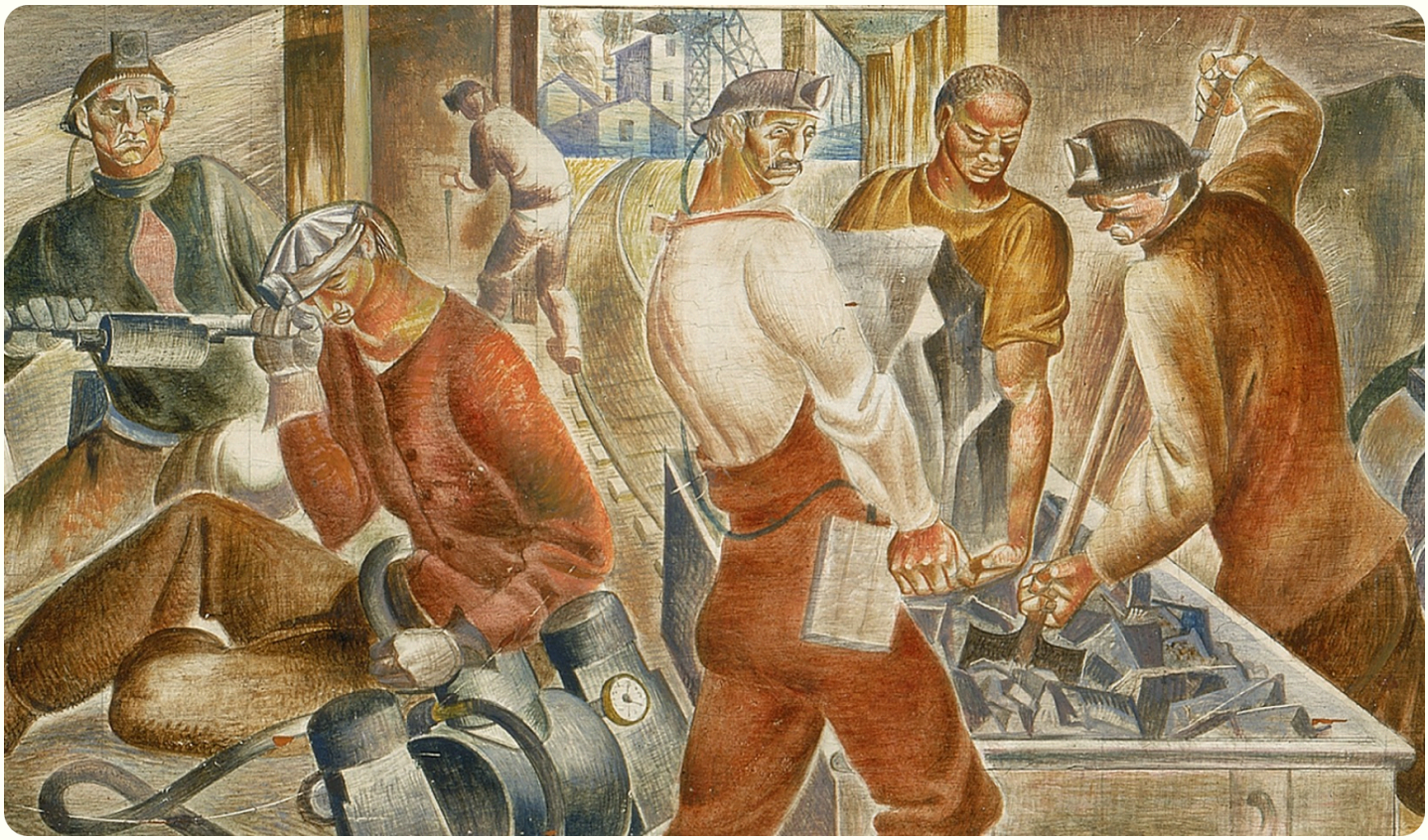

5. A Lost Decade? The UK's Industrial Approach to AI

by Matt Davies

Nearly ten years ago at time of writing, Google (now Alphabet) acquired London-based AI startup DeepMind, then famous for having made a number of breakthroughs in the field of deep reinforcement learning.[360] At the time, Google's new acquisition was met with relatively little fanfare in the domestic political arena. While doing the rounds in the business and tech press, it passed with scant mention from the commentariat and no formal statement from the government of the day. DeepMind's sole mention that year in Hansard (the official record of debates in the

[360] See Catherine Shu, "Google Acquires Artificial Intelligence Startup DeepMind for More than $500M," TechCrunch, January 26, 2014, https://techcrunch.com/2014/01/26/google-deepmind; and Samuel Gibbs, "Google Buys UK Artificial Intelligence Startup DeepMind for £400m," *Guardian*, January 27, 2014, https://www.theguardian.com/technology/2014/jan/27/google-acquires-uk-artificial-intelligence-startup-deepmind.

UK Parliament) was in a general debate on UK R&D investment in the House of Lords, several months after the acquisition had been finalized.[361]

Four years later, British investor and entrepreneur Ian Hogarth would query the wisdom of the UK government allowing the sale:

> With hindsight, would it have been better for the UK government to block this acquisition and help keep it independent? Even now, is there a case to be made for the UK to reverse this acquisition and buy DeepMind out of Google and reinstate it as some kind of independent entity?[362]

Hogarth's provocation came in an essay titled "AI nationalism," which claimed that AI was becoming an "omni-use technology that will come to touch all sectors and parts of society" and therefore also a strategic national resource.[363] Hogarth predicted an "AI arms race," in which countries would compete over AI and the factors that underpin its development: talent, compute, and access to data.

Hogarth's essay has proved prescient. In the six years since he wrote it, and in the near decade since DeepMind's sale, "AI arms race" narratives have become mainstream against the backdrop of a growing rivalry between the United States and China.[364] With it, AI has emerged as a core industrial concern for the UK, and technological sovereignty an important theme across the political spectrum.[365] In this context, DeepMind—now Google DeepMind[366]—has become a powerful symbol both of the UK's AI prowess and of the country's failure to truly compete at the frontier without US patronage.

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[361] UK Parliament, House of Lords, Hansard, "Scientific Research and Development," vol. 755, July 7, 2014, https://hansard.parliament.uk/Lords/2014-07-07/debates/14070742000334/ScientificResearchAndDevelopment?highlight=deepmind#contribution-14070742000031.
[362] Ian Hogarth, "AI Nationalism," *Ian Hogarth* (blog), June 13, 2018, https://www.ianhogarth.com/blog/2018/6/13/ai-nationalism.
[363] Ibid.
[364] See for example AI Now Institute, "Tracking the US and China AI Arms Race," April 11, 2023, https://ainowinstitute.org/publication/tracking-the-us-and-china-ai-arms-race.
[365] The term "technological sovereignty" was repeatedly used in relation to the controversy over Huawei's proposed role in providing Britain's 5G infrastructure, for example by opposition spokesperson Chi Onwurah. See Onwurah, "The Huawei Debacle Shows the Government's Failure to Invest in British Technology," New Statesman, January 30, 2020, https://www.newstatesman.com/politics/the-staggers/2020/01/huawei-debacle-shows-government-s-failure-invest-british-technology. More recently, "sovereign capabilities" have been invoked in relation to large language models (LLMs). See GOV.UK, "Initial £100 Million for Expert Taskforce to Help UK Build and Adopt Next Generation of Safe AI, press release, April 24, 2023, https://www.gov.uk/government/news/initial-100-million-for-expert-taskforce-to-help-uk-build-and-adopt-next-generation-of-safe-ai; Labour Party, "Prosperity through Partnership: Labour's Industrial Strategy," September 2022, https://labour.org.uk/wp-content/uploads/2022/09/Industrial-Strategy.pdf; Fiona Dennehy, "The Alan Turing Institute Responds to Government's New Foundation Model Taskforce," Alan Turing Institute, accessed January 11, 2024, https://www.turing.ac.uk/news/alan-turing-institute-responds-governments-new-foundational-model-taskforce; and Benedict Macon-Cooney et al, "A New National Purpose: AI Promises a World-Leading Future of Britain," Tony Blair Institute for Global Change, June 13, 2023.
[366] DeepMind remained an independent entity within Google for several years, before merging with Google Brain in 2023 to become Google DeepMind. See Sundar Pichai, "Google DeepMind: Bringing Together Two World-Class AI Teams," Google (blog), April 23, 2023, https://blog.google/technology/ai/april-ai-update. For the sake of brevity, references to the company in the remainder of this essay will use the short name.

Over the past decade, these narratives have led UK AI policy down a blind alley, providing at best only a partial solution to, and at worst a damaging distraction from, the UK's economic challenges. Instead of articulating a clear vision for the role that a domestic AI sector could play in the UK economy and how this can be achieved, the UK's industrial approach to AI has been motivated by a desire to excel within an existing framework, leading to a myopic focus on limited criteria for AI "success."

An "AI Superpower": Framing the UK's Industrial Approach to AI

The UK's industrial approach to AI is dominated by a desire to perform better than its global peers in an "AI arms race."[367] The UK government frequently claims to be "number 3 in the world on AI," behind the United States and the People's Republic of China: Secretary of State for Science, Innovation and Technology Michelle Donelan recently claimed that "we are among the top three nations in the world for AI – brushing shoulders with the US and China."[368]

This "best of the rest" status is borne out by a number of (relatively narrow) metrics: the UK boasts a high number of AI startups, is home to several world-leading academic centres of expertise in computing and data science, and consistently contributes a high number of citations to advanced AI research.[369] These metrics are routinely trotted out to buttress the UK's claims to be a "world leader"[370] and "global superpower" in AI.[371] However, enjoyment of this position is riven by a number of anxieties about the UK's role in the global AI economy.

The first of these concerns the narrowness of the UK's advantage in AI, which is closely tied to the presence of DeepMind. Discounting DeepMind, the UK's share of

[367] AI Now Institute, "Tracking the US and China AI Arms Race."
[368] Michelle Donelan, "Secretary of State Speech to AI Fringe," Department for Science, Innovation and Technology, November 13, 2023, https://www.gov.uk/government/speeches/secretary-of-state-speech-to-ai-fringe.
[369] See, e.g. Nathan Benaich, "State of AI Report," October 12, 2023, https://www.stateof.ai; and Serena Cesareo and Joseph White, "The Global AI Index," Tortoise Media, accessed January 12, 2024, https://www.tortoisemedia.com/intelligence/global-ai.
[370] Department for Business, Energy and Industrial Strategy, "UK Industrial Strategy," GOV.UK, 2017, https://assets.publishing.service.gov.uk/media/5a75559fe5274a3cb28699b5/uk-industrial-strategy-international-brochure-single-pages.pdf.
[371] See for example Department for Science, Innovation and Technology et al., "National AI Strategy," GOV.UK, September 22, 2021, https://www.gov.uk/government/publications/national-ai-strategy; and Department for Business, Energy and Industrial Strategy, "Establishing a Pro-Innovation Approach to Regulating AI," GOV.UK, July 18, 2022, https://www.gov.uk/government/publications/establishing-a-pro-innovation-approach-to-regulating-ai/establishing-a-pro-innovation-approach-to-regulating-ai-policy-statement.

citations in the top 100 recent AI papers drops from to 7.2 to 1.9 percent.[372] As noted in 2018 by Hogarth and by many others since, the UK is therefore in the peculiar position of boasting a "national champion" that is primarily based in London but owned elsewhere. Yet this statistic also suggests a further type of narrowness: that of judging AI "success" through frontier research alone. Evidence of business uptake of AI in the UK is uneven and, as we will see, support for commercialisation has become a recurring focus of government strategies. Beyond DeepMind,[373] the UK's AI sector continues to be centered on London and Cambridge, and dependent on a small number of other high-performing labs.

A second, related anxiety concerns the precarity of the UK's position in the long term due to relatively low levels of investment, notably in compute resources,[374] or to the failure to "unlock" the latent value of assets such as public-sector data.[375] Overall, the UK possesses only 1.4 percent of total global compute capacity, ranking tenth in the world behind countries such as Italy, Russia, and Finland.[376] This represents a significant decline from the country's placing of third in the world as recently as 2005, and can be viewed as a consequence of sustained low investment in science and technology compared with other large economies in the nearly two decades since.[377] Over the same period, reliance on compute resources has increased,[378] leaving UK firms reliant on private-sector rentiers, and vulnerable to pressures that incentivize acquisition: DeepMind, for instance, cited access to compute as a reason for choosing to be acquired by Google.

A third anxiety is dependence on other countries, both in economic and regulatory terms. DeepMind, of course, is owned by Google, but many other UK firms were founded by consortia led by US venture capital (VC) investment. In contrast to other countries, the UK lacks the institutional financing mechanisms to back these kinds of firms domestically, and steps to unlock this (such as moves to reform pension

[372] Anjana Ahuja, "World-Leading? Britain's Science Sector Has Some Way to Go," *Financial Times*, March 15, 2023, https://www.ft.com/content/470e9848-b2dd-4ad5-94cb-65e95c226545.
[373] Department for Digital, Culture, Media and Sport, "AI Activity in UK Businesses: An Assessment of the Scale of AI Activity in UK Businesses and Scenarios for Growth over the Next Twenty Years," GOV.UK, January 2022, https://assets.publishing.service.gov.uk/media/61d87355e90e07037668e1bd/AI_Activity_in_UK_Businesses_Report__Capital_Economics_and_DCMS__January_2022__Web_accessible_.pdf.
[374] For an argument that compute is likely to be a key constraint on the UK's AI ambitions going forward, see Department for Science, Innovation and Technology, "Independent Review of the Future of Compute: Final Report and Recommendations," GOV.UK, March 6, 2023, https://www.gov.uk/government/publications/future-of-compute-review/the-future-of-compute-report-of-the-review-of-independent-panel-of-experts.
[375] John Taysom, , "Health Data Could Form the Basis of a UK Sovereign Wealth Fund," *Financial Times*, February 17, 2023, https://www.ft.com/content/e9cc9889-5711-4842-8e3c-bcb752e2c598.
[376] Mark Sellman, Britain Falls Behind Russia, Italy and Finland in Computing Power, " Times, March 6, 2023, https://www.thetimes.co.uk/article/britain-falls-behind-russia-italy-and-finland-in-computing-power-mn0r9cv3m.
[377] Ibid.
[378] Jaime Sevilla et al. , "Compute Trends across Three Eras of Machine Learning," Epoch, February 16, 2022, https://epochai.org/blog/compute-trends.

funds) have faced delays.[379] In the context of the emerging regulatory race on AI,[380] it is unclear whether the UK is significant enough in market terms to shape or drive up standards, or even maintain any sort of meaningful regulatory independence from the European Union's "Brussels effect"[381]. The UK does not meaningfully influence the direction of AI development, either through investment or regulation, at the scale of the US, China, or the European Union—and this state of affairs is unlikely to change in the near future.

In reaction to these interlinked anxieties, the UK's rhetoric and strategies in this area have exhibited both boosterism and what David Edgerton has termed "declinism,"[382] marked by a deep insecurity about the UK's place in the world and (lack of) ability to play a driving role in the development of globally transformative technologies. Google DeepMind forms something of a metonym for both, representing at once the UK's success as an attractive destination for AI investment, and its failure to cultivate a world-leading "national champion" that is genuinely independent.

The UK's AI Strategies

Recent years have seen significant political churn at the top of UK government.[383] This has disrupted almost every policy area, and prevented the adoption of a consistent approach to industrial policy: as recently noted by the Institute for Public Policy Research, since the 2010 general election there have been "11 growth plans or industrial and economic strategies overseen by nine business secretaries and seven chancellors of the exchequer."[384]

[379] Josephine Cumbo, "UK Pension Funds Warn of Roadblocks to Mansion House Reforms," https://www.ft.com/content/51dd6da0-7a92-449e-8414-24182a2257ad.
[380] Natalie A. Smuha, "From a 'Race to AI' to a 'Race to AI Regulation': Regulatory Competition for Artificial Intelligence," Law, Innovation and Technology 13, no. 1 (March 23, 2021): 57–84, https://doi.org/10.1080/17579961.2021.1898300.
[381] Anu Bradford, "The Brussels Effect," *Northwestern University Law Review* 107, no. 1 (2012), https://ssrn.com/abstract=2770634.
[382] David Edgerton, "Yes, We're in a Bad Way. But to Wallow in Myths of British 'Declinism' Won't Help Us Thrive," Guardian, June 12, 2022, https://www.theguardian.com/commentisfree/2022/jun/12/yes-were-in-a-bad-way-but-to-wallow-in-myths-of-british-declinism-wont-help-us-thrive.
[383] The Institute for Government has referred to this as the "policy churn cycle" and has noted its acceleration in recent years. See Emma Norris et al., "Government Reshuffles: The Case for Keeping Ministers in Post Longer," Institute for Government, January 24, 2020, https://www.instituteforgovernment.org.uk/publication/report/government-reshuffles-case-keeping-ministers-post-longer.
[384] Sam Alvis et al., "Making Markets in Practice," IPPR, November 27, 2023, https://www.ippr.org/research/publications/making-markets-in-practice.

AI is no exception, with the development of the UK's approach marked by both evolution and discontinuity. The policies of the post-2010 Conservative-led governments can broadly be periodized into four eras:

- Pre-2016: focus on digital economy, digital government and "Big Data"
- 2016–2019: turn to sectoral "industrial strategy"
- 2020–2023: institutionalization of AI policy
- 2023: pivot to "AI safety"

What follows is a brief overview of each of these eras, focusing on the emergence of AI as an industrial focus for the UK through the framing lenses described above.

Pre-2016: Focus on Digital Economy, Digital Government and "Big Data"

Between 2010 and 2016—the period in which DeepMind was acquired by Google[385]—AI and other data-driven technologies did not yet enjoy the prominence they would later achieve. Data and AI were predominantly seen as verticals within the broader rubric of the "digital economy" rather than a strategic focus in their own right.

This era was characterized by a focus on government modernization initiatives, represented most prominently by the launch of gov.uk and the creation of Government Digital Services (GDS).[386] These initiatives aimed to improve public services, with the side effect of making government a smarter client for a burgeoning startup sector through the streamlining of internal processes, open sharing of government data and the breaking up of monopolies with a stranglehold on government procurement. Yet by the end of this period the ambition of GDS had been reined in, with key staff leaving the organization,[387] and the focus of other organizations such as the Open Data Institute—founded in 2012 with a remit to support businesses to innovate with government open data[388]—had drifted.[389]

[385] Gibbs, "Google Buys UK Artificial Intelligence Startup DeepMind for £400m."
[386] Chris Middleton, "Maude Sets Out 'Digital by Default,' Single-Platform Vision for UK Government," Computing, June 12, 2012, https://www.computing.co.uk/analysis/2183794/maude-sets-digital-default-single-platform-vision-uk-government.
[387] Derek du Preez, "Why Are Senior Staff Fleeing the Government Digital Service?" *Guardian*, August 12, 2015, https://www.theguardian.com/public-leaders-network/2015/aug/12/government-digital-service-staff-resignations.
[388] Cabinet Office, "Plans to Establish Open Data Institute Published," press release, GOV.UK, May 22, 2012, https://www.gov.uk/government/news/plans-to-establish-open-data-institute-published.
[389] Open Data Institute, "Knowledge for Everyone: ODI's Third Year," 2016, https://www.scribd.com/doc/311714343/ODI-s-3rd-Year-Annual-Report.

The scope for broader industrial interventions during this period was highly circumscribed by tight fiscal policy and a laissez-faire approach to the economy. The coalition government's austerity agenda—more severe than that adopted by any of the UK's European peers[390]—drove cuts to departmental budgets and dramatic falls in state investment, contributing to the UK's relative decline in access to underlying AI infrastructure such as compute. While ministers sang paeans to the potential of the "Big Data" revolution,[391] state support for technology consisted primarily in reforms to the tax system such as the introduction of the Seed Enterprise Investment Scheme (SEIS), the so-called "patent box" tax incentive, and enhancements to R&D tax credits. Evidence of impact for these initiatives is limited,[392] and UK business investment in R&D remains significantly lower than the Organisation for Economic Co-operation and Development (OECD) average.[393]

Ultimately, however, the role played by government here was chiefly that of an ambassador for businesses through the establishment of organizations like TechNation (in 2014), rather than that of a standards setter, regulator, or leader. The creation of the Catapult Network from 2012 onward marked a focus on commercializing technology that would persist in subsequent periods, with this program enjoying mixed success.[394]

2016–2019: Turn to Sectoral "Industrial Strategy"

Following the Brexit vote and under the leadership of Theresa May, the UK Government adopted more statist and interventionist rhetoric, epitomized by the creation of a new department for Business, Energy and Industrial Strategy.[395] However, this rhetoric was not always accompanied by greater government intervention in practice.

[390] See for example Harry Quilter-Pinner and Dean Hochlaf, Austerity: There Is an Alternative and the UK Can Afford to Deliver It," IPPR, April 19, 2019, https://www.ippr.org/blog/austerity-there-is-an-alternative-and-the-uk-can-afford-to-deliver-it.
[391] "The [Big] Data Revolution" was famously one of the "Eight Great Technologies", first set out in a speech by then-Chancellor of the Exchequer George Osborne, and later detailed by Minister of State for Universities and Science David Willets. See "Osborne champions science in a speech at the Royal Society," Royal Society, November 12, 2012, https://www.ippr.org/blog/austerity-there-is-an-alternative-and-the-uk-can-afford-to-deliver-it; and David Willets, "Eight Great Technologies", Policy Exchange, 2013.
[392] British Academy, "What Role Do R&D Tax Reliefs Play in Encouraging UK R&D?" accessed January 18, 2024, https://www.thebritishacademy.ac.uk/documents/207/What-role-do-RD-tax-reliefs-play-in-encouraging-UK-RD.pdf.pdf.
[393] Organisation for Economic Co-operation and Development (OECD), "Research and Development (R&D) – Gross Domestic Spending on R&D," https://www.oecd.org/sti/msti.htm.
[394] Ernst & Young , *UK SBS PS17086 Catapult Network Review*, November 17, 2017, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/662509/Catapult_Review_-_Publishable_Version_of_EY_Report__1_.pdf.
[395] "About Us," Department for Business, Energy and Industrial Strategy, accessed January 30, 2024, https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about.

There was some fiscal loosening in this period, but public investment remained far below the median for OECD countries.[396] There was also little willingness to use the tools of industrial policy to more aggressively shape industry behavior—as exemplified by the Government's decision not to block takeovers such as the acquisition of chip manufacturer ARM by SoftBank, despite calls from the opposition parties and voices within the tech sector.[397]

The language of "grand challenges" used in the government's industrial strategy aped that of prominent innovation economist Mariana Mazzucato, who briefly advised government.[398] Despite this, the approach to industrial strategy remained fundamentally sectoral rather than mission-led, with each of the government's four grand challenges broadly corresponding to areas of the economy.

While the rubric of "digital" persisted, with the government publishing a digital strategy, it was during this period that AI emerged as a concern in itself.[399] One of the industrial strategy's "grand challenges" was "Growing our Artificial Intelligence and Data-Driven Economy"; accordingly, strategies for AI were published including the 2017 Hall review[400] and the 2018 AI Sector Deal[401] that leaned into global competition narratives, pledging to "put the UK at the forefront of the AI and data revolution."[402] In each of these documents, the growth of the AI sector was taken as a paramount purpose, with emphasis placed on skills, access to data, research environment, and commercialization as means of achieving this end.

While the investments accompanying these strategies were relatively small, they did seed some institutions that would assume importance in the growth and

[396] Office for Budget Responsibility, "International Comparisons of Government Investment," March 2020, https://obr.uk/box/international-comparisons-of-government-investment.
[397] David Bond, Robert Cookson, and Lauren Fedor, 'UK Government Welcomes Arm Takeover but Tech Leaders Mourn Loss," *Financial Times*, July 18, 2016, https://www.ft.com/content/e5e0cf3e-4cc4-11e6-88c5-db83e98a590a.
[398] UCL Institute for Innovation and Public Purpose, 'A Mission Oriented Industrial Strategy: UCL-IIPP Commission Meets with Greg Clark,' March 7, 2018, https://www.ucl.ac.uk/bartlett/public-purpose/news/2018/mar/mission-oriented-industrial-strategy-ucl-iipp-commission-meets-greg-clark.
[399] Department for Science, Innovation and Technology, Department for Digital, Culture, Media and Sport, and Karen Bradley, "UK Digital Strategy," GOV.UK, March 1, 2017, https://www.gov.uk/government/publications/uk-digital-strategy.
[400] Wendy Hall and Jérôme Pesenti, "Growing the Artificial Intelligence Industry in the UK," Department for Science, Innovation and Technology, Department for Digital, Culture, Media & Sport, and Department for Business, Energy & Industrial Strategy, GOV.UK, October 15, 2017, https://www.gov.uk/government/publications/growing-the-artificial-intelligence-industry-in-the-uk.
[401] Department for Business & Trade, et al., "AI Sector Deal," GOV.UK, May 21, 2019, https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal.
[402] Department for Business, Energy and Industrial Strategy, "The Grand Challenges," GOV.UK, updated January 26, 2021, withdrawn March 1, 2023, https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges.

institutionalization of UK AI policy: notably the Centre for Data Ethics and Innovation[403] and the Alan Turing Institute, which added AI to its remit in 2017.[404]

2020–2023: Institutionalization of AI Policy

The period from 2020 onward marked the institutionalization of AI policy in the UK. The 2020 National Data Strategy and 2021 AI Strategy framed data and AI as national assets to be stewarded and "unlocked" in order to yield benefits across the economy and "[to ensure that] AI benefits all sectors and regions."[405] In order to facilitate this, a premium was placed on public trust.[406] Major regulators, such as the Competition and Markets Authority (CMA) through its Digital Markets Unit, began to acquire strong data and AI capabilities.[407]

These developments, a consequence of the foundations laid in the previous "industrial strategy period," led to a proliferation of new institutions and government teams focused on data and AI. This stronger institutional landscape was, however, undermined by continued low resourcing and frequent refocusing of political objectives (illustrated by the replacement of the May government's industrial strategy with a post-COVID "Plan for Growth").[408]

One symptom of this was the Data Protection and Digital Information Bill, which was developed in this period and has yet to pass Parliament. The bill represents contradictory impulses: on one hand it aims to carry out a deregulatory strategy inspired by the Taskforce on Growth and Regulatory Reform,[409] while on the other it takes forward measures such as Smart Data more closely associated with the interventionist approach of the Furman Review.[410] Similarly, the 2023 AI regulation white paper published by the Department of Science, Innovation and Technology (DSIT) set out to empower regulators and enable a context-specific approach to AI

[403] "About Us," Centre for Data Ethics and Innovation, GOV.UK, accessed January 30, 2024 https://www.gov.uk/government/organisations/centre-for-data-ethics-and-innovation/about.
[404] "About Us," Alan Turing Institute, accessed January 30, 2024, https://www.turing.ac.uk/about-us.
[405] Department for Science, Innovation and Technology et al., "National AI Strategy."
[406] Frontier Economics, *Increasing Access to Data across the Economy*, March 2021, https://assets.publishing.service.gov.uk/media/6062e149d3bf7f5cde260991/Frontier-access_to_data_report-26-03-2021.pdf.
[407] Competition and Markets Authority, "Digital Markets Unit," GOV.UK, April 7, 2021, https://www.gov.uk/government/collections/digital-markets-unit.
[408] HM Treasury, "Build Back Better: Our Plan for Growth," GOV.UK, March 3, 2021, https://www.gov.uk/government/publications/build-back-better-our-plan-for-growth.
[409] Taskforce on Innovation, Growth and Regulatory Reform, Taskforce on Innovation, Growth and Regulatory Reform I*ndependent Report*, June 16, 2021, https://www.gov.uk/government/publications/taskforce-on-innovation-growth-and-regulatory-reform-independent-report.
[410] HM Treasury, *Unlocking Digital Competition, Report of the Digital Competition Expert Panel*, March 13, 2019, https://www.gov.uk/government/publications/unlocking-digital-competition-report-of-the-digital-competition-expert-panel.

governance, but was undercut by government's unwillingness to endow regulators with new statutory powers.[411]

During this period, UK funding for innovation policy increased, with the adoption of a target of 2.4 percent GDP[412] and the establishment of the Advanced Research and Invention Agency (ARIA),[413] modeled on the US's Defense Advanced Research Projects Agency (DARPA). Reflecting the increased role of compute in AI development,[414] and the UK's relative weaknesses in compute provision, compute resources came into focus as a key strand of UK AI policy with the commissioning of the Independent Review into the Future of Compute, and a change to R&D tax credits making compute investments eligible for tax relief.[415]

A Lost Decade? Recurring Themes in UK AI Policy

Ten years on from the DeepMind takeover, has the UK developed a coherent or distinctive industrial approach to AI? The discontinuity between these phases makes it difficult to claim so. Nonetheless, we can identify a number of common themes.

Throughout the past decade, the UK government has consistently advanced a shrewd assessment of the country's assets in relation to AI: namely a strong academic and research sector, an internationally significant industry cluster, and valuable public data held by the NHS and the other remnants of the postwar welfare state. It has, to a degree, successfully parlayed this into significant state and regulatory capacity: regulators such as the Information Commissioner's Office (ICO) and the CMA are considered global leaders in their fields, while DSIT now houses a significant number of AI policy experts and, following the establishment of the Frontier AI Taskforce and AI Safety Institute, increased technical expertise.

[411] Department for Science, Innovation and Technology and Office for Artificial Intelligence, , "A Pro-Innovation Approach to AI Regulation," UK.GOV, March 29, 2023, https://www.gov.uk/government/publications/ai-regulation-a-pro-innovation-approach/white-paper.
[412] UK Parliament, House of Commons Library, *Research and Development Spending*, September 11, 2023, https://commonslibrary.parliament.uk/research-briefings/sn04223.
[413] Advanced Research and Invention Agency (ARIA), https://www.aria.org.uk, accessed January 30, 2024.
[414] See Jai Vipra and Sarah Myers West "Computational Power and AI," AI Now Institute, September 27, 2023, https://ainowinstitute.org/publication/policy/compute-and-ai; and Jaime Sevilla et al., , "Compute Trends across Three Eras of Machine Learning," Epoch, February 16, 2022, https://epochai.org/blog/compute-trends.
[415] HM Treasury, *Spring Statement*, GOV.UK, March 2022, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1062486/Spring_Statement_2022_Web_Accessible.pdf.

However, coordination between these different actors has often been weak and progress has been stymied due to competing agendas, institutional churn, and a fragmented regulatory landscape.[416] The relative weakness of central coordinating institutions and long-term technology horizon-scanning capabilities[417] cannot be ignored, leaving government technology strategy reliant on ministerial whim, unpredictable market coordination, and external expertise from industry. This institutional gap has meant that while the aspiration of joined-up government to marshal AI toward strategic challenges has often been expressed, in practice this has happened only infrequently. The design and implementation of public infrastructures to deliver these benefits has also been limited by consistently low resourcing due to fiscal restrictions, with even the 2023 public compute announcements relatively conservative in global terms.

But it also reflects the fact that central government has rarely, if ever, advanced a coherent vision for the role that a domestic AI sector should play within the UK economy. Strategic challenges and public benefits have frequently been invoked, from innovation in particular areas (such as new drug discovery and low carbon technologies) or specific economic goals (such as economic rebalancing or higher productivity). It is frequently assumed that a growing UK AI sector will lead to these outcomes; "promoting adoption" is the aim, not leading or shaping AI development. There has been little reflection on the type of AI sector that might achieve particular outcomes—notwithstanding the occasional allusion to the UK as an AI assurance hub,[418] or a center for "safe" or "responsible" AI. Success has usually been understood in crude terms related to the size of a relatively ill-defined sector: more AI startups, more "unicorns," greater private investment in "AI" understood broadly, and so on.

Consequently, the approach has often been to try to platformize the UK's assets—with perhaps the clearest example of this being public, and particularly NHS, data—so that they can better service a growing private sector. There has been little attempt to leverage access to these assets to shape industry behavior, or use other levers to shape industry (such as the introduction of hard regulation, the

[416] Notwithstanding, in the latter case, promising movement towards the coordination of a small number of leading regulators under the aegis of the Digital Regulation Cooperation Forum (DRCF). See Competition and Markets Authority, Information Commissioner's Office, Ofcom, and Financial Conduct Authority, "The Digital Regulation Cooperation Forum," GOV.UK, 10 March 2021, https://www.gov.uk/government/collections/the-digital-regulation-cooperation-forum.
[417] For a discussion of this, see for example Allan Nixon, Anna Dickinson, and Anastasia Bektimirova, *Wired for Success: Reforming Whitehall to Support Science and Technology*, Onward, August 1, 2023, https://www.ukonward.com/reports/wired-for-success.
[418] Cabinet Office, "Global Britain in a Competitive Age: The Integrated Review of Security, Defence, Development and Foreign Policy," GOV.UK, March 16, 2021, https://www.gov.uk/government/publications/global-britain-in-a-competitive-age-the-integrated-review-of-security-defence-development-and-foreign-policy.

blocking of takeovers, or the acquisition of public stakes in strategically important companies). Even the AI Safety Institute—heralded as a "startup within government"[419] and an attempt to do something different by building state capacity on AI—risks essentially becoming the provider of voluntary services to large incumbent companies.

In other sectors—and particularly those sectors considered to be of infrastructural importance, such as medicines and energy[420]—this approach would not pass muster. Instead, as seen through the international turn toward the "strategic state," governments are increasingly using industrial policy tools to shape and "direct" growth in key sectors toward societal benefits. This trend can be seen most clearly in the example of the energy transition. Both the Inflation Reduction Act in the United States[421] and the Net-Zero Industry Act in the European Union include measures to "crowd in" private investment toward goals linked to decarbonization. [422] Others have argued that such a market-shaping approach is warranted in the case of AI to "better align domestic investment and AI capability development with economic, societal and national security objectives."[423] While at times parts of government have made overtures to this school of thought—notably during the 2016 to 2019 period under Greg Clark as Secretary of State for Business, Energy and Industrial Strategy—the substantive policy commitments necessary to carry through such an approach have consistently been lacking.

Fantasies of Independence

Instead of assuming that any and all types of AI will produce economic growth and societal surplus with minimal state intervention, government needs to develop a

[419] Notably by Ian Hogarth in AI Safety Institute and Department for Science, Innovation and Technology, *Frontier AI Taskforce: Second Progress Report*, GOV.UK, October 30, 2023, https://www.gov.uk/government/publications/frontier-ai-taskforce-second-progress-report/frontier-ai-taskforce-second-progress-report.
[420] Julia Smakman, Matt Davies, and Michael Birtwistle, *Mission Critical: Lessons from Relevant Sectors for AI Safety*, Ada Lovelace Institute, October 31, 2023, https://www.adalovelaceinstitute.org/policy-briefing/ai-safety.
[421] White House, *Inflation Reduction Act Guidebook*, November 28, 2023, https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook.
[422] ""The Net-Zero Industry Act," European Commission, accessed January 30, 2024, https://single-market-economy.ec.europa.eu/industry/sustainability/net-zero-industry-act_en.
[423] Mariana Mazzucato, Marietje Schaake, Seb Krier, and Josh Entsminger, "Governing Artificial Intelligence in the Public Interest, UCL Institute for Innovation and Public Purpose, July 28, 2022, https://www.ucl.ac.uk/bartlett/public-purpose/publications/2022/jul/governing-artificial-intelligence-public-interest. The notion of a challenge-led approach to governing AI has also been articulated by, among others, Harry Farmer, *Regulate to Innovate: A Route to Regulation That Reflects the Ambition of the UK AI Strategy*, Ada Lovelace Institute, November 2021, https://www.adalovelaceinstitute.org/wp-content/uploads/2021/12/Regulate-to-innovate-Ada-report.pdf; and Francesca Bria, "Open, Sovereign, Independent AI: Europe's Greatest Challenge?" Medium, December 10, 2023, https://medium.com/@francescabria/open-sovereign-independent-ai-europes-greatest-challenge-6c8a899041ec.

clear articulation of what "public benefit" looks like in the context of AI and what sort of AI sector will deliver it. It also needs to understand how AI—as a general-purpose technology influencing the development of other sectors—impinges on other long-term priorities such as environmental obligations[424] and the concentration of power in the digital economy.[425]

This more strategic conception of industrial policy has renewed currency in many parts of the world today—but in the UK this has only manifested itself in fits and starts, and predominantly in rhetorical terms. The UK continues to perform relatively well against global peers on a number of narrow metrics related to frontier research. However, the succession of strategies adopted over the last 10 or so years has failed to alleviate the anxieties discussed above. The UK's AI economy remains narrow, larger on paper than in its footprint in our society. Those advantages it does enjoy over its European peers are precarious and in certain respects are being eroded by underinvestment. And the shape, pace, and direction of AI development in the UK is dictated not in Westminster or Whitehall, but overwhelmingly in the boardrooms and pitch decks of Silicon Valley.

This is at least in part because of our attachment to the founding myth of British AI policy: that of the arms race. Arms race narratives are implicitly linear, positioning individual states as able to influence the pace but not the direction of economic development and technological change. They take for granted that increased support for UK firms will lead to the UK becoming a global leader in AI development, and that achieving this position will—by virtue of "winner-takes-all" dynamics and the putative tendency of wealth to "trickle down"—deliver sustained value for the public.

The arms race offers a fantasy of independence that masks deeper structural dependence on a paradigm of AI development led by, and wholly dependent on, funding and infrastructures provided by Silicon Valley.[426] In this sense the question we started with from Ian Hogarth is misframed: it is not clear to what extent DeepMind ever represented a truly "independent entity," given how intertwined its

[424] Emily Clough, "Net Zero or Net Hero? The Role of AI in the Climate Crisis," Ada Lovelace Institute, September 15, 2023, https://www.adalovelaceinstitute.org/resource/climate-change-ai.
[425] Valentina Pavel et al., *Rethinking Data and Rebalancing Digital Power*, Ada Lovelace Institute, 2022, https://www.adalovelaceinstitute.org/project/rethinking-data.
[426] See David Gray Widder, Sarah West, and Meredith Whittaker, "Open (For Business): Big Tech, Concentrated Power, and the Political Economy of Open AI," August 18, 2023, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4543807; and Barry Lynn, Max von Thun, and Karina Montoya, *AI in the Public Interest: Confronting the Monopoly Threat*, Open Markets Institute, November 2023, https://www.openmarketsinstitute.org/publications/report-ai-in-the-public-interest-confronting-the-monopoly-threat.

early history was with US venture capital[427] and how wedded its aspirations were to the existing Silicon Valley model.

This model of AI development militates against many of the UK government's other stated policy aims and (in some cases) its legally mandated targets. It is highly resource intensive, monopolizing investment[428] and extracting huge ecological[429] and human[430] costs.[431] It concentrates power, with even "open" iterations and academic labs dependent on and shaped by corporate infrastructure,[432] and market entrants vulnerable to anticompetitive practices.[433] It drives harms such as misinformation, exploitation, and oversurveillance, with few incentives in existing law for developers or deployers to ensure their systems are "safe."[434] AI and other data-centric technologies often don't work as intended outside of deployed settings[435] and can deepen existing inequalities,[436] yet aggressive marketing campaigns led by the private sector often oversell their benefits, particularly in public-sector contexts.[437] It is far from clear that simply "Growing the AI industry in the UK"—as the 2017 Hall review was titled—will lead to positive outcomes for the UK.[438]

True "independence" would be to challenge this paradigm and articulate a vision of AI that links its functioning in the UK economy to a wider vision about the society we want to live in. By leveraging those strengths it does have, the UK could incentivize types of AI that preserve privacy, respect ecological boundaries, and create genuine societal benefit, from climate action to new drug discovery. This is

[427] See Cade Metz, Karen Weise, Nico Grant, and Mike Isaac, "Ego, Fear and Money: How the A.I. Fuse Was Lit," *New York Times*, December 3, 2023, https://www.nytimes.com/2023/12/03/technology/ai-openai-musk-page-altman.html.
[428] Perhaps the most pronounced in the example of compute costs: if model sizes continue growing along the current trajectory, some estimates place compute costs in excess of the entire US GDP by 2037. See Lennart Heim, "This Can't Go On(?) – AI Training Compute Costs," **.XYZ* (blog), June 1, 2023, https://blog.heim.xyz/this-cant-go-on-compute-training-costs; and Vipra and West, "Computational Power and AI."
[429] Clough, "Net Zero or Net Hero?"
[430] See for example Billy Perrigo, "OpenAI Used Kenyan Workers on Less than $2 per Hour to Make ChatGPT Less Toxic," *Time*, January 18, 2023, https://time.com/6247678/openai-chatgpt-kenya-workers. These effects typically accrue to workers in global majority countries; for more information, see Aditya Singh and Daniel Vale, "A New AI Lexicon: Existential Risk," AI Now Institute,October 8, 2021, https://ainowinstitute.org/publication/a-new-ai-lexicon-existential-risk.
[431] See Heim "This Can't Go On"; and Vipra and West, "Computational Power and AI."
[432] See Widder, Whittaker, and West, "Open (For Business)"; and Meredith Whittaker, "The Steep Cost of Capture," *Interactions* 28, no. 6 (November–December 2021): 50–55, https://doi.org/10.1145/3488666.
[433] As noted in Competition and Markets Authority, *AI Foundation Models: Initial Report*, GOV.UK, September 18, 2023, https://www.gov.uk/government/publications/ai-foundation-models-initial-report.
[434] AWO, "AWO Analysis Shows Gaps in Effective Protection from AI Harms," AWO (blog), July 17, 2023, https://www.awo.agency/blog/awo-analysis-shows-gaps-in-effective-protection-from-ai-harms.
[435] Inioluwa Deborah Raji et al., "The Fallacy of AI Functionality," *arXiv* 2206.09511, no. 2, July 1, 2022, https://arxiv.org/abs/2206.09511.
[436] The tendency of datacentric technologies to exacerbate existing socioeconomic inequalities is a key finding of the Ada Lovelace Institute's three-year program of work on healthcare in partnership with the Health Foundation. See for instance Anna Studman, "Access Denied? Socioeconomic Inequalities in Digital Health Services," Ada Lovelace Institute, September 18, 2023, https://www.adalovelaceinstitute.org/report/healthcare-access-denied.
[437] The secrecy of these practices makes them difficult to describe in detail, but their prevalence is well known and reported on. See for instance Adam Satariano, "Palantir Wins Major U.K. Health Contract Despite Criticism," *New York Times*, November 21, 2023, https://www.nytimes.com/2023/11/21/business/palantir-nhs-uk-health-contract-thiel.html.
[438] Hall and Pesenti, "Growing the Artificial Intelligence Industry in the UK."

not to adopt boosterish—some might say quixotic—narratives about leading the world, or beating the United States and China at their own games: the UK is a small market in global terms, facing profound challenges. It is equally to avoid declinism and be realistic about the assets the British state has and the agency that they bestow: to choose not to subsidize a trajectory of continual development but instead to think critically about whether and how we continue to embed these technologies in our daily lives.

Politicians on both sides of politics are currently preaching stability and "long-term" policymaking[439] as an antidote to the "age of insecurity."[440] The opposition Labour party, which—according to current polling—is likely to win this year's general election, has expressed a willingness to take a more proactive role in shaping technology toward public benefit. There is therefore an opportunity for 2024 to mark a reorientation of the UK's industrial policy for AI toward more concerted and strategic ends. To do so will require a rejection of the existing model of AI development, and the negotiation of a new partnership on more even terms.

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[439] In different guises: Prime Minister Rishi Sunak has adopted the rhetoric of "long-term decisions" while moving away from institutions such as the Committee on Climate Change that are designed to embed long-term perspectives in policymaking. (See Hannah White, "Rishi Sunak's 'wholly new kind of politics' does not bear scrutiny," Institute for Government, September 27, 2023, https://www.instituteforgovernment.org.uk/comment/sunak-politics-scrutiny.) Keir Starmer's Labour Party has similarly promised to end "sticking-plaster politics," but has promised to *create* new institutions of this nature akin to the Office for Budgetary Responsibility (OBR) and the Climate Change Committee (CCC). See Labour Party, "5 Missions for a Better Britain," 2023, https://labour.org.uk/wp-content/uploads/2023/02/5-Missions-for-a-Better-Britain.pdf; and Chris Smyth, "New Watchdogs Could See Labour's Promises Are Kept," *Times*, October 9, 2023, https://www.thetimes.co.uk/article/new-watchdogs-could-see-labours-promises-are-kept-rdh3tc26s.

[440] For a discussion of the "age of insecurity," see for example Labour Party, "Rachel Reeves: 'Securonomics'," press release, May 24, 2023, https://labour.org.uk/updates/press-releases/rachel-reeves-securonomics; and Labour Party, "Rachel Reeves Speech at Labour Conference," press release, October 9, 2023 https://labour.org.uk/updates/press-releases/rachel-reeves-speech-at-labour-conference.