional investment in the regulatory environment will require innovative approaches to regulatory capability-building.

A starting point would be a detailed analysis of regulatory gaps or overlaps. This analysis is vital in shifting focus from high-level principles to practical implementation and directing constrained resources to priority areas. It would help increase confidence amongst those deploying AI about the regulatory implications of their work, and so would help derisk investment. Establishing a strong central coordination function could also help build regulatory capabilities. For example, understanding where sandbox initiatives have been successful could help scale access to proving grounds where innovators can work with regulators to test the regulatory implications of new products or services, while highlighting where action is needed to change or strengthen current regulations. Across these areas, progress requires collaboration between innovation, regulation, and policy communities to build understanding of how current practices in AI impinge on regulatory frameworks, what new practices or technical capability might create new regulatory challenges, and what responses are needed.

Building a public innovation infrastructure

Leveraging investments in compute

Compute has been an important enabler of advances in AI over the last ten years.[43] Model performance, and in particular Large Language Model performance, scales with compute power, access to data, and model size, though the relative importance of each of those factors varies across different areas of AI research and application.[44] While there is debate within the research community about whether this scaling relationship will continue, access to compute will remain an important enabler of AI research and development.

Investment in compute has been a recurring theme in UK AI policy:

- 2018's AI Sector Deal highlighted the importance of investing in the UK's digital infrastructure, noting a new partnership between the Engineering and Physical Sciences Research Council (EPSRC), the Science and Technology Facilities Council (STFC) and the University of Cambridge would deliver a £10 million AI supercomputer.
- 2021's National AI Strategy commissioned a review of the UK's compute needs to inform further investments.[45]
- 2021's UK Research and Innovation AI review noted access to compute would be an important enabler of AI innovation.
- 2022's Independent Review of the Future of Compute called for a strategic vision and roadmap for compute and support for researchers and businesses to access to compute facilities.[46]
- 2023's AI Research Resource announcements said that Government would invest in a cluster of advanced computers for AI research.[47] 2024 saw further announcements that no funding was available for some of the projects anticipated under this investment.[48]

Excitement about the size of proposed investments in compute – and whether those investments will proceed – obscures an important conversation about how to deliver public value from these investments. Delivering such value requires consideration not only of the size of the compute facility being developed, but how it works and who it serves.

A world-leading High Performance Compute (HPC) facility needs to provide both compute capabilities and support for its users. Those users might include AI researchers, domain researchers from across disciplines, businesses, civil society, or public sector organisations. Each brings different types of compute need. Design factors to consider in developing this ecosystem of support include:

Hardware: While GPUs dominate conversations about AI hardware, many areas of research benefit from access to both CPUs and GPUs for different types of compute jobs.[49] For example, a climate modeller might wish to access CPUs to support data processing or cleaning, or to run some initial calculations, before using GPUs for large-scale parallel computations of atmospheric dynamics; a deep learning researcher working on neural network architectures might prioritise access to GPUs for faster training of large models. In the coming years, trends in hardware development may also put the needs of different communities in tension. A shift towards lower precision GPUs might benefit AI researchers focused on developing large models, as they allow faster computation of larger models using less energy. Such researchers might prefer increased computational speed at lower precision. However, other areas of research could suffer because of reduced precision. In climate research, for example, where researchers are modelling energy transfer across complex atmospheric, oceanic, and land systems, precision matters; this type of research uses high-precision calculations to create accurate simulations that represent the Earth's systems across vast spatial and temporal scales.[50] HPC facilities that need to serve a diverse community or research and practice need to maintain both CPU and GPU resources that allow different types of compute job, alongside software stacks that support both traditional scientific software and systems optimised for AI.

Strategic asset management: Balancing competing HPC demands from different user communities requires effective workflow management. The needs of large, computationally intensive projects may be in tension with those of other projects. For many smaller projects – or innovative projects trialling new methods – it may be beneficial to quickly try something at smaller scale and make changes, before deploying a larger job. Many HPC facilities are run to maximise processor utilisation, at the expense of queue times, but scheduling policies can be designed to enable flexibility and agility.

Skills: Dedicated resources are needed to provide an on-ramp to HPC for new users. Such resources might look different from traditional models of HPC support. For HPC managers, this means a shift from enabling jobs to run to providing education, curation, and other 'training wheels' that help new users get projects off the ground. Meeting the needs of these diverse user communities will require:

- Skilled machine learning engineers, who can work with research projects to develop and deploy AI systems at scale. This will in turn require incentives to train, recruit, and retain such talent.
- Training for users, for example in how to move from running a project on their laptop to a larger system.
- Peer mentoring between users, sharing the knowledge and know-how they have gained through their experiences of using HPC.

Open-source: Open-source software practices in traditional computer science have ensured that stakeholders of all varieties, from start-ups to individuals to governments and large corporations, have access to state-of-the-art software. In traditional programs, the source code fully specifies the algorithms. This means that access to the source code of an operating system or a programming language is sufficient to allow others to contribute to or build on these innovations. In AI, the situation is more nuanced. Some works have identified as many as fourteen[51] ways in which AI models can be perceived

as open, with no existing models fulfilling all.[52] One particularly challenging area is data openness, where issues include a lack of standards around openness of data, and tensions around intellectual property rights of individual creators, personal data rights of citizens, and the data requirements of state-of-the-art models. Traditionally intellectual property has protected the rights of the individual creator.[53] As generative AI distils data to capture much broader aspects of human culture, there are calls for reforms that respect fundamental rights of access to the educational value of such models.[54] By dominating source code, data or compute, large company incumbents are able to obstruct disruptive innovations that may better serve the needs of citizens.[55]

Developing the National Data Library

Data is the resource that allows AI systems[56] to learn how to identify patterns, generate predictions, or make decisions. The availability of large volumes of high-quality data has been central to the development of today's AI capabilities. For example, open resources such as ImageNet[57] have provided rich training material for deep learning algorithms. More recently, high-profile AI successes such as AlphaFold have relied on access to carefully curated datasets that represent the 'ground truth' of experimentally determined protein structures,[58] alongside protein sequence databases,[59] to drive advances in understandings of protein folding.

Creating a data environment that facilitates safe, secure, and trustworthy access to data for AI development is a long-term policy challenge. Data governance has complex technical, organisational, cultural, and economic elements, including questions about:

- regulatory requirements;
- ethical concerns;
- ownership;
- value of data assets and incentives for data sharing;
- sovereignty concerns; and
- security and privacy issues.

Waves of policy development have sought to unlock wider access to data. For example: the FAIR data principles aimed to make research data more discoverable, accessible, and reusable;[60] data intermediaries have proposed a new type of organisation to overcome coordination issues or power asymmetries across stakeholders involved in data sharing;[61] and synthetic data was proposed as an alternative to access to sensitive datasets.[62] Each of these approaches have added to understandings of what works – or does not work – in enabling access to data. None provided a silver bullet.

2020's National Data Strategy started a conversation about the role of government in tackling these interconnected issues. It set out a framework for government action to improve the quality of data assets, build skills in data use, make data appropriately accessible and re-usable, and embed data ethics in research and innovation, under the umbrella of "missions" to:

- Unlock the value of data across the economy;
- Secure a pro-growth and trusted data regime;
- Transform government's use of data to drive efficiency and improve public services;
- Ensure the security and resilience of the infrastructure on which data relies;
- Champion the international flow of data.[63]

Despite a stated intention to collaborate with stakeholders in implementation, this Strategy lacked an underpinning action plan. A result is that it failed to gain momentum.

The proposal to create a National Data Library offers an opportunity to reinvigorate efforts to increase the accessibility and use of strategic data assets. This initiative is expected "to bring together existing research programmes and help deliver data-driven public services, whilst maintaining strong safeguards and ensuring all of the public benefit".[64]

A range of design considerations for the National Data Library have already been set out, including:

- The ability to provide practical tools, support, and governance structures to link diverse public sector datasets and data feeds[65] and provide a platform to access data assets;[66]
- Provision of support for users to find and access data resources;[67]
- Implementation of governance mechanisms that ensure trustworthy data management;[68]
- Co-design with stakeholder communities who could benefit from the National Data Library, supported by public dialogues to identify priority areas for action.[69]
- How to understand the value of different data assets.[70]

Success will require action to bridge from these strategic design features to the practical barriers that block access to data today. These are summarised in Box 3.

Box 3: Practical concerns in data access

Uncertainty about the legal mechanisms to share data for public services:
The UK Digital Economy Act 2017 gives a legal basis for Government departments to share and combine datasets for the purposes of improving public services, preventing fraud, or supporting research. However, research suggests that uncertainty amongst officials about the breadth of the legal cover provided by the Act for data sharing, and a lack of robust, easily implementable, and legally compliant data sharing frameworks has led to an underutilisation of these powers. Where the Act has been successfully used to facilitate data sharing, it has been with the support of strong inter-departmental coordination and clear legal guidance.[71] Forthcoming legislative proposals under the Data (Access and Use) Bill could bring further changes in policy and practice in this area.

Gaps between legal rights and practical access:
There are cases where the legal basis for data access might be clear, yet a range of practical barriers still hinder its use. For example, the UK Copyright, Designs and Patents Act 1988 permits researchers to make copies of copyright-

protected works, including journal articles or books, for the purposes of computational analysis, so long as it is for non-commercial research. In such circumstances, permission from the copyright holder to carry out such analysis is not required, provided the researcher can lawfully access the material, for example through open access repositories. However, in practice, it can be difficult to access such material. Publishers might use digital rights management technologies to prevent automated scraping, limiting how much content researchers can download for the development of large AI models. Publishers can also implement restrictive licensing provisions or API restrictions that limit access to data or require specific licenses or fees to use journal data. The result can be lengthy contract negotiations between research institutions and scientific publishers to unlock data access.[72] Even when publishers are willing to make their material available, modern content delivery networks (CDNs) may limit availability by default.[73] A CDN can help websites load faster and handle high traffic by serving content from a server closer to the user. However, because CDNs act as intermediaries between users and websites, they can interfere with automated access, even when the website owners intend to allow it. This can unintentionally hinder legal web-scraping efforts.

Interoperability of data assets:
The ability to generate new insights from combinations of datasets should be a strength of today's AI systems. However, a lack of interoperability in data systems – the ability to exchange and integrate data from different sources – can impede such analysis. Datasets are often stored in different formats by different data holders, or use different standards for describing data, which makes merging data from diverse sources technically challenging. Alongside these issues of technical interoperability, when combining datasets from disparate sectors or disciplines there is a need to ensure its semantic interoperability – ensuring that the information contained in data is understood in the same way. For example, in the NHS, hospitals, clinics, and local surgeries often store patient data in different formats, creating silos of patient data, or use different codes or taxonomies to describe the information held in patient data, hindering integration. Initiatives like the Local Health and Care Record programme have set out to tackle these issues through the creation of a common standard technology for health and care.[74]

Connecting secure data access to HPC facilities:
Secure data environments (SDEs) provide a platform for accessing, processing, and analysing sensitive data resources under controlled conditions. SDEs are designed to ensure that only personnel with appropriate permissions can access data, that data access is legally compliant, and that security measures are in place to prevent release of sensitive information. Integrating SDEs with HPC facilities can streamline analysis of sensitive data, removing the risks of data breaches as different data resources are moved between SDEs and other facilities. There are already examples of such capabilities in the UK. For example, Health Data Research UK provides a secure health data environment that links sensitive health data to HPC systems provided by Cambridge Services for Data Driven Discovery.[75]

Access to skilled data managers:
There is a growing demand for data professionals who can understand the technical and governance aspects of data management.[76] Without adequate funding for such roles, it is difficult for organisations to establish effective data sharing practices. Investment in data management teams can help create strategic data assets that deliver value for research and innovation. For example, UK Biobank has a dedicated data management team that ensures the quality, integrity, and accessibility of its data resources, through data curation, metadata management, and the facilitation of data sharing agreements with researchers. The team also provides a user-friendly data portal that provides an easy point of entry for researchers to request access to data.[77]

Lack of incentives for private sector data sharing:
Even when data is not being actively used to generate value, many organisations reasonably view their data as a competitive asset. This can create a reluctance to share data, in case it reveals proprietary information, or reduces competitive advantage, as well as possibly contravening competition law or other regulations, or creating risks that are uninsurable. For example, the importance of understanding global supply chains was highlighted during the Covid-19 pandemic. Firm-level transaction data can provide insights into patterns of economic activity that can inform policymaking. However, accessing such data is challenging.[78] By acting as an intermediary with private sector organisations, the National Data Library could help unblock such data access agreements. There are precedents for third parties intervening to facilitate private sector data sharing. The Data Communications Network, for example, provides a communications technology infrastructure that allows secure data transfers across over 100 million smart meter devices, encouraging energy companies to share data through financial incentives, clear data governance protocols, and a focus on a shared public benefit.[79]

Delivering high-level policy aspirations to build a public innovation infrastructure requires a deep understanding of the practices associated with AI innovation. The National Data Library provides an opportunity to unblock the practical barriers to data access and use experienced by those innovating with AI. Investments in HPC present an opportunity to accelerate innovation, if they can be built for the needs of those working with real-world challenges, including respecting data privacy and security, and intellectual property rights.

Policy development and implementation in these areas needs to be grounded in an understanding of user need. The next wave of policy effort to build our public innovation infrastructure can help create this understanding through use cases or pathfinder projects that convene diverse stakeholders around the shared ambition to tackle a specific problem using AI, that commit to working through the practical issues that arise in AI development and deployment, and that share lessons from these experiences back into the design of the UK's innovation infrastructure.

Growing the domestic base

Enablers of innovation

Government can draw on a variety of levers to stimulate innovation, many of which have already been looked at in the context of AI (see Box 4).

The challenge of growing the domestic AI base is partly one of complexity; there is no single point of policy intervention that delivers immediate results. Instead, a web of policies need to interact to help create an amenable environment for AI development. The challenge is also one of specificity. While AI policy debates have identified a range of levers to support innovation – procurement, tax credits, regulation, for example – these answers are often too broad to be operationalisable. Efforts to translate those ideas into action suffer from an absence of deep understanding of the issues that arise in implementing an AI innovation, of what policy interventions have been tried before (and with what success), and of how government can help overcome these implementation issues.

The public sector as a role model for innovation

Another way in which government can catalyse innovation is by showing how to deliver successful AI projects and enabling others to follow in its footsteps. The recent reconfiguration of the Department for Science, Innovation, and Technology has created a digital centre of government with the aim of positioning the Department as "standard bearer" for the use of technology in public services,[96] and driving a technology-enabled transformation of people's interactions with Government.

ai@cam's public dialogues on AI and the Missions for Government suggest the role that AI could play in public services. They also demonstrate a scepticism about whether Government can translate these aspirations into reality, in a context where public sector workers in critical frontline services like health, education, and criminal justice are facing growing demand and constrained resources. Such high pressure on day-to-day delivery leaves little time for the staff that have most detailed understanding of how these services work to experiment or innovate.

There are promising examples of bottom-up initiatives through which public sector workers are finding opportunities to use AI to improve their work, sharing their understanding of these technologies, and supporting others to build their capabilities. For example:

- In local government, South Cambridgeshire District Council has set up an AI Club that is open to all staff with an interest in using AI to transform Council services.[97]
- In education, the AI in Education initiative has convened teacher panels to share ideas and information about how to use AI in the classroom.[98]

The challenge that follows is how to scale these initiatives. Without such bottom-up engagement, there is a risk that – despite positive intentions – central government imposes technology solutions that are not fit for purpose on frontline delivery teams. This disconnect between the intention behind an

Box 4: Policy levers to catalyse wider innovation in AI

Procurement: Public sector procurement can be a driver for innovation by creating a market or customer base for AI companies. With the aim of helping civil servants to better understand how to procure AI-enabled products and services, Government has produced guidelines for AI procurement[80] and for the use of generative AI.[81] While providing a helpful starting point in understanding the issues associated with AI procurement, a lack of specific implementation mechanisms has proved challenging for those seeking to follow these guidelines. Further work is needed to translate these principles into practical guidance that helps public sector workers to resolve the range of questions that arise during the procurement process.[82]

Competition: Competition policy plays an important role in helping provide a level playing field for new or smaller companies, building a diverse and competitive AI ecosystem that delivers better results for consumers. 2019's Furman Panel review set out a collection of reforms to the UK's competition framework that could tackle the economic challenges associated with market concentration in the

digital sector.[83] The creation of the Competition and Market Authority's (CMA) Digital Markets Unit in 2021 and subsequent passing of the Digital Markets, Competition and Consumers Act 2024 have updated the CMA's powers of to intervene to prevent anticompetitive practices in the tech sector, enabling new UK companies to enter the market and grow.

Skills and talent: There are skills gaps across the AI development and implementation pipeline, from demands for leading AI talent in industry and academia, to the upskilling required to help people use AI in the workplace, to the need for broad educational initiatives to equip people with basic data skills. A range of government initiatives have sought to build this skills base, including:

- funding and visa schemes to attract AI talent and support AI research;[84]
- funding for "AI conversion" courses to increase the number of skilled workers in AI roles;[85] and
- postgraduate training schemes.[86]

Innovative approaches are needed to scale the impact of these interventions, driving a step-change in the number of UK residents with AI skills at all levels.

Research funding: The UK's science and innovation base is central to its international competitiveness in AI. Maintaining the UK's global leadership in AI research and innovation has been a key part of successive governments' ambitions for AI. Robust research funding is vital to deliver these ambitions. The UK's current capabilities in AI are grounded in long-term investment in its innovation base. These investments have helped create the vibrant research environment and human capital that push the UK towards the top of international rankings in AI development. They also demonstrate the importance of sustained investment to create the conditions for innovation. A series of investments from UKRI in recent years has created a network of UK AI hubs[87] and fellowships for world-leading researchers. However, the UK has lagged behind other countries in the scale and long-term stability of its research funding.[89] Despite the strategic importance of these investments, they are not leveraged to provide expertise and insights to inform policy developments in central government.

Missions: Bringing a focus to AI applications that address social needs can drive innovation and help demonstrate the value of AI to the public. The Missions for Government could provide an umbrella for driving progress in the use of AI to tackle major challenges in health, education, energy and net zero, and crime and policing. Evidence of 'what works' in mission-led innovation suggests that successful missions require:

- Clear, inspiring goals that provide direction and motivation to diverse stakeholders.
- Cross-sector and interdisciplinary collaboration that brings different expertise and skills sets to the table.
- Flexible funding mechanisms that provide adaptable, long-term support for collaborations.
- Leadership and team management that drives progress.
- Stakeholder engagement with affected communities that brings user voices into research.
- A willingness to take risks, or have projects fail.
- Measurable outcomes and mechanisms for evaluation based on clear indicators of success and feedback loops that connect these to mission design.[90]

Delivering beneficial outcomes from the use of AI in the Missions for Government will require further work to develop translate high-level mission objectives into targeted, measurable interventions that can be delivered in practice.

Support for scaling up: The UK has a vibrant AI start up scene.[91] However, it faces a long-standing policy challenge in how to enable small, innovative companies to grow.[92] A particular area of concern has been the ability of companies started in the UK to scale here, instead of being acquired by a large overseas company. Scale-ups face a variety of challenges, including access to finance, talent, and infrastructure.[93] A Scale Up Forum, announced in January 2024, proposed to bring a new focus to challenges faced by companies as they grow.[94] Recent work by the UK Government's Council for Science and Technology suggests how this scale up challenge could be addressed through a range of policy interventions.[95]

intervention and its real-world impact has been a failure mode behind many major IT or digital initiatives.

The UK has recently seen the impact of such failures in the Horizon scandal. When the Post Office's accounting system was computerised by Fujitsu and installed in 1999, it was with inadequate technical understanding or operational scrutiny. Individual sub postmasters were blamed for errors in the system, in some cases with serious and long-lasting personal impacts. Factors that contributed to this failure included a central push for widespread adoption of a new IT system into an environment where many users lacked advanced IT skills; bugs and errors in the system; a lack of adequate testing and feedback; and variability in local infrastructure.

Horizon is not the only example of how these implementation failures can arise. The Lorenzo scandal, for example, arose in connection to the National Programme for IT. This programme intended to move the NHS towards the use of electronic health records in the early 2000s. It was subsequently abandoned and resulted in one of the most expensive contracting bills in the history of the public sector.[99] Its failure was attributed to "lack of adequate end user engagement, the absence of a phased change management approach, and underestimation of the scale

of the project".[100]

These failures share certain characteristics:

- Insufficient consideration of local needs, capabilities, or constraints, and insufficient engagement with end-users in system design.
- Lack of effective feedback mechanisms from users to leadership.
- Rigid, top-down approaches to implementation that did not allow for local adaptation.

Since these projects, practices in software development and implementation have shifted away from monolithic software systems towards so-called 'software as a service'. This change results in an "intellectual debt",[101] created by the complexity of having multiple AI-enabled subcomponents in a decision-making system. Engineers and users might have insights into whether a system works without understanding why it works, making it more challenging to identify potential failure modes or respond to them when they occur.

These insights from previous IT project failures point to the importance of developing AI-enabled tools for public services in collaboration with users on the front line of delivering those services. They demonstrate the importance of stakeholder engagement at all stages of design and roll-out, of flexibility in implementation and iterative feedback from users, of ensuring technical competence at both policy and implementation levels, and of engaging independent, technically competent oversight to support implementation.

Conclusion

The fundamentals of AI policy have been largely consistent since policymakers first became interested in this field, spanning investment in research, access to data, skills and talent, support for business, and governance and regulation. This paper is being published at a time where the UK's policy priorities across these areas are in flux. Future pathways for policy development could include a new drive behind the use of AI in public services, investments in infrastructure, or a focus on economic growth. Along any of these pathways, how policy is developed and implemented matters. Engaging the UK's communities of AI research and practice can help policymakers connect macro-level policy decisions to practical implementation, then to feed the understanding of AI innovation created at that 'micro' level back into policy design.

Research and talent are strengths of the UK's AI community. These strengths can be deployed to build AI-enabled solutions to the problems that affect people's health, wealth, and wellbeing, and to develop the governance mechanisms needed to deliver safe and effective AI innovations. Evidence from public dialogues about data and AI provides a starting point for showing what people want from these technologies. They also show the checks-and-balances needed to ensure that AI works for people and society.

By recentring discussions about AI technology and policy around social needs –the demand side of the innovation economy – the UK can unlock a new wave of innovation that serves the public good. Discussions surrounding AI too often focus on "supply"; on creating new technologies without attention to the "demand" signals that relate to real-world needs or challenges. The next wave of technology and policy development in AI needs to bridge the gap between AI's technical capabilities and their use to deliver real-world public benefit. Articulating areas of need, bringing resources to bear on addressing them, and feeding the lessons learned back into the generation of new knowledge can help overcome this gap. If successful in building these connections between policy and practice, the UK can create an AI ecosystem that is world-leading in its innovation and positive social impact.

The UK's research institutions can help respond to these challenges by working on the challenges in health, social care, education, environment, and more, that people highlight as priorities for AI intervention. Research institutions cannot fix this problem alone, but can provide the place for bridging public and private concerns. Focusing on the practical barriers to implementing AI in areas of public interest or concern – and supporting those on the frontlines of such innovation to overcome these barriers – can generate a productivity flywheel that closes the gap between technological progress and real-world benefit. By building a community around these issues – in research, policy, and practice – we can translate these advances into a virtuous circle of engagement that scales access to expertise and insights in how to make AI work for science and society.

Annexes

This briefing reflects a series of workshops convened by ai@cam in autumn 2024, on topics ranging from the Missions for Government to AI in local government, to national AI strategy, to HPC facility design. Thank you to everyone that contributed to these engagements.

About ai@cam

ai@cam is the University of Cambridge's mission to develop AI that serves science, citizens, and society. It is an interdisciplinary AI incubator that is accelerating research to tackle real-world challenges with AI, informing the development of AI policy, and connecting across business and civil society to help translate AI innovations to practice. Its vision is of AI-enabled innovations that benefit society, created through interdisciplinary research that is deeply connected to real-world needs.

More information: ai.cam.ac.uk

About the Bennett Institute for Public Policy

The Bennett Institute for Public Policy is one of the UK's leading public policy institutes, achieving significant impact through its high-quality research. Our goal is to rethink public policy in an era of turbulence and inequality. Our research connects the world-leading work in technology and science at the University of Cambridge with the economic and political dimensions of policymaking. We are committed to outstanding teaching, policy engagement, and to devising sustainable and long-lasting solutions.

More information: www.bennettinstitute.cam.ac.uk

About the Minderoo Centre for Technology and Democracy

The Minderoo Centre for Technology and Democracy is an independent team of academic researchers at the University of Cambridge, who are radically rethinking the power relationships between digital technologies, society and our planet.

More information: www.mctd.ac.uk

Endnotes

1. Hall, W. and Pesenti, J. (2017) Growing the Artificial Intelligence industry in the UK, available at: https://www.gov.uk/government/publications/growing-the-artificial-intelligence-industry-in-the-uk [accessed 22 October 2024]
2. Dutton, T., Barron, B. and Boskovic, G. (2018) Building an AI world: Report on national and regional AI strategies, available at: https://cifar.ca/wp-content/uploads/2020/05/buildinganaiworld_eng.pdf [accessed 22 October 2024]
3. UK Government (2018) AI Sector Deal, available at: https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal [accessed 22 October 2024]
4. UK Government (2021) National AI Strategy, available at: https://www.gov.uk/government/publications/national-ai-strategy [accessed 22 October 2024]
5. UK Government (2023) A pro-innovation approach to AI regulation, available at: https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper [accessed 22 October 2024]
6. Including the Data Protection Act (2018) giving force to the GDPR: https://www.legislation.gov.uk/ukpga/2018/12/contents; The Digital Markets, Competition and Consumers Act (2024), giving new powers to the Competition and Markets Authority https://www.legislation.gov.uk/ukpga/2024/13/contents; and the Online Safety Act (2023) setting out new duties for OFCOM in relation to online communications https://www.legislation.gov.uk/ukpga/2023/50/contents [accessed 22 October 2024]
7. UK AI Safety Institute: https://www.aisi.gov.uk [accessed 22 October 2024]
8. See: Data (Use and Access) Bill factsheets, available at: https://www.gov.uk/government/publications/data-use-and-access-bill-factsheets [accessed 24 October 2024]
9. For example: Goldman Sachs (2024) Will the $1 trillion of generative AI investment pay off?, available at: https://www.goldmansachs.com/insights/articles/will-the-1-trillion-of-generative-ai-investment-pay-off [accessed 22 October 2024
10. Paleyes, A., Urma, R.G. and Lawrence, N. D. (2022) Challenges in Deploying Machine Learning: A Survey of Case Studies. ACM Comput. Surv. 55, 6, Article 114 (June 2023), 29 pages. https://doi.org/10.1145/3533378
11. Denford, J.J., Dawson, G.S. and Desouza, K.C. (2023) A cluster analysis of national AI stragegies, available at: https://www.brookings.edu/articles/a-cluster-analysis-of-national-ai-strategies/#the-focus-of-our-cluster-analysis-373 [accessed 22 October 2024]
12. UN AI Advisory Body (2024) Governing AI for humanity, available at: https://www.un.org/en/ai-advisory-body [accessed 22 October 2024]
13. An example of this failure can be seen in the use of AI during Covid-19 response. For example: Heaven, W.D. (2021) Hundreds of AI tools have been built to catch covid. None of them helped. MIT Tech Review, available at: https://www.technologyreview.com/2021/07/30/1030329/machine-learning-ai-failed-covid-hospital-diagnosis-pandemic/ [accessed 22 October 2024]
14. UK Government (2024) Artificial Intelligence (AI) Opportunities Action Plan: terms of reference, available at: https://www.gov.uk/government/publications/artificial-intelligence-ai-opportunities-action-plan-terms-of-reference/artificial-intelligence-ai-opportunities-action-plan-terms-of-reference [accessed 22 October 2024]
15. Tortoise Media (2024) Global AI Index, available at: https://www.tortoisemedia.com/intelligence/global-ai/#rankings [accessed 22 October 2024]
16. Discussions were designed to align with the Missions for Government. See: https://labour.org.uk/change/mission-driven-government/
17. For an example of an alternative lens to view international relations in AI, see: Turobov, A., Coyle, D. and Harding, V. (2024) Moving beyond competition: domain-specific approach for international AI framework, Bennett Institute for Public Policy, available at: https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2024/11/AIXGEO-Moving-beyond-competition.pdf [accessed 1 December 2024]
18. Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics-policy/projects/machine-learning/ [accessed 22 October 2024]; RSA (2018) Application of automated decision-making systems, available at: https://www.thersa.org/action-and-research/rsa-projects/economy-enterprise-manufacturing-folder/forum-for-ethical-AI [accessed 22 October 2024]; Ipsos MORI (2023) Public Attitudes to AI, available at: https://www.ipsos.com/sites/default/files/ct/publication/documents/2023-11/Public%20Perceptions%20of%20AI%20charts.pdf [accessed 22 October 2024]; Geospatial Commission (2021) Public dialogue on location data ethics, available at: https://www.gov.uk/government/news/public-dialogue-on-location-data-ethics-published [accessed 22 October 2024]; Ada Lovelace Institute (2023) How do people feel about AI? Ada Lovelace Institute, available at: https://www.adalovelaceinstitute.org/report/public-attitudes-ai/ [accessed 22 October 2024]; DSIT (2023) The tide is changing: Monitoring public attitudes towards data and AI (December 2023), available at: https://rtau.blog.gov.uk/2023/12/06/the-tide-is-changing-monitoring-public-attitudes-towards-data-and-ai/ [accessed 22 October 2024]; DSIT (2024) Public attitudes to data and AI: Tracker survey (Wave 3) available at: https://www.gov.uk/government/publications/public-attitudes-to-data-and-ai-tracker-survey-wave-3/public-attitudes-to-data-and-ai-tracker-survey-wave-3#:~:text=7.1%20Summary,healthcare%2C%20policing%2C%20and%20education.[accessed 22 October 2024]
19. Department for Transport (2018) Attitudes to emerging technologies, including automated vehicles, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/721722/future-roads-public-dialogue-exploring-the-publics-reactions-to-future-road-technologies.pdf [accessed 22 October 2024]; ai@cam and Hopkins van Mil (2024) AI and the Mis-

sions for Government: insights from public dialogue, available at ai.cam.ac.uk [accessed 28 October 2024]

20. Milltown Partners and Clifford Chance (2023) Responsible AI in Practice: Public Expectations of Approaches to Developing and Deploying AI, available at: https://www.cliffordchance.com/content/dam/cliffordchance/hub/TechGroup/responsible-ai-in-practice-report-2023.pdf [accessed 22 October 2024]; ai@cam and Hopkins van Mil (2024) AI and the Missions for Government: insights from public dialogue, available at ai.cam.ac.uk [accessed 28 October 2024]

21. DSIT (2024) Public attitudes to data and AI: Tracker survey (Wave 3) available at: https://www.gov.uk/government/publications/public-attitudes-to-data-and-ai-tracker-survey-wave-3/public-attitudes-to-data-and-ai-tracker-survey-wave-3#:~:text=7.1%20Summary,healthcare%2C%20policing%2C%20and%20education.[accessed 22 October 2024]

22. Drawing from: Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics
-policy/projects/machine-learning/ [accessed 22 October 2024];
ONS (2023) Public awareness, opinions and expectations about artificial intelligence: July to October 2023, available at: htt-ps://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/articles/publicawarenessopinionsandexpectationsaboutartificialin-telligence/julytooctober2023 [accessed 22 October 2024]; Ada Lovelace Institute (2023) How do people feel about AI? Ada Lovelace Institute, available at: https://www.adalovelaceinstitute.org/report/public-attitudes-ai/ [accessed 22 October 2024]; DSIT (2024) Public attitudes to data and AI: Tracker survey (Wave 3) available at: https://www.gov.uk/government/publications/public-attitudes-to-data-and-ai-tracker-survey-wave-3/public-attitudes-to-data-and-ai-tracker-survey-wave-3#:~:text=7.1%20Summary,healthcare%2C%20policing%2C%20and%20education.[accessed 22 October 2024]

23. Drawing from Geospatial Commission (2021) Public dialogue on location data ethics, available at: https://www.gov.uk/government/news/public-dialogue-on-location-data-ethics-published [accessed 22 October 2024]; ONS (2023) Public awareness, opinions and expectations about artificial intelligence: July to October 2023, available at: https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/articles/publicawarenessopinionsandexpectationsaboutartificialinte-lligence/julytooctober2023 [accessed 22 October 2024]; DSIT (2024) Public attitudes to data and AI: Tracker survey (Wave 3) available at: https://www.gov.uk/government/publications/public-attitudes-to-data-and-ai-tracker-survey-wave-3/public-attitudes-to-data-and-ai-tracker-survey-wave-3#:~:text=7.1%20Summary,healthcare%2C%20policing%2C%20and%20education.[accessed 22 October 2024]; DSIT (2024) Public dialogue on trust in digital identity services: a findings report, available at: https://www.gov.uk/government/publications/public-dialogue-on-trust-in-digital-identity-services/public-dialogue-on-trust-in-digital-identity-services-a-findings-report [accessed 22 October 2024]

24. Drawing from Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics-policy/projects/machine-learning/ [accessed 22 October 2024]; Public First (2023) What does the public think about AI? Available at: https://publicfirst.co.uk/ai/ [accessed 22 October 2024]; DSIT (2023) The tide is changing: Monitoring public attitudes towards data and AI (December 2023), available at: https://rtau.blog.gov.uk/2023/12/06/the-tide-is-changing-monitoring-public-attitudes-towards-data-and-ai/ [accessed 22 October 2024]; DSIT (2024) Public attitudes to data and AI: Tracker survey (Wave 3) available at: https://www.gov.uk/government/publications/public-attitudes-to-data-and-ai-tracker-survey-wave-3/public-attitudes-to-data-and-ai-tracker-survey-wave-3#:~:text=7.1%20Summary,healthcare%2C%20policing%2C%20and%20education.[accessed 22 October 2024]

25. Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics-policy/projects/machine-learning/ [accessed 22 October 2024]; RSA (2018) Application of automated decision-making systems, available at: https://www.thersa.org/action-and-research/rsa-projects/economy-enterprise-manufacturing-folder/forum-for-ethical-AI [accessed 22 October 2024]; Ada Lovelace Institute (2023) How do people feel about AI? Ada Lovelace Institute, available at: https://www.adalovelaceinstitute.org/report/public-attitudes-ai/ [accessed 22 October 2024]; ai@cam and Hopkins van Mil (2024) AI and the Missions for Government: insights from public dialogue, available at ai.cam.ac.uk [accessed 28 October 2024]

26. Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics-policy/projects/machine-learning/ [accessed 22 October 2024]; ai@cam and Hopkins van Mil (2024) AI and the Missions for Government: insights from public dialogue, available at ai.cam.ac.uk [accessed 28 October 2024]

27. Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics-policy/projects/machine-learning/ [accessed 22 October 2024]; RSA (2018) Application of automated decision-making systems, available at: https://www.thersa.org/action-and-research/rsa-projects/economy-enterprise-manufacturing-folder/forum-for-ethical-AI [accessed 22 October 2024]; Geospatial Commission (2021) Public dialogue on location data ethics, available at: https://www.gov.uk/government/news/public-dialogue-on-location-data-ethics-published [accessed 22 October 2024]; Ada Lovelace Institute (2021) The Citizens' Biometrics Council, available at: https://www.adalovelaceinstitute.org/report/citizens-biometrics-council/ [accessed 22 October 2024]; DSIT (2024) Public dialogue on trust in digital identity services: a findings report, available at: https://www.gov.uk/government/publications/public-dialogue-on-trust-in-digital-identity-services/public-dialogue-on-trust-in-digital-identity-services-a-findings-report [accessed 22 October 2024]; Connected by Data (2023) Involving the public in AI policymaking - Experiences from the People's Panel on AI, available at: https://connectedby-data.org/projects/2023-peoples-panel-on-ai [accessed 22 October 2024]

28. Milltown Partners and Clifford Chance (2023) Responsible

AI in Practice: Public Expectations of Approaches to Developing and Deploying AI, available at: https://www.cliffordchance.com/content/dam/cliffordchance/hub/TechGroup/responsible-ai-in-practice-report-2023.pdf [accessed 22 October 2024]

29. Ada Lovelace Institute (2021) The Citizens' Biometrics Council, available at: https://www.adalovelaceinstitute.org/report/citizens-biometrics-council/ [accessed 22 October 2024]; Ada Lovelace Institute (2023) How do people feel about AI? Ada Lovelace Institute, available at: https://www.adalovelaceinstitute.org/report/public-attitudes-ai/ [accessed 22 October 2024]; Ipsos MORI (2023) Public Attitudes to AI, available at: https://www.ipsos.com/sites/default/files/ct/publication/documents/2023-11/Public%20Perceptions%20of%20AI%20charts.pdf [accessed 22 October 2024]; Milltown Partners and Clifford Chance (2023) Responsible AI in Practice: Public Expectations of Approaches to Developing and Deploying AI, available at: https://www.cliffordchance.com/content/dam/cliffordchance/hub/TechGroup/responsible-ai-in-practice-report-2023.pdf [accessed 22 October 2024]; Public First (2023) What does the public think about AI? Available at: https://publicfirst.co.uk/ai/ [accessed 22 October 2024]; ai@cam and Hopkins van Mil (2024) AI and the Missions for Government: insights from public dialogue, available at ai.cam.ac.uk [accessed 28 October 2024]
30. Department for Transport (2018) Attitudes to emerging technologies, including automated vehicles, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/721722/future-roads-public-dialogue-exploring-the-publics-reactions-to-future-road-technologies.pdf [accessed 22 October 2024]
31. DSIT (2024) Public dialogue on trust in digital identity services: a findings report, available at: https://www.gov.uk/government/publications/public-dialogue-on-trust-in-digital-identity-services/public-dialogue-on-trust-in-digital-identity-services-a-findings-report [accessed 22 October 2024]
32. For a discussion about the role of AI in art and poetry, see: Royal Society (2017) Public attitudes towards machine learning, available at: https://royalsociety.org/topics-policy/projects/machine-learning/ [accessed 22 October 2024]
33. UK Government (2021) National AI Strategy, available at: https://www.gov.uk/government/publications/national-ai-strategy [accessed 22 October 2024]
34. As set out in the AI Regulation White Paper subsequently in 2023: UK Government (2023) A pro-innovation approach to AI regulation, available at: https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper [accessed 22 October 2024]
35. For example, the Data (Use and Access) Bill, introduced to Parliament on 23 October 2024.
36. Made up of the Information Commissioner's Office, Ofcom, the Competition and Markets Authority, and the Financial Conduct Authority
37. DSIT (2023) New advisory service to help businesses launch AI and digital innovations, available at: https://www.gov.uk/government/news/new-advisory-service-to-help-businesses-launch-ai-and-digital-innovations [accessed 22 October 2024]
38. DRCF (2024) AI Transparency: DRCF Perspectives, available at: https://www.drcf.org.uk/publications/blogs/ai-transparency-drcf-perspectives/ [22 October 2024]
39. Regulators' strategic approaches to AI, published at: https://www.gov.uk/government/publications/regulators-strategic-approaches-to-ai/regulators-strategic-approaches-to-ai [accessed 22 October 2024]
40. UK Government (2023) Introducing the AI Safety Institute, available at: https://assets.publishing.service.gov.uk/media/65438d159e05fd0014be7bd9/introducing-ai-safety-institute-web-accessible.pdf [accessed 22 October 2024]
41. Request for regulators to publish an update on their strategic approach to AI: Secretary of State letters, available at: https://www.gov.uk/government/publications/request-for-regulators-to-publish-an-update-on-their-strategic-approach-to-ai-secretary-of-state-letters [accessed 22 October 2024]
42. Regulators' strategic approaches to AI, published at: https://www.gov.uk/government/publications/regulators-strategic-approaches-to-ai/regulators-strategic-approaches-to-ai [accessed 22 October 2024]
43. OpenAI (2021) AI and compute, available at: https://openai.com/index/ai-and-compute/ [accessed 22 October 2024]
44. Kaplan, J. et al. (2020) Scaling laws for neural language models, available at: https://openai.com/index/scaling-laws-for-neural-language-models/ [accessed 22 October 2024]
45. UK Government (2021) National AI Strategy, available at: https://www.gov.uk/government/publications/national-ai-strategy [accessed 22 October 2024]
46. DSIT (2023) Independent Review of The Future of Compute: Final report and recommendations, available at: https://www.gov.uk/government/publications/future-of-compute-review/the-future-of-compute-report-of-the-review-of-independent-panel-of-experts#list-of-recommendations [accessed 22 October 2024]
47. DSIT (2023) Technology Secretary announces investment boost making British AI supercomputing 30 times more powerful, available at: https://www.gov.uk/government/news/technology-secretary-announces-investment-boost-making-british-ai-supercomputing-30-times-more-powerful [accessed 22 October 2024]
48. TechRadar (2024) UK government cancels £1bn AI investment plan, available at: https://www.techradar.com/pro/uk-government-cancels-pound1bn-ai-investment-plan [accessed 22 October 2024]
49. In general, Central Processing Units (CPUs) are used for general-purpose computing and sequential processing,

relevant to tasks like data cleaning, statistical analysis, simulation, or running of some scientific software. Graphics Processing Units (GPUs) are more useful for matrix operations or parallel processing.

50. Düben, P. D., and T. N. Palmer, 2014: Benchmark Tests for Numerical Weather Forecasts on Inexact Hardware. Mon. Wea. Rev., 142, 3809–3829, https://doi.org/10.1175/MWR-D-14-00110.1.

51. Liesenfeld, A. and Dingemanse, M. (2024) Rethinking open source generative AI: open-washing and the EU AI Act. In Proceedings of the 2024 ACM Conference on Fairness, Accountability, and Transparency (FAccT '24). Association for Computing Machinery, New York, NY, USA, 1774–1787. https://doi.org/10.1145/3630106.3659005

52. For a discussion about emerging definitions of open source, see: Mozilla (2024) Celebrating an important step forward for open source AI, available at: https://blog.mozilla.org/en/mozilla/ai/open-source-ai-definition/ [accessed 1 December 2024]

53. Though variations in text and data mining legislation stipulate different duties around aggregated data sets. For example, in the US, which is the largest jurisdiction for model training, notions such as fair use are still contested.

54. Delacroix, S. (2024) Sustainable Data Rivers? Rebalancing the Data Ecosystem That Underlies Generative AI. Critical AI 1 April 2024; 2 (1): No Pagination Specified. doi: https://doi.org/10.1215/2834703X-11205224

55. ai@cam and Hopkins van Mil (2024) AI and the Missions for Government: insights from public dialogue, available at ai.cam.ac.uk [accessed 28 October 2024]

56. AI systems that are based on machine learning, which is the method underpinning many of the current AI tools in deployment.

57. Deng, J., Dong, W., Socher, R., Li, L.-J., Li, K., & Fei-Fei, L. (2009). Imagenet: A large-scale hierarchical image database. In 2009 IEEE conference on computer vision and pattern recognition (pp. 248–255). https://ieeexplore.ieee.org/document/5206848 [accessed 22 October 2024]

58. Such as the Protein Data Bank https://www.rcsb.org

59. Detailed further in Jumper, J., Evans, R., Pritzel, A. et al. Highly accurate protein structure prediction with AlphaFold. Nature 596, 583–589 (2021). https://doi.org/10.1038/s41586-021-03819-2

60. Available at: https://www.go-fair.org/fair-principles/ [accessed 22 October 2024]

61. Ada Lovelace Institute (2021) Legal Mechanisms for Data Stewardship, available at: https://www.adalovelaceinstitute.org/report/legal-mechanisms-data-stewardship/#:~:text=The%20three%20legal%20mechanisms%20discussed,in%20the%20data%2Dgovernance%20toolbox [accessed 22 October 2024]

62. Alan Turing Institute and Royal Society (2024) Synthetic data – what, why and how? Available at: https://royalsociety.org/-/media/policy/projects/privacy-enhancing-technologies/Synthetic_Data_Survey-24.pdf [accessed 22 October 2024]

63. DCMS (2020) National Data Strategy, available at: https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy [accessed 22 October 2024]

64. Party Manifesto (2024), available at: https://labour.org.uk/wp-content/uploads/2024/06/Labour-Party-manifesto-2024.pdf#page=35 'accessed 22 October 2024]

65. ADR UK (2024) The new UK Government wants a National Data Library: a brilliant aspiration, if built on solid foundations, available at: https://www.adruk.org/news-publications/news-blogs/the-new-uk-government-wants-a-national-data-library-a-brilliant-aspiration-if-built-on-solid-foundations/ [accessed 22 October 2024]

66. Onward (2024) Let's get real about Britain's AI status, available at: https://sciencesuperpower.substack.com/p/lets-get-real-about-britains-ai-status [accessed 22 October 2024]

67. Freeguard, G. (2024), How should we think about a National Data Library? Available at: https://gavin-freeguard.medium.com/how-should-we-think-about-a-national-data-library-dd2d47edee8b [accessed 22 October 2024]

68. ODI (2024) The ODI's input to the AI Action Plan: an AI-ready National Data Library, available at: https://theodi.org/news-and-events/consultation-responses/the-odis-input-to-the-ai-action-plan-an-ai-ready-national-data-library/ [accessed 22 October 2024]

69. ai@cam (2024) Access to data for research: lessons for the National Data Library from the front lines of AI innovation, available at: https://ai.cam.ac.uk/projects/access-to-data-case-studies [accessed 1 December 2024]

70. For reports and briefings on this topic, see: https://www.bennettinstitute.cam.ac.uk/research/research-projects/valuing-data/ [accessed 1 December 2024]

71. DCMS and Kantar (2020) Motivations for and barriers to data sharing, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/895505/_Kantar_research_publication.pdf and https://www.gov.uk/government/publications/digital-economy-act-2017-part-5-codes-of-practice/mid-point-report-on-use-of-the-dea-powers#next-steps [accessed 22 October 2024]

72. These issues are explored in a case study on access to data for climate research in ai@cam's policy brief on researcher access to data, available at: https://ai.cam.ac.uk/projects/access-to-data-case-studies [accessed 1 December 2024]

73. A content delivery network (CDN) is a system of distributed servers that deliver web content to users based on their geographic location. It's like having multiple copies of a book in libraries across the country, rather than just one central library.

74. For example, in Greater Manchester, this programme has been taking action to create a joined up health and social care patient record system. For information available at:

https://healthinnovationmanchester.com/partnerships/greater-manchester-doing-digital-differently/local-health-and-care-records-in-gm/

75. For example: https://www.hdruk.ac.uk/news/health-data-research-uk-partners-with-state-of-the-art-supercomputing-service-to-support-national-research-to-understand-the-causes-of-disease/ [accessed 22 October 2024]

76. DCMS (2021) Quantifying the UK's data skills gap, available at: https://www.gov.uk/government/publications/quantifying-the-uk-data-skills-gap/quantifying-the-uk-data-skills-gap-full-report#ministerial-foreword [accessed 22 October 2024]

77. For example: https://www.ukbiobank.ac.uk/enable-your-research/apply-for-access [accessed 22 October 2024]

78. Anton Pichler et al. (2023) Building an alliance to map global supply networks.Science382,270-272.DOI:10.1126/science.adi7521

79. For example: https://www.smartdcc.co.uk/about-dcc/ [accessed 22 October 2024]

80. Guidelines for AI procurement, available at: https://www.gov.uk/government/publications/guidelines-for-ai-procurement [accessed 22 October 2024]

81. Generative AI framework for HMG, available at: https://www.gov.uk/government/publications/generative-ai-framework-for-hmg/generative-ai-framework-for-hmg-html [accessed 22 October 2024]

82. For example, initiatives like the GovTech Catalyst sought to provide a forum for working through issues associated with public sector procurement of digital technologies. Further information available at: https://gds.blog.gov.uk/2020/06/18/what-we-learnt-from-the-first-phase-of-the-govtech-catalyst/ [22 October 2024]

83. Furman Review (2019) Unlocking digital competition, available at: https://www.gov.uk/government/publications/unlocking-digital-competition-report-of-the-digital-competition-expert-panel [22 October 2024]

84. For example: Turing AI World-Leading Researcher Fellowships: https://www.ukri.org/opportunity/turing-ai-world-leading-researcher-fellowships-round-three/#:~:text=Through%20the%20Turing%20AI%20World,currently%20located%20in%20the%20UK. and AI Futures grants: https://www.great.gov.uk/campaign-site/ai-futures/#:~:text=AI%20Futures%20Grants%20helps%20the,surcharge%20and%20travel%2Fsubsistence%20expenses. [accessed 22 October 2024]

85. DCMS (2020) 2,500 new places on artificial intelligence and data science conversion courses now open to applicants, available at: https://www.gov.uk/government/news/2500-new-places-on-artificial-intelligence-and-data-science-conversion-courses-now-open-to-applicants [accessed 22 October 2024]

86. DSIT (2024), Thousands more to train in future tech like AI as government unveils over £1.1 billion package to skill-up UK, available at: https://www.gov.uk/government/news/thousands-more-to-train-in-future-tech-like-ai-as-government-unveils-over-11-billion-package-to-skill-up-uk [accessed 22 October 2024]

87. UKRI (2024) £100m boost in AI research will propel transformative innovations, available at: https://www.ukri.org/news/100m-boost-in-ai-research-will-propel-transformative-innovations/ [accessed 22 October 2024]

88. For information about Turing AI Fellows, see: https://www.turing.ac.uk/people/fellows/turing-ai-fellows [accessed 22 October 2024]

89. Digital Science (2024) Research on Artificial Intelligence – the global divides, available at: https://www.digital-science.com/tldr/article/research-on-artificial-intelligence-the-global-divides/ [22 October 2024]

90. For example, work by the OECD: https://oecd-opsi.org/work-areas/mission-oriented-innovation/ and Mazzucato, M. (2018) 'Mission Oriented Innovation Policy: Challenges and Opportunities', Industrial and Corporate Change, 27 (5), pp. 803–815, available at: https://www.ucl.ac.uk/bartlett/public-purpose/publications/2017/sep/mission-oriented-innovation-policy-challenges-and-opportunities [accessed 22 October 2024]

91. Mandys, F. and Coyle, D. (2024) Competitiveness, productivity and innovation in the UK's computing sector, Bennett Institute for Public Policy, available at: https://www.bennettinstitute.cam.ac.uk/wp-content/uploads/2024/06/Competitiveness-productivity-innovation-in-the-UK-computing-sector.pdf [accessed 22 October 2024]

92. For example, see this discussion on "bridging the valley of death" from 2013: Science and Technology Committee (2013), Bridging the Valley of Death, Committee's Eighth Report of Session 2012–13, available at: https://committees.parliament.uk/work/4548/bridging-the-valley-of-death-improving-the-commercialisation-of-research/news/ [accessed 22 October 2024]

93. techUK (2024) techUK creates new Scale-up Group to support the UK Government's Scale-up Sprint initiative, available at: https://www.techuk.org/resource/techuk-creates-new-scale-up-group-to-support-the-uk-government-s-scale-up-sprint-initiative.html [accessed 22 October 2024]

94. DSIT (2024) Science, Innovation and Technology Secretary Michelle Donelan's speech at Plexal, available at: https://www.gov.uk/government/speeches/science-innovation-and-technology-secretary-michelle-donelans-speech-at-plexal [acccesed 22 October 2024]

95. Council for Science and Technology (2024) Driving economic growth by unlocking investment at scale for innovative science and technology companies https://assets.publishing.service.gov.uk/media/67473ceccf0d45234dd8d0d2/CST_letter_on_scale_up_finance_-_October_2024.pdf [accessed 29 November 2024]

96. DSIT (2024) DSIT bolstered to better serve the British public through science and technology, available at: https://www.gov.uk/government/news/dsit-bolstered-to-better-serve-the-british-public-through-science-and-tech-

nology#:~:text=The%20Department%20for%20Science%2C%20Innovation,digital%20transformation%20of%20public%20services [accessed 22 October 2024]

97. South Cambridgeshire District Council: Our Productivity Plan, available at: https://www.scambs.gov.uk/your-council-and-democracy/our-business-plan-and-performance/our-productivity-plan [accessed 22 October 2024]

98. For further information, see: https://www.ai-in-education.co.uk

99. BBC News (2013) NHS IT system one of 'worst fiascos ever', say MPs, available at: https://www.bbc.co.uk/news/uk-politics-24130684 [accessed 22 October 2024]

100. Justinia T. (2017) The UK's National Programme for IT: Why was it dismantled? Health Serv Manage Res. Feb;30(1):2-9. doi: 10.1177/0951484816662492. Epub 2016 Nov 16. PMID: 28166675.

101. Zittrain, J. (2022) 'Intellectual Debt: With Great Power Comes Great Ignorance', in S. Voeneky et al. (eds.) The Cambridge Handbook of Responsible Artificial Intelligence: Interdisciplinary Perspectives. Cambridge: Cambridge University Press (Cambridge Law Handbooks), pp. 176–184.

ai@cam

ai.cam.ac.uk

For questions about this report, get in touch via the information below:

Email:
contact@ai.cam.ac.uk

Visit:
ai.cam.ac.uk

Connect on X:
@ai_cam_mission

LinkedIn:
@ai-cambridge

Connect on Bluesky:
@ai.cam.ac.uk

In partnership with:

MINDEROO CENTRE FOR TECHNOLOGY & DEMOCRACY

Bennett Institute for Public Policy Cambridge