

# Report: Generative AI in Healthcare as a Driver of Economic Growth in the UK





# HealthcareUK

A joint initiative between



This report was commissioned by Healthcare UK. The research, analysis, and proposals contained within this report were developed independently by the authors and do not necessarily represent the views of the UK Government.

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**nhsinnovations.uk**

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## Executive Summary

**The United Kingdom stands at a crossroads, where technological innovation, healthcare transformation, and economic renewal converge, forcing the nation to make decisive choices about its future path. As the UK navigates modest economic growth and a healthcare system under profound pressure, Generative AI has emerged not merely as a technological advancement but as a strategic catalyst capable of addressing pressing national imperatives.**

The Plan for Change<sup>1</sup> published in December 2024 set out five national missions to drive government policy and national renewal.

- Kickstart economic growth – to drive growth, rebuild Britain, support good jobs, unlock investment, and improve living standards across the country.
- Make Britain a clean energy superpower through delivering clean power by 2030 and accelerating to net zero.
- Take back our streets by halving serious violent crime and raising confidence in the police and criminal justice system to its highest levels.
- Break down barriers to opportunity by reforming our childcare and education systems, to make sure there is no class ceiling on the ambitions of our young people.
- Build an NHS fit for the future that is there when people need it, where everyone lives well for longer.



The NHS's triple transformation agenda – transitioning from hospital to community, analogue to digital, and sickness to prevention – creates a potential virtuous cycle where enhanced healthcare efficacy leads to increased workforce participation, economic growth, increased tax revenue, and ultimately, strengthened public service capacity. Generative AI is uniquely positioned to accelerate this transformation.

*The UK now hosts approximately 30% of all Generative AI startups in Europe<sup>2</sup>, with roughly £200 million in private investment flowing into the nation's AI industry each day since mid-2024<sup>3</sup>. As of March 2025, the UK AI sector is valued at over USD \$92 billion and projected to surpass USD \$1 trillion by 2035<sup>4</sup>*

## The AI opportunity

With their comprehensive longitudinal patient data spanning diverse populations and unified public structures, the UK's health systems (particularly NHS England), represents an unparalleled national asset in the global AI landscape. This sovereign data resource, when thoughtfully deployed within appropriate ethical and governance frameworks, creates a distinctive competitive advantage that few other nations can match.

1. Plan for Change - GOV.UK (Accessed 20 Mar 25)

2. Reuters UK takes top spot in Europe for Generative AI startups, Accel says 20 Jun 24 (Accessed 10 Mar 25)

3. Gov.uk UK AI sector attracts £200 million a day in private investment since July 15 Jan 25 (Accessed 10 Mar 25)

4. Gov.uk Tech Secretary to bang the drum for closer AI partnership with the US 20 Mar 25 (Accessed 21 Mar 25)

## Generative AI offers multidimensional applications across the healthcare ecosystem:



### Optimisation of access

Signposting and triage of care requests in primary and secondary care settings



### Clinical Decision Support

AI-augmented diagnostic and treatment support



### Ambient Documentation

Transcription, translation and summarisation of clinical consultations



### Administrative uses

Intelligent coding, clinical documentation & filing, dynamic workflows and care pathways



### Population Risk Stratification

Identifying high risk populations for targeted and personalised communication and preventative care



### Drug Discovery and accelerated trials

Rapid compound identification and predictive trial outcomes

These applications have the potential to fundamentally restructure clinician cognitive load, reducing burnout and freeing bandwidth for patient care while generating data insights that fuel continuous system improvement. Early adoption patterns show approximately 20% of General Practitioners already using Generative AI tools in their clinical practice<sup>5</sup>.



5. Bleas et al. Generative artificial intelligence in primary care: an online survey of UK general practitioners BMJ Health Care Inform. 2024 Sep 17;31(1):e101102 (Accessed 10 Mar 25)

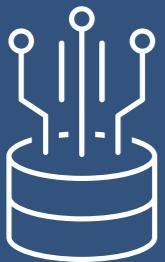
## Proposals for Economic Growth

To position the UK as a global leader in healthcare AI and drive meaningful economic growth, five strategic imperatives were identified:



### 1. Establish the UK as the Global Leader in Healthcare AI

Make the UK the first port-of-call for safe, effective Generative AI by establishing a premier evidence-generation hub, implementing a focused model-development strategy, strengthening a national conformity-assessment hub, running adaptive, risk-based regulatory sandboxes, and projecting UK standards internationally so innovators can take a product from proof-of-concept to global market.



### 2. Turn UK health data into a Strategic Growth Engine

Convert the health service's comprehensive longitudinal data into an economic asset by creating a sovereign healthcare data resource, simplifying secure access, cultivating a domestic synthetic-data industry, offering incentives for UK-based development, and building the energy and compute infrastructure that keeps workloads on-shore and sustainable.



### 3. Secure Public Trust through Transparency, Co-production and Patient Empowerment

Put citizens at the centre by engaging the public early and often, ensuring transparent, accountable benefit-sharing and data-use reporting, handing patients meaningful control over their data, and embedding co-production in every Generative AI project—demonstrating that economic growth and responsible use go hand-in-hand.



### 4. Unlock Capital and New Commercial Models for Scale-up

Fuel adoption through a UK Health Data Sovereign Wealth Fund, extending fit-for-purpose funding pathways, fixing market fragmentation that hampers deployment, bridging healthcare, academia and industry, and piloting sustainable payment models that reward real-world outcomes.



### 5. Develop World-Class Healthcare AI Workforce and Leadership

Equip the system to implement Generative AI safely by modernising healthcare education, professionalising the data workforce, enhancing digital leadership, strengthening procurement expertise, and rolling out streamlined implementation frameworks that let frontline teams adopt proven tools quickly and responsibly.

## Eight High Priority Actions

Guided by the findings of this research and the five strategic imperatives recommended, eight high priority actions are proposed:



### 1. Stand-up a UK-wide Health Data Resource & API Gateway

Provide a single point of access to existing TRE/SDE estate, publish national metadata catalogue, launch live developer sandbox with synthetic test data.

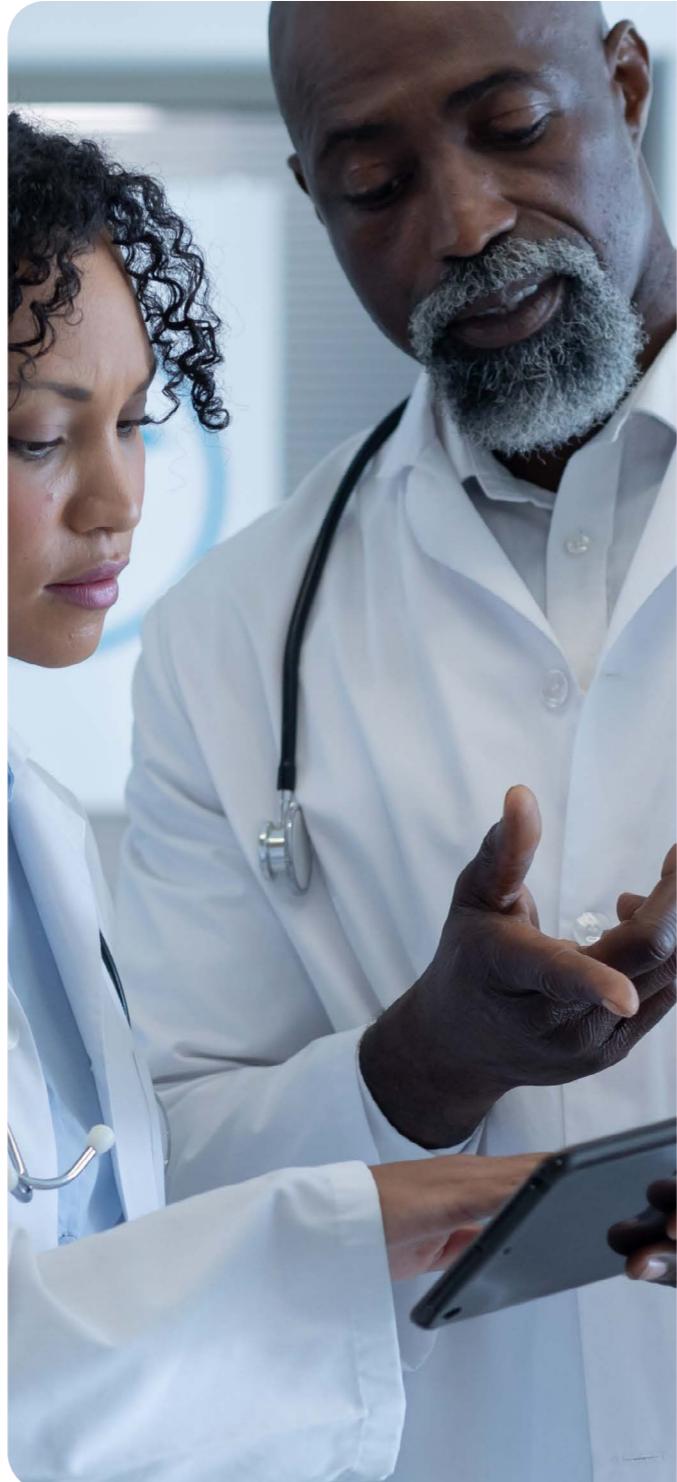
Turns the NHS' "biggest data pool on earth" into a usable economic asset for tech development, while de-risking real-data access through high-fidelity synthetic variants.



### 2. Create the UK Evidence & Assurance Hub for Healthcare-AI

Initiate inside a small network of "AI Ready" NHS sites. Common protocols, shared REC, rapid-cycle prospective studies, linked to MHRA's AI Airlock.

Makes the UK the default place to validate and CE/UKCA-mark health Gen-AI – cutting 12-24 months off time-to-market and anchoring jobs, trials and inward investment here.



### 3. Launch a Risk-Based, Multi-Regulator Sandbox

Issue joint 12-month pilot licences from MHRA, ICO, CQC, NICE, and their counterparts across the UK, with shared liability cover and publication duty.

Provides the regulatory clarity industry keeps asking for, while keeping the most sensitive use-cases under tight real-world monitoring.



### 4. Seed the Health-Data Sovereign Wealth Fund

Launch with initial £500m from British Business Bank and first wave of licensing receipts, to take minority equity in companies that train/validate on NHS data and to co-finance compute & green power in AI Growth Zones.

Converts licensing rent into compounding national wealth and guarantees UK patients a financial return on their data.





## 5. Green-light high-volume “quick-win” deployments

Green light ambient voice technology (AVT) at pace and adopt the latest in digital therapeutics for both supportive and wrap-around care (and for direct clinical delivery where services have the appropriate regulatory approvals – typically Class IIa).

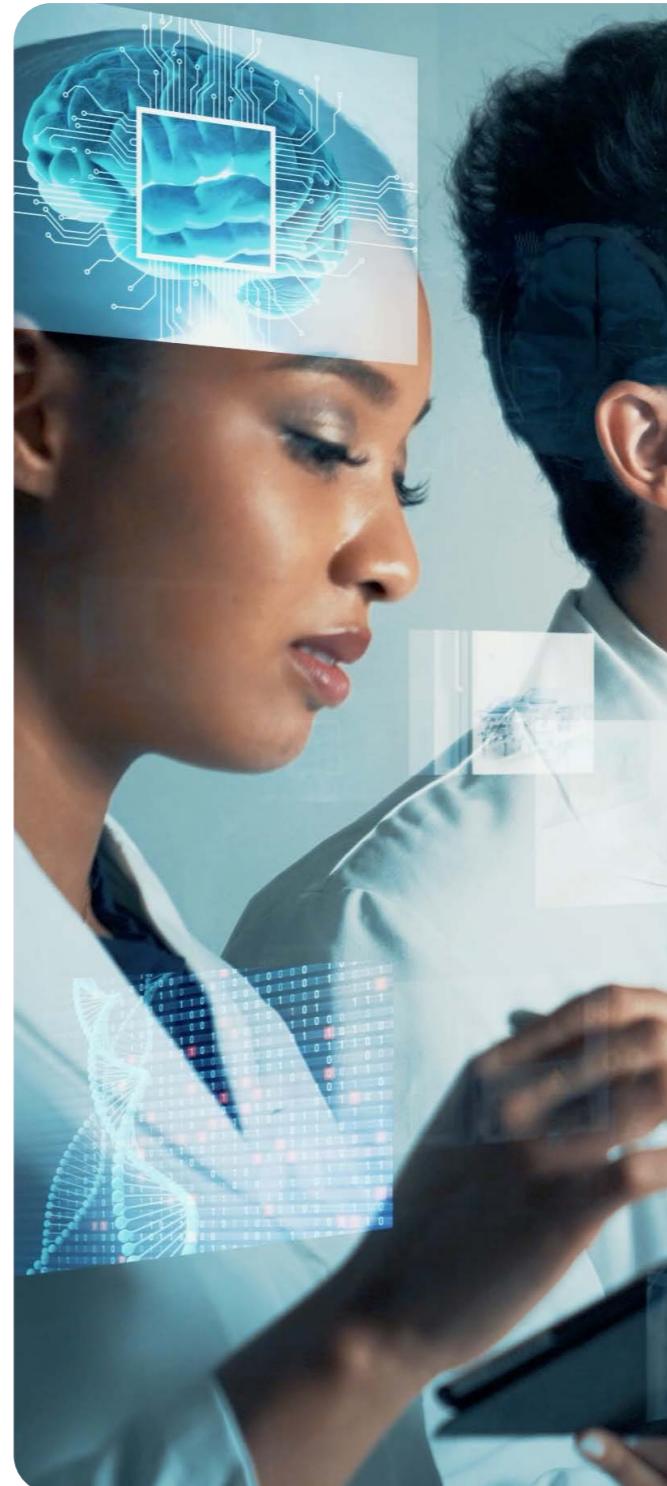
Achieves rapid productivity lift, highly measurable ROI, and generates the implementation playbooks others can reuse.



## 6. Mandate the Digital & AI skills core-curriculum

Mandate the Digital & AI skills core-curriculum for every undergraduate health-professional programme starting Sept 2026, quadrupling capacity in programmes modelled on the Topol/Clinical-AI Fellowships.

Creates the first national workforce that is “AI-native”, closing the safety gap created by low frontline literacy and becoming an exportable training product.



## 7. Publish the Public Benefit & Transparency Charter

Develop and publish a clear template for commercial data-sharing agreements, a federated, real-time public dashboard of all AI uses (fed by local registries), and annual independent audit.

Answers the Care.data legacy head-on, secures the social licence and therefore long-run economic value of the data.



## 8. Fix the “pilot-purgatory” market

Establish a national agile framework of assessed market-ready solutions with volume-based pricing, interoperability clauses and revenue-share back to service providers; plus enforcement powers to stop vendor lock-in.

This should cut sales cycles from years to months, let SMEs scale, and ensure savings flow back into care better.



## The Imperative to Act

The economic dimensions of this transformation are substantial. Beyond the financial value of the data, which is hard to estimate but often is within the billions<sup>6,7</sup>, and the impact of AI on GDP<sup>8</sup>, there is the downstream impact of improved public health on the work force<sup>9</sup>. Strategic investments in healthcare AI infrastructure, regulatory capacity, and specialised workforce development could position the UK as the premier global destination for healthcare AI innovation – creating high-value knowledge economy jobs, attracting international investment, establishing exportable expertise, and generating significant returns on public data assets through carefully structured commercial models.

This window of opportunity is narrowing as international competitors make substantial strategic investments in healthcare AI. Without coordinated action, the UK risks losing its current advantages to better-resourced international alternatives, despite the government's recent "AI Opportunities Action Plan" launched in early 2025 and commitment of £100 million for new AI research hubs and regulator training.

The time for strategic action is now. The convergence of the UK's unparalleled data assets, clinical expertise, world-leading research capabilities, and a dynamic business and start-up ecosystem creates a unique opportunity to establish leadership in a field that will fundamentally reshape healthcare delivery and economic value creation globally. With decisive action guided by this framework, the UK can position healthcare AI as a powerful driver of economic renewal while improving health outcomes for generations to come.



6. EY [How we can place a value on health care data](#) 19 Jul 19 (Accessed 28 Mar 25)

7. Tony Blair Institute [A New National Purpose: Harnessing Data for Health](#) May 2024 (Accessed 28 Mar 2025)

8. PWC [The economic impact of artificial intelligence on the UK economy](#) Jun 17 (Accessed 28 Mar 25)

9. NHS England. "Health, work and prevention." NHS England, 3 Dec 2024 (Accessed 10 Mar 25) <https://www.england.nhs.uk/long-read/health-work-and-prevention-december-2024/>

## Strategic Imperatives



## Proposals

<b>1. Premier evidence generation hub</b>	<b>7. Establish sovereign healthcare data resource</b>	<b>12. Public engagement</b>	<b>16. UK data sovereign wealth fund</b>	<b>21. Healthcare education transformation</b>
<b>2. Focused model development strategy</b>	<b>8. Data access</b>	<b>13. Benefit-sharing &amp; data use</b>	<b>17. Funding pathways for UK healthcare AI ventures</b>	<b>22. Healthcare data workforce professionalisation</b>
<b>3. Leading healthcare AI conformity hub</b>	<b>9. Synthetic data industry</b>	<b>14. Patient empowerment via data integration and control</b>	<b>18. Enable scalable AI deployment</b>	<b>23. Leadership capabilities</b>
<b>4. Risk-based regulatory approaches</b>	<b>10. Economic incentives for UK-based development</b>	<b>15. Embedding co-production in AI development</b>	<b>19. Unite healthcare, academia &amp; industry</b>	<b>24. Procurement expertise building</b>
<b>5. International leadership &amp; regulatory influence</b>	<b>11. Sustainable energy infrastructure for AI</b>		<b>20. Sustainable commercial models for healthcare AI</b>	
<b>6. Streamlined implementation frameworks</b>				

## Priority Actions

<b>1. A UK-wide National Health Data Resource &amp; API Gateway</b>	<b>2. Create the UK Evidence &amp; Assurance Hub for Healthcare-AI</b>	<b>3. Risk-based, multi-regulator sandbox</b>	<b>4. Health-Data Sovereign Wealth Fund</b>	<b>5. High-volume “quick-win” deployments</b>	<b>6. Digital &amp; AI skills core-curriculum</b>	<b>7. Public Benefit &amp; Transparency Charter</b>

## 1. Overview: The current Landscape

### 1.1 Economic Outlook in the UK

The UK economy faces a complex and rapidly shifting macroeconomic environment. According to the most recent forecasts<sup>10</sup> from the Office for Budget Responsibility (OBR), GDP growth for 2025 has been revised upward to 1.5%, compared with the 1.0% projection in March, following stronger-than-expected activity early in the year. However, momentum remains subdued, with growth anticipated to average around 1.4% in 2026 and 1.5% thereafter, reflecting persistent global uncertainty and domestic headwinds such as weak productivity and cautious business investment. Inflation is forecast to average 3.5% in 2025, easing to 2.5% in 2026 before returning to the Bank of England's 2% target by 2027. For 2024, GDP growth was confirmed at 1.1%,

slightly stronger than initial estimates, though quarterly performance was uneven, with only marginal growth of 0.1% in Q4. This report's explores healthcare AI as a driver of productivity, service transformation, and long-term economic renewal.

### 1.2 Healthcare Challenges

Healthcare stands at a critical intersection with this technological revolution. Lord Darzi's report of September 2024<sup>11</sup> highlights profound systemic challenges: protracted waiting lists for both routine and emergency care, strained accessibility to General Practice services, diminished public health function and suboptimal outcomes in cancer and cardiovascular disease management. These issues arise from multiple factors: workforce demoralisation, prolonged fiscal constraints, the aftermath

of the pandemic, and leadership discontinuity. When combined with an ageing population bearing an increased burden of chronic disease, these pressures create an urgent need for solutions that can simultaneously enhance care quality, improve system efficiency, and reduce unsustainable workforce burdens.

### 1.3 The Strategic Shift

The NHS England 10 Year Plan<sup>12</sup> transformation agenda centers on a tripartite strategic shift:

- from hospital to community
- from analogue to digital
- from sickness to prevention

This reorientation carries economic dimensions beyond clinical outcomes, aiming to address the 2.8 million individuals economically inactive due to long-term health conditions (an 800,000 increase from pre-pandemic levels), predominantly attributed to mental health challenges.

The aim is to create a virtuous cycle: prevention reduces future demand for healthcare, leading to enhanced healthcare efficacy leading to workforce participation, economic growth, increased tax revenue, and ultimately, strengthened public service capacity.



10. Economic and fiscal outlook – March 2025 - Office for Budget Responsibility

11. Gov.uk Independent Investigation of the National Health Service in England Sep 24 (Accessed 11 Mar 25)

12. Gov.uk Build an NHS Fit for the Future (Accessed 11 March 25)

## 1.4 Generative AI

The emergence of Generative AI represents a watershed moment in technological evolution. It can be defined as 'a subset of AI capable of generating text, images, video or other forms of output by using probabilistic models trained across various domains'.<sup>13</sup>

Since ChatGPT's release in November 2023, adoption has been rapid, reaching 1 million users within five days and expanding to 400 million weekly active users by February 2025<sup>14</sup>. This trajectory extends beyond consumer applications; a recent Deloitte report estimates that over 7 million people in the UK have used Generative AI at work<sup>15</sup>. Global market projections reflect this momentum, with forecasts suggesting growth from £10.5 billion in 2023 to GBP £198 billion by 2033<sup>16</sup>.

The artificial intelligence sector has emerged as a bright spot and strategic focus. The UK now hosts about 30% of all Generative AI startups in Europe<sup>17</sup>, and the government reports that roughly £200 million in private investment is flowing into the nation's AI industry each day since mid-2024<sup>18</sup>. At the time of writing, the UK AI sector is valued at over \$92 billion and projected to surpass \$1 trillion by 2035<sup>19</sup>.

To build on this momentum, an "AI Opportunities Action Plan" was launched in early 2025 aimed at making the UK a magnet for AI firms and talent, alongside a commitment of £100 million for new AI research hubs and regulator training<sup>20</sup>. This pro-innovation agenda, bolstered by international efforts like the UK's global AI Safety Summit, and signing of memorandums of understanding with Anthropic on AI opportunity<sup>21</sup>, aims to drive tech investment and growth while ensuring appropriate safeguards<sup>22</sup>.

At the same time, the ambition for AI leadership comes with a high financial, technological and environmental price tag. Training and fine-tuning modern LLM's requires computational power and data storage orders of magnitude greater than previously required<sup>23</sup>, with equally greater power consumption requiring upgrades to energy infrastructure<sup>24</sup>, leading to challenges around National and corporate commitments to net zero targets<sup>25</sup>. Furthermore, pollution and climate change resulting from non-renewable energy sources have known detrimental effects on human health<sup>26</sup>.

13. Gov.uk [AI Playbook for the UK Government](#) 10 Feb 25 (Accessed 12 May 25)

14. CNBC [OpenAI tops 400 million users despite DeepSeek's emergence](#) 20 Feb 25 (Accessed 6 Mar 25)

15. Deloitte Digital Consumer Trends 2024: Generative AI | Deloitte UK 25 Jun 24 (Accessed 6 Mar 25)

16. Market.US <https://market.us/report/generative-ai-market/> Oct 24 (Accessed 6 March 25)

17. Reuters UK takes top spot in Europe for Generative AI startups, Accel says 20 Jun 24 (Accessed 10 Mar 25)

18. Gov.uk [UK AI sector attracts £200 million a day in private investment since July](#) 15 Jan 25 (Accessed 10 Mar 25)

19. Gov.uk [Tech Secretary to bang the drum for closer AI partnership with the US](#) 20 Mar 25 (Accessed 21 Mar 25)

20. Gov.uk [AI Opportunities Action Plan](#) 13 Jan 2025 (Accessed 16 March 2025)

21. Gov.uk [Memorandum of Understanding between UK and Anthropic on AI opportunities](#) 14 Feb 25 (Accessed 10 Mar 25)

22. Reuters [Britain invests 100 million pounds in AI research and regulation](#) 6 Feb 24 (Accessed 10 Mar 25)

23. Sevilla et al, [Compute Trends Across Three Eras of Machine Learning](#), 2022 International Joint Conference on Neural Networks (IJCNN), Padua, Italy, 2022, pp. 1-8. (Accessed 20 Mar 25)

24. John Pettigrew, CEO National Grid, [How the UK's plans for AI could derail net zero – the numbers explained](#) 26 Mar 24 (Accessed 20 Mar 25)

25. World Economic Forum [AI and energy: Will AI help reduce emissions or increase demand? Here's what to know](#) July 24 (Accessed 10 Mar 25)

26. Han et al [The Unpaid Toll: Quantifying the Public Health Impact of AI](#) 9 Dec 24 (Accessed 21 Mar 25)

## 1.5 Generative AI's Healthcare Applications

Stakeholder interviews conducted to inform this report, have revealed multidimensional applications for Generative AI within healthcare ecosystems

- **Optimisation of access:** Signposting and triage of care requests in primary and secondary care settings.
- **Clinical Decision Support:** AI-augmented diagnostic and treatment support.
- **Ambient Documentation:** Transcription, translation, and summarisation of clinical consultations.
- **Administrative uses:** Intelligent coding, clinical documentation & filing, dynamic workflows and care pathways.
- **Population Risk Stratification:** Identifying high risk populations for targeted and personalised communication and earlier intervention.
- **Drug Discovery and accelerated trials:** Rapid compound identification and predictive trial outcomes.

These and many other future applications represent more than efficiency mechanisms – they have the potential to fundamentally restructure cognitive load, liberating professional bandwidth for high-value patient interactions. This potential is evidenced by early adoption patterns, with approximately 20% of General Practitioners already independently integrating Generative AI tools into their practice<sup>27</sup>.

27. Bleas et al. [Generative artificial intelligence in primary care: an online survey of UK general practitioners](#) BMJ Health Care Inform 17 Sep 24 (Accessed 10 Mar 25)

## 1.6 Risk-Benefit Equilibrium

While the focus is on opportunities it is critical to recognise that Healthcare's high stakes environment requires careful implementation approaches. Generative AI's fundamental characteristics – where algorithmic hallucinations or embedded biases could manifest as patient or clinician harm – demand comprehensive governance frameworks. The need for responsible deployment shouldn't constrain innovation but rather channel it through appropriate ethical and safety parameters.

## 1.7 The UK Advantage

The United Kingdom possesses distinctive advantages that position it for potential leadership in healthcare AI implementation. These competitive advantages are explored in detail within the findings of this report, alongside a comprehensive framework for leveraging these assets to drive both healthcare transformation and economic growth.

## 2. Findings & Proposals

The analysis and proposals made in this report, developed between December 2024 and April 2025, brings together findings from an extensive review of existing literature, reports, online resources, and over 40 expert interviews spanning healthcare, artificial intelligence, industry, investment, regulation, and other relevant fields.

It is important to note that healthcare in the United Kingdom is a devolved power. This means the UK does not have a single 'National Health Service,' but rather four distinct systems: NHS England, NHS Scotland, NHS Wales, and Health and Social Care (HSC) in Northern Ireland.

The analysis and recommendations move beyond considerations of mere cost recovery and operational efficiencies, highlighting significant opportunities for revenue generation for reinvestment into patient care and the health and social care system and to drive wider economic growth for the UK.

As the global race for AI competitive advantage intensifies, the United Kingdom possesses distinctive assets. By addressing implementation challenges systematically, the UK can create a multi-dimensional value proposition:

### 1. Establish the UK as the Global Leader in Healthcare AI:

Positioning the UK as the premier global hub for healthcare AI validation and certification, leveraging respected institutions like MHRA and NICE to shape international standards while deploying AI to address care backlogs, optimise workforce utilisation, and transition towards preventative, community-based care models.

### 2. Turn UK Health Data into a Strategic Growth Engine:

Converting the NHS's comprehensive longitudinal patient data into a strategic economic asset through improved governance, infrastructure, and innovative commercial models that generate sustainable returns while enhancing healthcare delivery.

### 3. Secure Public Trust through Transparency, Co-production and Patient Empowerment:

Creating global competitive advantage through transparent governance frameworks and meaningful public engagement, establishing the UK as the standard-bearer for ethically implemented healthcare AI.

### 4. Unlock Capital and New Commercial Models for Scale-up:

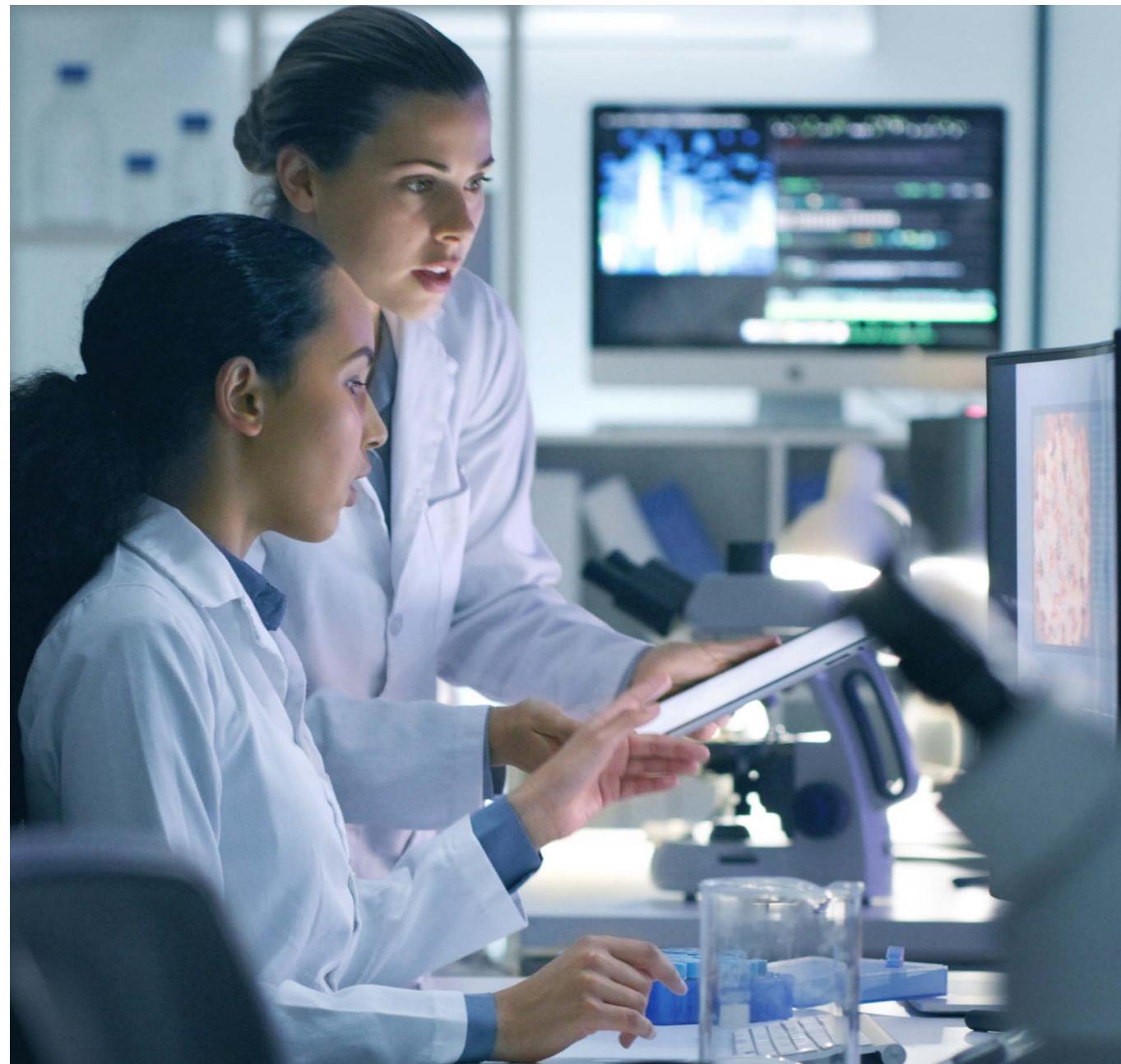
Developing innovative funding approaches and commercial structures that bridge the gap between early-stage development and scaled implementation, attracting domestic and international investment while ensuring appropriate returns to the NHS.

### 5. Develop World-Class Healthcare AI Workforce and Leadership:

Cultivating world-class capabilities in healthcare AI workforce, leadership, and implementation methodologies that become exportable knowledge assets while addressing critical skills gaps that currently limit adoption.

This strategic approach extends beyond technological adoption; it establishes a framework for healthcare transformation, economic growth, and global leadership in a critical emerging field where the UK can secure first-mover advantage.

While comprehensive in scope, these proposals will require further detailed development prior to implementation. Stakeholder consultation across healthcare, industry, and government will be essential to refine operational specifics, establish realistic timelines, and develop appropriate governance frameworks. The proposals presented serve as strategic roadmap rather than implementation blueprints – a firm foundation upon which practical execution plans must now be built.



## How to Read the Proposals

Each proposal is scored according to two dimensions:

### Effort (1–5):

An indicative estimate of the relative implementation effort required, where 1 represents lower effort and 5 represents higher effort. This considers factors such as system complexity, time horizon, required coordination, and policy and/or legislative change.

### Value (1–5):

An indicative estimate of the potential strategic and economic value to the UK if implemented successfully. This includes economic impact, international positioning, and NHS transformation potential.

### Key Enabler (KE):

Some proposals are designated as Key Enablers—actions that are foundational to unlocking value across multiple other areas, even if not high-value in isolation.

These estimates were developed through internal discussions within the project team, drawing on insights from stakeholder interviews, the research literature, and the authors' own implementation experience. They are intended to guide prioritisation and further exploration. No formal economic modelling has been undertaken at this stage; a more detailed analysis would be necessary to fully operationalise these proposals.

## 2.1 Establish the UK as the Global Leader in Healthcare AI

The UK stands at a pivotal moment regarding its approach to Generative AI in healthcare, with the opportunity to become global innovators and secure significant economic rewards. Internationally, larger countries are often presumed to lead this field, yet many lack the integrated healthcare systems essential to scale AI-driven innovations effectively. The UK has distinct advantages; exceptional academic institutions, a dynamic technology sector, and the NHS, a globally recognised single-payer health system capable of large-scale innovation with some world class centres of clinical expertise.

Despite these advantages, fragmentation within the UK's Health System continues to restrict the comprehensive implementation of new technologies. The UK needs a cohesive national strategy for the adoption of new technologies to significantly improve funding, coordination, evaluation and sharing of best practice. Without this, we will continue to be held back by slow implementation and find it challenging to realise tangible benefits from our advantages.

Realising our untapped potential to operationalise AI-driven healthcare solutions on a national level is critical to establishing the UK as a leading force in healthcare innovation.

The regulatory landscape simultaneously presents challenges and strategic opportunities. Our analysis indicates a regulatory system

in transition, shaped by internationally respected bodies operating under tight resource constraints, the evolving flexibility having left the European Union, and uncertainty around AI-specific regulatory frameworks. Stakeholders repeatedly underlined that regulatory clarity – not leniency – is the essential enabler of sustainable economic growth in healthcare AI. Clarity and regulatory system capacity are seen as crucial to attracting international investment, stimulating innovation, and maintaining patient safety, thus offering the UK a competitive advantage on the global stage.

Complementing the regulatory framework, the UK's established healthcare research infrastructure, world-class academic institutions, and defined regulatory pathways uniquely position it to excel in validating healthcare AI solutions. Stakeholders have emphasised the importance of investment in evidence-generation frameworks that balance pace, innovation, and safety, alongside a strategic focus on model development that capitalises on the UK's existing strengths rather than competing broadly in areas where it lacks competitive advantage. Embracing this dual approach – establishing the UK as both the premier hub for evidence generation and a specialised centre for focused model development – will create complementary pathways to economic prosperity in the healthcare AI sector.

Together, these strategic imperatives form the foundation for establishing the UK as the preeminent global leader in healthcare AI, delivering both transformative healthcare outcomes and substantial economic growth.

### 2.1.1. Opportunities

#### Specialised Model Development

The UK's established global leadership in specialised healthcare AI models, exemplified by DeepMind's Nobel Prize-winning AlphaFold technology<sup>28</sup>, positions it uniquely to extend this competitive advantage into Generative AI. Stakeholders highlighted significant opportunities in focusing investment on developing specialised generative models targeted at clinical domains where the UK possesses distinctive data resources, clinical expertise, and world-leading academic institutions. Examples of existing platforms, such as Foresight<sup>29</sup>, built using the Cogstack<sup>30</sup> platform, illustrate this targeted approach, providing valuable templates for future innovation.

UK academia's strengths in research and clinical translation, combined with centralised funding programmes that facilitate partnerships between NHS trusts, universities, and industry, could accelerate innovation, market readiness, and global competitiveness. The strategic implementation of common interoperability standards across funded initiatives would offer the UK an opportunity to create a strong healthcare AI ecosystem. This structured yet agile approach to model development would not only optimise resource allocation but also generate higher-value intellectual property tailored specifically to healthcare applications, strengthening the UK's position as a global leader and exporter of specialised AI solutions.

#### Evidence Generation Excellence

The UK possesses established capabilities in clinical trials, health technology assessment, and regulatory science that can be used to establish global leadership in AI validation. Stakeholders identified the opportunity to create standardised evaluation frameworks specifically tailored to Generative AI applications, addressing not just technical performance but clinical & economic effectiveness, safety profiles, and implementation factors. This expertise represents an export opportunity and target for international investment.

#### Unified Healthcare Structure

Unlike fragmented healthcare systems in other major markets, the UK's relatively unified health system offers potential for more streamlined commissioning and implementation pathways for validated technologies. This structural advantage could significantly reduce market access complexities for innovators, creating economic incentives for companies to prioritise UK development and deployment.

#### International Regulatory Leadership

The UK's strategic position between US and European regulatory systems, combined with its internationally respected institutions like MHRA and NICE, creates a unique opportunity to serve as both a validation bridge and global standard-setter. These bodies carry international influence extending beyond their formal jurisdictions, providing foundations

28. Deepmind Demis Hassabis & John Jumper awarded Nobel Prize in Chemistry 9 Oct 24 (Accessed 28 Mar 25)

29. Krajlevik, J et al [Foresight—a generative pretrained transformer for modelling of patient timelines using electronic health records: a retrospective modelling study](#) Lancet Digital April 2024 (Accessed 28 Mar 25)

30. <https://cogstack.org/> (Accessed 16 March 25)

for thought leadership in emerging regulatory frameworks for Generative AI. This distinctive positioning could attract substantial international investment while establishing the UK as a premier destination for developers seeking streamlined multi-market access. The resulting "soft power" represents a valuable economic asset that enhances the UK's competitive advantage in the evolving global healthcare AI landscape.

### Regulatory Flexibility

The UK's position as an independent trading nation creates opportunities to develop more agile regulatory frameworks while ensuring alignment with key international standards. The government has underlined their commitment to this through the establishment of the Regulatory Innovation Office (RIO) in October 2024, tasked with eliminating red tape and accelerating innovation in multiple areas, including AI & Digital in Healthcare<sup>31</sup>. Stakeholders identified potential for the UK to position itself as more nimble than the EU in certain aspects of regulation, creating competitive advantages in attracting investment and innovation while preserving necessary patient safeguards.

However, stakeholders cautioned that the very post-Brexit flexibility that makes UK regulation appear "nimble" can feel like a vacuum when detailed guidance is missing, creating a short-term clarity gap even as long-term agility remains a strategic advantage.

## 2.1.2. Challenges

### Regulatory Clarity Gap

Post-Brexit freedoms give the UK licence to act faster than many peers, yet developers still describe a 'Wild West' of overlapping regulators, thin resources and missing guidance. Until the MHRA, ICO, NICE, CQC, and other UK equivalents translate that flexibility into clear, risk-based pathways<sup>32</sup>, investment will stay stuck at proof-of-concept. In short, the UK excels at getting innovation off the launch pad, but struggles to take it into orbit.

### Evidence Standards Definition

The rapidly evolving nature of Generative AI technology creates significant challenges in defining appropriate evidence standards. Traditional randomised controlled trial (RCT) methodologies are not optimised for dynamic and adaptive interventions, while purely technical validation approaches may not reveal critical implementation and real world factors. Stakeholders highlighted the lack of consensus on what constitutes sufficient evidence for different use cases and risk profiles.

### Fragmentation and Duplication

Multiple regulatory bodies (MHRA, ICO, CQC, NICE, and their counterparts across the UK) and stakeholders across the NHS, academia and industry create complexities that can lead to fragmentation, inefficiencies, and gaps in oversight and governance. The introduction of multiple specialised Generative AI models risks increasing this complexity unless carefully managed through

robust interoperability standards and coordinated governance structures. Stakeholders emphasised the potential for duplication of efforts across NHS trusts and academic institutions if centralised coordination and clear strategic direction are not rigorously implemented, potentially diluting the impact of funding and increasing compliance costs for innovators.

### Implementation Complexity

Stakeholders highlighted the complexity of implementing AI solutions in healthcare settings as a significant challenge. This includes difficulties integrating with existing systems, adapting clinical workflows, managing change processes, and addressing resistance from various stakeholders. In the absence of structured approaches to implementation that address these complexities, many promising AI technologies fail to deliver their potential benefits. This represents both wasted investment and missed opportunities for service improvement and economic gain.

### Validation-specific Funding Gaps

Generating robust evidence for AI systems requires significant investment in validation and real world implementation and evaluation infrastructure, skilled personnel, and computing resources. While recent UKRI reforms to equipment funding and matched funding expectations represent an important step toward addressing the wider sustainability gap in UK research<sup>33</sup>, stakeholders noted that validation-specific funding

still often falls between traditional academic and commercial streams; a particular challenge for resource-constrained startups.

### Regulatory Body Resource Constraints

Current regulatory bodies face significant resource limitations that impede their ability to develop and implement effective frameworks for Generative AI. The MHRA announced in May 2024 that it had just 3 full time equivalent staff members working on AI as a medical device<sup>34</sup>. Stakeholders reported that the MHRA struggles to manage lengthy approval timelines (18-24 months for AI medical devices) and provide clear guidance to developers. Similar constraints affect the Information Commissioner's Office (ICO) and National Data Guardian, creating bottlenecks throughout the regulatory ecosystem.

### Foundation Model Competition

The development of large-scale foundation models requires capital investment and ongoing maintenance resources that are difficult to sustain in the UK context. Stakeholders referenced various open-source AI initiatives which, despite significant initial investment, faced challenges maintaining competitiveness against larger, better-resourced international alternatives. The costs of operating the models is high, and the market competitive: despite strong growth, OpenAI reported losses of approximately \$5b USD in 2024<sup>35</sup>, and the recent announcement of Microsoft Dragon as a component of its existing

31. Gov.uk Game-changing tech to reach the public faster as dedicated new unit launched to curb red tape 18 Oct 24 (Accessed 21 Mar 25)

32. See proposals 6: Develop Streamlined Implementation Frameworks

33. UKRI UKRI updates funding policies to improve research sustainability 21 Mar 25 (Accessed 24 Mar 25)

34. Gov.uk Impact of AI on the regulation of medical products 30 Apr 24 (Accessed 24 Mar 25)

35. Windows Central. "OpenAI's \$3.7 billion in revenue won't save the ChatGPT maker from an imminent \$5 billion loss in 2024." 2 Oct 2024 (Accessed 16 Mar 25). <https://www.windowscentral.com/software-apps/openai-could-be-on-the-brink-of-bankruptcy-in-under-12-months-with-projections-of-dollar5-billion-in-losses>

widely adopted offering has threatened the large number of ambient scribe vendors in the market<sup>36</sup>. The rapid pace of innovation with smaller models such as DeepSeek also challenges foundation model supremacy<sup>37</sup>. These illustrate the difficult strategic decisions organisations face when determining how to focus limited resources effectively.

### International Harmonisation Tensions

The UK faces challenging decisions regarding alignment with international standards versus developing independent frameworks. While harmonisation facilitates international market access and reduces compliance burdens, it potentially constrains the UK's ability to develop more innovation-friendly approaches tailored to its specific healthcare context. This issue is compounded by the dynamic landscape in countries such as the US.

### Novel Challenges of Generative AI

Probabilistic AI systems present fundamental regulatory challenges that existing frameworks struggle to address. Traditional approaches to medical device regulation based on deterministic performance may be inadequate for systems with non-deterministic outputs and the potential for hallucination (coherent outputs that are incorrect or nonsensical). Stakeholders identified significant gaps in current frameworks related to:

- Standards for measuring and reporting bias and hallucination rates.
- Clear liability frameworks for AI-assisted decisions.
- Oversight mechanisms for autonomous applications.
- Regulatory approaches for ambient AI tools.



36. The Verge Microsoft's new Dragon Copilot is an AI assistant for healthcare 3 Mar 25 (Accessed 16 Mar 25)

37. Reuters What is DeepSeek and why is it disrupting the AI sector? 28 Jan 25 (Accessed 16 Mar 25)

## 2.1.3. International Perspective

### France



France aims to lead in AI regulation within the EU and promotes open-source model development through initiatives like BLOOM<sup>38</sup> and the Jean Zay supercomputer, and private sector investment & innovation through companies like Mistral and Hugging Face<sup>39</sup>. Its alignment with EU ethical frameworks offers the UK opportunities to shape cross-border regulatory convergence and collaborate on transparent validation standards.

### Denmark



Denmark's Pioneer Centre<sup>40</sup> supports ethical AI deployment through public-sector "signature projects" and sovereign infrastructure like the Gefion supercomputer<sup>41</sup>. The UK could explore bilateral cooperation on evaluation frameworks, co-validation of health models, and mutual recognition of assurance processes.

### United States



The United States dominates global AI development through private firms like OpenAI and Anthropic, with emerging regulatory approaches driven by the private sector. UK strengths in health-system validation, clinical safety, and risk-based regulation offer a complementary position for trusted collaboration on cross-market access and safety research.



### China

China's state-led AI strategy includes regulatory centralisation and strict model certification processes<sup>42</sup>, enabling large-scale domestic deployment. While its governance model differs significantly, the UK can monitor technical standards and explore cooperation on transparency metrics, data provenance, and interoperability safeguards through multilateral forums.



### Saudi Arabia

Saudi Arabia is positioning itself as a regional certification hub through SDAIA<sup>43</sup> and flagship projects like NEOM<sup>44</sup>, which integrates AI into health and smart-city services. UK collaboration could focus on standards, clinical safety, and regulatory assurance.



### United Arab Emirates

The United Arab Emirates (UAE) is building regulatory capacity alongside sovereign model development, led by MBZUAI<sup>45</sup>, the Falcon LLM series<sup>46</sup>, and its UAE National Strategy for Artificial Intelligence 2031<sup>47</sup>. UK strengths in conformity assessment and health AI validation offer strong complementarity.



### Qatar

Qatar is building early-stage regulatory foundations for AI in health through state-backed research. UK support could accelerate capability-building in ethics, validation, and conformity processes.

38. CNRS Press Release of largest trained open-science multilingual language model ever 12 Jul 22 (Accessed 25 Mar 25)

39. Government of France. "MAKE FRANCE AN AI POWERHOUSE." Elysee.fr, 10 Feb 2025 (Accessed 25 Mar 25) <https://www.elysee.fr/en/emmanuel-macron/2025/02/11/make-france-an-ai-powerhouse>

40. <https://dg.dk/en/what-is-a-pioneer-center/> (Accessed 25 May 25)

41. Nvidia Denmark Launches Leading Sovereign AI Supercomputer to Solve Scientific Challenges With Social Impact | NVIDIA Blog Oct 24 (Accessed 12 March 2025)

42. EU Parliament China's ambitions in artificial intelligence Sep 21 (Accessed 25 Mar 25)

43. Saudi Data & AI Authority <https://sdaia.gov.sa/en/default.aspx> (Accessed 9 Apr 25)

44. NEOM (Accessed 25 Mar 25)

45. Mohammed bin Zayed University of Artificial Intelligence (Accessed 31 Mar 25)

46. TTI <https://falconllm.tii.ae/> (Accessed 23 May 25)

47. UAE Minister of State for AI Office UAE National Strategy for Artificial Intelligence 2031 (Accessed 25 Mar 25)

## 2.1.4. Proposals

### **Proposal 1: Establish the UK as the Premier Evidence Generation Hub**

**Effort:** 3

**Value:** 5

The UK should position itself as the global leader in proving the safety and effectiveness of Generative AI healthcare solutions through:

#### **Specialised AI Evaluation Frameworks:**

Instruct multi-agency collaboration to develop safety & effectiveness evaluation standards and methodologies tailored to diverse AI applications and associated risk profiles. This would enable more confident adoption of these technologies delivering more economic opportunity for innovators.

#### **Collaborative Real-World Evidence Pathways:**

Foster close collaboration among regulatory bodies, healthcare providers, academic institutions, and industry partners to establish validation pathways in real-world settings that effectively balance innovation with robust safeguards. This would reduce the time to market for the most cutting-edge use cases, making the UK an attractive launchpad for such use cases.

#### **Commercial Evidence Generation Services:**

Support the commercial evidence-generation service offering validation support to international developers aiming for streamlined multi-market regulatory access. This would generate revenue through capturing the value of our healthcare data without needing to transfer data to external parties.

#### **NHS AI Innovation Hubs:**

Designate specific NHS sites across community, primary, and secondary care as dedicated innovation hubs, providing streamlined processes for validating and implementing AI solutions within real-world clinical environments. This would ensure innovators have access to well-resourced and capable partners from within the health system, and create an accessible knowledge base of implementation expertise for replication nationally and potential international export.

#### **Supportive Funding Alignment:**

UKRI's updated funding policies<sup>48</sup> (including 80% full economic cost support for equipment and removal of default matched funding requirements) to reduce entry barriers and enhance infrastructure investment for evidence generation activities.

48. UKRI UKRI updates funding policies to improve research sustainability 21 Mar 25 (Accessed 24 Mar 25)

## ✓ **Proposal 2: Implement a Focused Model Development Strategy**

**Effort:** 2

**Value:** 4

The UK should strategically prioritise the development of specialised Generative AI models tailored to high-impact clinical domains leveraging existing NHS data strengths, clinical expertise, academic research capabilities, and technological innovation. Rather than concentrating resources into a single, centralised foundation model, a diversified approach encouraging multiple models will provide greater resilience, agility, and innovation capacity.

Specifically, this strategy should:

### **Encourage Multiple Specialised Models:**

Support the agile development of diverse, specialised Generative AI models, each clearly targeted at clinical areas where the UK has substantial competitive advantages. This mitigates the risks associated with single-model strategies, such as those experienced during COVID, and promotes innovation diversity

### **Appoint Mission-Focused AI Programme Directors:**

Within the new Health Data Research Service<sup>49</sup>, assign healthcare mission-focused AI programme directors. Drawing inspiration from models like US ARPA-H, empower these directors with substantial autonomy and funding (discussed further in the investment proposals below), enabling rapid decision-making and allocation of resources towards high-impact healthcare AI initiatives supporting the NHS's triple transformation agenda. This strategic alignment ensures maximum healthcare impact and relevance to national healthcare and research priorities.

### **Mandate Interoperability and Compliance Standards:**

Tie funding to mandatory adherence to national standards for interoperability, clinical validation, regulatory conformity, and ethical deployment. This will ensure that funded models are capable of integration within the NHS and across healthcare environments, fostering a coherent and integrated AI ecosystem.

### **Establish Centralised Industry-Healthcare-Academic Partners for Build & Scale:**

Create a centralised funding and coordination programme that specifically facilitates strategic partnerships between NHS clinical centres of excellence, academic research institutions, and industry partners. The establishment of this approach builds on recommendations like the Sudlow Report [REF] for a national health data service, but must ensure the mandate of services like the Health Data Research Service (HDRS) is explicitly extended beyond research access to facilitate the secure build and validation of commercial AI models at scale<sup>50</sup>. This programme should offer dedicated support for commercialisation, research translation, industry linkage, intellectual property management, and scale-up.

### **Strengthen Commercial and Export Capabilities:**

Include within this central programme dedicated commercialisation support in close cooperation with Healthcare UK, advising on scaling validated academic and industry-driven AI solutions, accessing domestic and international markets, and intellectual property management. This approach maximises economic returns from both academic discoveries and industry innovations.

<sup>49</sup> Gov.uk Prime Minister turbocharges medical research 7 Apr 25 (Accessed 8 Apr 25)

<sup>50</sup> Sudlow, CLM Uniting the UK's Health Data: A Huge Opportunity for Society November 2024  
<https://www.hdruk.ac.uk/wp-content/uploads/2024/11/Executive-Summary-Uniting-the-UKs-Health-Data-1.pdf>

### **Proposal 3: Strengthen the UK's Role as a Leading Healthcare AI Conformity Hub**

**Effort:** 2**Value:** 3

The UK should position itself as a European and international leader in the regulatory compliance and conformity assessment of healthcare AI, becoming the preferred jurisdiction for developers seeking efficient and transparent approval processes. This includes:

#### **Targeted funding for MHRA AI Capacity-Building:**

Increase dedicated MHRA funding to expand Generative AI regulatory expertise, accelerate approval timelines, and align certification infrastructure with UKRI's updated cost recovery and capital thresholds to support efficient, scalable AI validation.

#### **Mandate a Transparent Public AI Approvals Registry:**

Mandate the MHRA (in coordination with the AI and Digital Regulation Service or AIDRS) to establish a transparent, publicly accessible AI approvals dashboard. This registry must publish rationale documentation on certification decisions and real-world performance data, enhancing public trust and providing clear market signals.

#### **Expand the Network of Approved Bodies:**

Increase the number and scope of Approved Bodies operating under UKCA<sup>51</sup> and CE marking<sup>52</sup> to ease market entry. Ensure close alignment with international standards (e.g. ISO/IEC<sup>53</sup>, IMDRF<sup>54</sup>) to support multi-market access, particularly in Europe, even as full harmonisation with the US FDA<sup>55</sup> remains limited.

### **Proposal 4: Develop Adaptive Risk-Based Regulatory Approaches for Generative AI**

**Effort:** 2**Value:** 2

To balance innovation with safety, the UK should:

#### **Develop Risk-Based Classification for Generative AI:**

Introduce a clear risk-based classification framework that targets higher-risk Generative AI applications, embedding minimum standards for AI explainability and interpretability, while actively enabling innovation

#### **Enhance Regulatory Sandboxes:**

Enhance regulatory sandbox initiatives such as the MHRA 'AI Airlock' to facilitate agile, iterative safety validations in real-world environments through collaborative co-development sandboxes involving regulators, academia, industry, clinicians, and patient representatives.

#### **Expand 'Human-in-the-Loop' & Autonomous AI Guidance:**

Establish dynamic, proportionate regulatory oversight with continuously updated guidance specifically tailored for autonomous and human-in-the-loop AI applications, ensuring agile responsiveness to rapid technological advancements and evolving clinical practices.

#### **Coordinate with the Government's new Regulatory Innovation Office (RIO):**

Work with RIO's cross-sector mandate so that MHRA, ICO, NICE, CQC, and their equivalents in Scotland, Wales, and Northern Ireland can issue time-limited pilot licences, share liability coverage, and apply common sandbox rules for Generative AI in healthcare.

<sup>51</sup> UK Conformity Assessed Gov.uk Using the UKCA Marking (Accessed 27 Mar 25)

<sup>52</sup> European Commission CE (Accessed 27 Mar 25)

<sup>53</sup> International Organization for Standardization <https://www.iso.org/> (Accessed 27 Mar 25)

<sup>54</sup> International Medical Device Regulators Forum <https://www.imdrf.org/> (Accessed 27 Mar 25)

<sup>55</sup> U.S. Food & Drug Administration <https://www.fda.gov/> (Accessed 27 Mar 25)

## ✓ **Proposal 5: Foster International Leadership and Strategic Regulatory Influence**

**Effort:** 2**Value:** 4

To secure international leadership in healthcare AI regulation, the UK should:

### **Invest in UK Regulatory Leadership:**

Expand global standing and influence of UK regulatory bodies, positioning MHRA's regulatory frameworks as international benchmarks, supported by formal collaborative forums co-created with NHS, academia, and patient groups.

### **Cultivate Regulatory Diplomacy:**

Strategically engage in forums like Organisation for Economic Co-operation and Development (OECD), World Health Organisation, and IMDRF to shape global risk-based frameworks such as the EU AI Act<sup>56</sup> and FDA's adaptive approaches. Foster flexible cooperation modelled on international alignments like the ACCESS Consortium<sup>57</sup> to maintain adaptable UK standards without compromising autonomy.

### **Export Regulatory Expertise:**

Develop and export the UK's regulatory expertise in healthcare AI, leveraging it as a significant economic asset and source of global regulatory leadership.

## ✓ **Proposal 6: Develop Streamlined Implementation Frameworks**

**Effort:** 1**Value:** Key Enabler

To maximise returns on AI investments and accelerate adoption at scale, the UK should:

### **Create Structured Generative AI Implementation Playbooks:**

Develop clear, detailed playbooks tailored to different categories of Generative AI innovation, providing healthcare organisations with structured, actionable methodologies for effective implementation and assessment.

### **Clarify Regulatory Responsibilities:**

Through the Regulatory Innovation Office (RIO)<sup>58</sup>, and building on the work of the AI and Digital Regulations Service for health and social care<sup>59</sup>, clearly communicate the distinct roles and responsibilities of CQC, NICE (for England), their counterparts (in Scotland, Wales, and Northern Ireland), MHRA, and ICO regarding Generative AI oversight, eliminating duplication and reducing regulatory uncertainty.

- **Integrate Robust Cybersecurity Procedures:** Embed clear and proportionate cybersecurity and resilience standards directly into implementation playbooks and frameworks. This should cover data transmission security, vulnerability management, and incident response, ensuring that the accelerated adoption of AI tools does not compromise the security of the data infrastructure or breach patient trust.
- **Align National HTA Appraisals (e.g., from NICE in England) with Local Implementation:** Address institutional disconnects between NICE technology appraisals and local implementation requirements, ensuring that national assessments effectively support practical local adoption.

<sup>56</sup> European Parliament EU AI Act (Accessed 28 Mar 25)

<sup>57</sup> Gov.uk Guidance: Access Consortium (Accessed 28 Mar 25)

<sup>58</sup> Gov.uk Game-changing tech to reach the public faster as dedicated new unit launched to curb red tape 18 Oct 24 (Accessed 21 Mar 25)

<sup>59</sup> AI and Digital Regulations Service for health and social care (Accessed 24 May 25)

- **Define Generative AI Evidence Standards for NICE Health Technology Assessments (and equivalent processes):** Establish clear evaluation thresholds for Generative AI technologies that balance validation requirements with the iterative nature of AI development cycles.
- **Streamline Regulator Digital Assessments: Reform CQC's methodologies (and those of its counterparts):** Reform CQC methodologies for digital technology assessment, reducing unnecessary bureaucratic barriers while maintaining robust and proportionate oversight, including Digital clinical safety standard compliance (DCB0129/0160)<sup>60</sup>.
- **Flexible Regional Implementation Frameworks:** Create structured frameworks that permit regional flexibility and adaptation in AI implementation while consistently adhering to established national standards.
- **Clarify Crown Indemnity for Generative AI:** Clearly define Crown indemnity coverage and jointly issue MHRA-NHS Resolution guidance clarifying liability and indemnity responsibilities for AI-supported clinical decisions, addressing practitioner and institutional risk.

#### Front-line Demand-Driven Implementation:

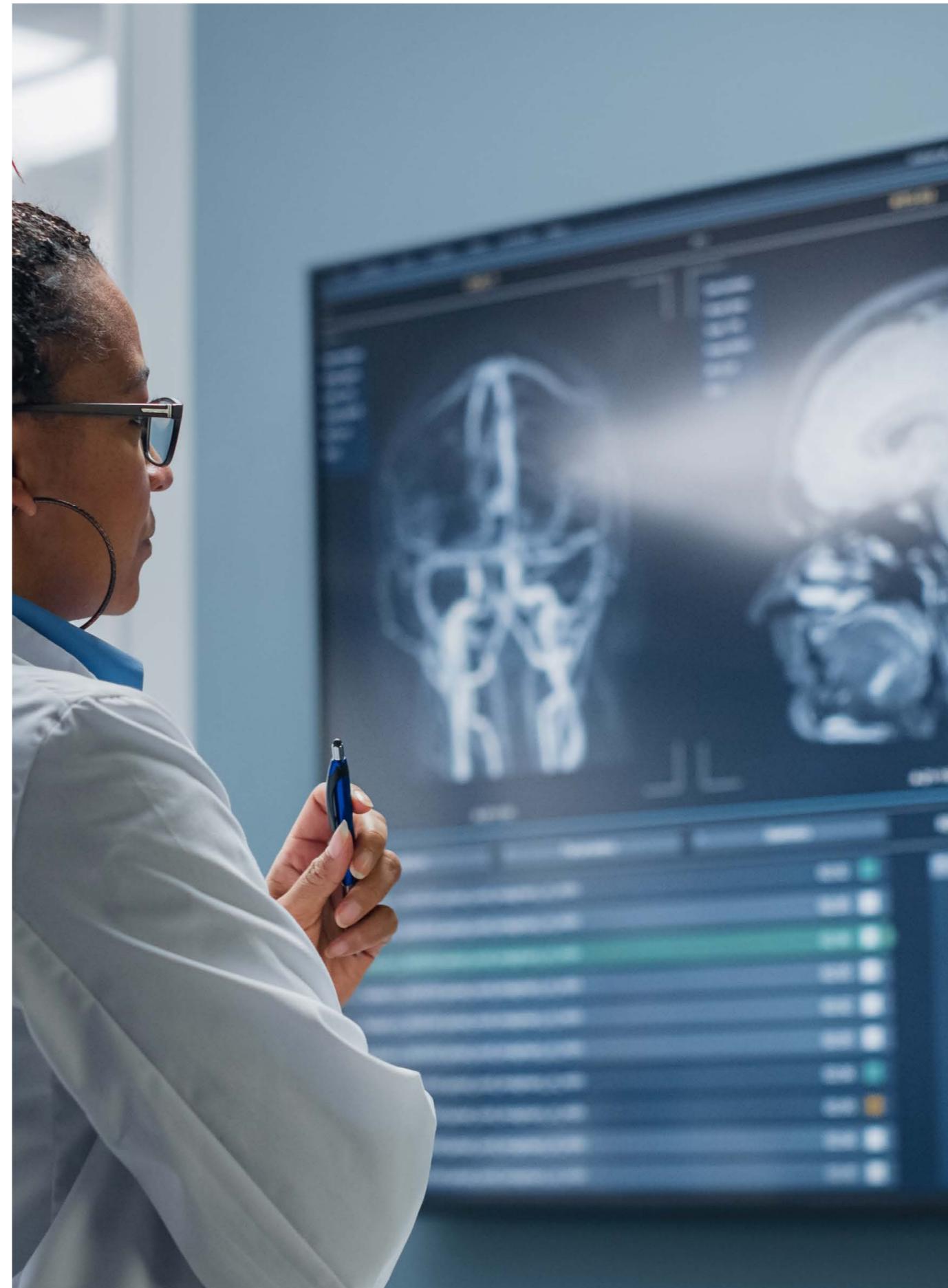
Identify front-line 'demand signals', concentrating AI implementation efforts on targeted healthcare pain points rather than broad transformations, prioritising opportunities for rapid impact and demonstrable return on investment.

#### Partnership with DSIT Digital Centre of Government:

Partner closely with the Department of Science, Innovation & Technology's Digital Centre of Government, leveraging their technical expertise and whole-of-government perspective to strengthen healthcare AI implementations.

#### Aligned Implementation Timelines:

Coordinate AI implementation timelines with quick-win initiatives identified in the Digital Centre of Government's AI Action Plan, maximising impact, efficiency, and resource optimisation.



## 2.2 Turn UK Health Data into a Strategic Growth Engine

The UK's health data represents a strategic national asset with transformative economic potential through Generative AI applications. Our extensive collection of longitudinal, population-wide healthcare data sets constitutes a distinctive competitive advantage in the global AI landscape. However, this potential remains largely untapped due to fragmentation, inconsistent quality, and access barriers<sup>61</sup>.

Recent developments in Secure Data Environments (SDEs) and Trusted Research Environments (TREs), exemplified by platforms such as OpenSAFELY<sup>62</sup> – an innovative analytics environment enabling secure, transparent, and privacy-preserving research across NHS datasets – represent important steps toward more effective data utilisation, but these platforms require significant enhancement to fully support commercial AI model training, including specialised compute infrastructure, appropriate privacy safeguards, integration with 3rd party software development environments, and standardised approaches to data curation.

The development of the NHS England's Federated Data Platform (FDP) offers potential to address some integration challenges, though stakeholders note that implementation barriers and concerns persist. During our stakeholder interview process, participants consistently identified the need for streamlined data governance, improved standardisation, and enhanced infrastructure to unlock the latent value of this resource. Addressing these challenges is not merely a technical exercise but a strategic economic imperative, establishing the foundations for both improved patient care and a thriving healthcare AI economy where the UK can emerge as a global leader.

### 2.2.1. Opportunities

#### UK Healthcare Data as a Strategic National Asset

The UK's health datasets represents a uniquely valuable resource that few other nations can match. As a unified healthcare system with comprehensive longitudinal patient data covering diverse populations, the UK possesses what one stakeholder described as "*the biggest data pool on Earth with a single payer system*"<sup>63</sup>. This combination of scale, diversity, and interconnectedness provides opportunities for AI development and validation that could position the UK as the leading global destination for healthcare AI innovation.

#### Economic Value Creation

Developing healthcare enhancing AI also has revenue generating potential –when ethically governed and properly deployed– by using data alongside its primary purpose of serving the healthcare needs of our population. Stakeholders identified multiple pathways to value creation:

- Development of validated AI models with global market potential.
- Creation of synthetic healthcare data, preserving privacy and enabling dataset sharing<sup>64</sup>.
- Attraction of international investment to UK-based healthcare AI ventures.
- Creation of data services and infrastructure businesses supporting the AI ecosystem.
- Export of data governance frameworks and implementation expertise.

#### Cross-Sector Integration

Beyond clinical data, the UK has opportunities to create value through integration of diverse data types – combining healthcare information with genomic data, imaging repositories, social determinants information, and environmental factors. This multidimensional approach would enable development of more sophisticated AI models with applications extending beyond traditional healthcare boundaries into social and preventative care, population health management, and personalised medicine.

61. The Health Foundation Priorities for an AI in health care strategy 26 Jun 2024 (Accessed 16 Mar 25)

62. OpenSAFELY <https://www.opensafely.org/> (Accessed 25 Mar 25)

63. Stakeholder interview

64. Arora et al [The urgent need to accelerate synthetic data privacy frameworks for medical research](#) The Lancet Digital Health, Feb 25 (Accessed 21 Mar 25)

## 2.2.2. Challenges

### Infrastructure Costs and Limitations

Technical infrastructure constraints represent a significant barrier to unlocking the economic impact of NHS data<sup>65</sup>. Stakeholders identified critical gaps in computing power, data storage, integration platforms, API standardisation, cybersecurity infrastructure, and energy-efficient computing resources for AI model training. A major challenge lies in cybersecurity vulnerabilities, including risks of data breaches and unauthorised access, particularly due to the aging technical infrastructure across the health and social care system. These limitations impede both the technical feasibility and economic viability of Generative AI applications in healthcare, potentially preventing the UK from leveraging its valuable data assets for competitive advantage globally.

The financial investment in NHS data assets is substantial but often overlooked – several billion pounds annually across the data lifecycle, primarily from healthcare professionals spending significant time on documentation in Electronic Health Records<sup>66</sup>. The NHS also employs thousands of data specialists and maintains extensive technical infrastructure, with technology systems across primary care and NHS Trusts requiring hundreds of millions annually. This considerable investment underscores the intrinsic value of NHS data and strengthens the case for developing frameworks that generate

appropriate returns while ensuring benefits flow back to patients and the health system.

**Data Quality and Standardisation**  
The current UK health data landscape is characterised by variable quality, inconsistent coding practices, and significant fragmentation. Stakeholders repeatedly highlighted the substantial pre-processing work required before meaningful value can be extracted from these datasets. The inconsistent adoption of universal data standards across the NHS ecosystem creates inefficiencies that impede both clinical care improvement and economic value realisation.

These issues are not limited to the NHS however. In England, a significant amount of healthcare activity and data also exists within local authorities by virtue of their community health services functions (e.g. health visiting and school nursing). This represents an often forgotten yet a rich source of data and insight during the most critical years of an individual's development.

The UK has also seen growth of the private healthcare sector, which is not currently well integrated with the wider healthcare data ecosystem. In addition to breaking information and management continuity for those patients that receive care across different settings, a further rich source of high quality data remains siloed.

It is here that synthetic data creation, particularly if built upon a rich sovereign data resource, becomes a significant contributor towards the data

requirements of training and validating Generative AI in healthcare in the UK and abroad.

**Ensuring Data Representativeness and Equity**

While transforming NHS data into an accessible asset is crucial, a core challenge lies in addressing the inherent biases and representational gaps within the existing data. Historical health inequalities and variations in data collection practices mean that datasets may underrepresent certain demographic groups – including based on sex and gender, ethnicity, socioeconomic status, geographic location, and disability<sup>67</sup>. Crucially, these factors often intersect, creating further biases that must be understood and addressed. Simply improving technical access or standardisation without proactively curating, augmenting, and evaluating the data for fairness risks perpetuating or even amplifying these biases in the AI models developed using this 'sovereign asset'. To achieve true data quality, it must encompass robust measures for diversity, representativeness, and bias mitigation.

**Governance and Access Barriers**

Despite existing legal frameworks designed to facilitate appropriate data sharing, stakeholders identified persistent barriers to access including data gatekeeping by system providers, excessive access fees creating prohibitive cost structures, risk-averse decision-making at institutional levels, inconsistent application of governance requirements, and primary care data controllership issues limiting integration potential. These challenges are compounded by inconsistencies

in the SDE programme, where varying pricing models, service offerings, and resource scales create significant inefficiencies for data users<sup>68</sup>.

The fragmented approach to data access points creates additional complications in an environment where commercial expertise and analytical skills are already in short supply. These structural impediments prevent the efficient flow of information necessary for AI development and implementation, representing a substantial opportunity cost in terms of potential economic value generation and healthcare improvement.

### Energy Infrastructure and Sustainability

Multiple stakeholders identified energy consumption as a significant constraint on Generative AI deployment at scale. The substantial computing power required for both model development and implementation creates dependencies on energy infrastructure that may be insufficient for rapid expansion. Stakeholders highlighted concerns about data centre capacity, electrical grid capabilities, and carbon footprint implications. Without robust and sustainable solutions to these pressing infrastructure challenges, the UK's ability to develop and deploy advanced healthcare AI models may be significantly limited regardless of other enabling factors.

65. [Guardian Government AI roll-outs threatened by outdated IT systems](#) 26 Mar 25 (26 Mar 25)

66. [Fontana, Gianluca et al Ensuring that the NHS realises fair financial value from its data](#) The Lancet Digital Health, Volume 2, Issue 1, e10 - e12 Jan 20

67. [Gov.uk Equity in medical devices: independent review - final report](#) 11 Mar 24 (Accessed 5 Apr 25)

68. [Tony Blair Institute for Global Change, A New National Purpose: Harnessing Data for Health](#) May 2024 (Accessed 12 Mar 25)

## 2.2.3. International Perspective

### France



France sees data sovereignty as central to its AI strategy, leveraging the Jean Zay supercomputer to train models under GDPR<sup>69</sup>. Its push for independence from US cloud providers aligns with UK ambitions to retain compute and data onshore, presenting opportunities for joint open data infrastructure initiatives and synthetic data collaboration.

### Denmark



Denmark prioritises domestic data control through its Gefion supercomputer and strong public-sector AI projects. Its emphasis on ethical and privacy-aligned data sharing offers scope for UK–Denmark collaboration on trusted research environments, federated analytics, and cross-border data assurance.

### United States



United States healthcare data is fragmented but vast, with model development led by commercial entities accessing proprietary EHR datasets (e.g., EHRs from Epic, Cerner). UK engagement could focus on developing safe validation pipelines for UK-trained models in the US market, while offering complementary capabilities in health data curation and ethical AI oversight.

### China



China treats health and consumer data as a sovereign asset under centralised control, enabling large-scale training of models like ERNIE<sup>70</sup> and Tongyi Qianwen<sup>71</sup>. While governance structures differ, the UK can track emerging Chinese data standards and engage through multilateral settings on topics such as cross-border data governance and synthetic dataset evaluation.

### Saudi Arabia



Saudi Arabia is building national health data lakes and HPC clusters via SDAIA to develop Arabic-language models. UK collaboration could focus on governance, secure access, and validation.

### United Arab Emirates



United Arab Emirates (UAE) is investing in sovereign compute and health data infrastructure through MBZUAI and national AI strategies. UK strengths in TREs and ethical data use offer strong alignment.

### Qatar



Qatar is expanding digital health capacity through research-led initiatives in genomics and population data. The UK could support with standards, synthetic data, and safe AI training methods.

69. CNRS Jean Zay: Introduction 7 Nov 24 (Accessed 25 Mar 25)

70. Reuters <https://www.reuters.com/technology/artificial-intelligence/baidu-make-ernie-ai-model-open-source-end-june-2025-02-14/> China's Baidu to make latest Ernie AI model open-source as competition heats up 14 Feb 25 (Accessed 31 Mar 25)

71. Alibaba Cloud <https://www.alibabacloud.com/en/solutions/generative-ai/qwen> Tongyi Qianwen (QWEN) (Accessed 31 Mar 25)

## 2.2.4. Proposals

### **Proposal 7: Establish a UK Sovereign Healthcare Data Resource**

**Effort:** 3

**Value:** 5

To create a sovereign healthcare data resource, the UK should:

#### **Unify National Healthcare Data Infrastructure:**

Create a dedicated national data infrastructure designed specifically to support AI innovation in healthcare through easier unified access across multiple existing data-sets.

#### **Balance Comprehensiveness and Practicality:**

Develop representative datasets that prioritise pragmatic implementation, meeting defined minimum standards for fairness and representation across key demographic factors, rather than waiting for theoretical perfection. Focus on datasets sufficiently representative to ensure safe and equitable initial deployment and drive meaningful AI innovation, supporting continuous improvement through active feedback loops.

#### **Deliver a “Minimum Viable Platform”:**

Develop and mandate baseline digital capabilities across NHS organisations, urgently prioritising the upgrading of outdated NHS IT systems to ensure compatibility with modern AI technologies.

#### **Strengthen Cyber Resilience and Data Security:**

Immediately enhance the cybersecurity framework for all national data infrastructure, including Secure Data Environments (SDEs) and Trusted Research Environments (TREs). This must ensure robust protection against data breaches and unauthorised access, particularly by raising the baseline technical capabilities to address vulnerabilities in aging infrastructure, which is essential for maintaining public trust and securing the long-term economic value of NHS data assets.

#### **API-First, Open Source Development:**

Adopt an API-first approach guided by open-source principles in NHS technology infrastructure development, ensuring compatibility with existing systems, preventing vendor lock-in, reducing integration complexity, and enabling collaborative innovation. This infrastructure-focused strategy makes use of existing AI communities and open standards rather than committing to specific proprietary AI models or implementations.

#### **Prioritise Strategic Compute Investment:**

Address compute capacity through strategic national investment, specifically targeting healthcare AI infrastructure within the government's AI Growth Zones (AIGZs)<sup>72</sup>, benefiting from streamlined planning and enhanced, sustainable energy infrastructure.

#### **Target Infrastructure Funding:**

Secure essential, ongoing infrastructure funding through vehicles such as the National Wealth Fund (NWF).

#### **Engage Infrastructure Partnerships:**<sup>73</sup>

Forge long-term partnerships with infrastructure providers, aligning their commercial objectives with NHS strategic priorities to ensure mutual benefit and infrastructure sustainability.

<sup>72</sup> Gov.uk AI Growth Zones: expression of interest 10 Feb 25 (Accessed 20 Mar 25)

<sup>73</sup> Gov.uk AI Opportunities Action Plan 13 Jan 25 (Accessed 16 Mar 25)

## ✓ **Proposal 8: Improve Data Access**

**Effort:** 2

**Value:** Key Enabler

To unlock the potential of UK Healthcare data in a safe, secure, and ethical manner, delivering on the core findings of the Sudlow review that health data is critical national infrastructure, the UK should:<sup>74</sup>

### **Reform Data Controllership Structures:**

Elevate data responsibility to National, Integrated Care Board, or Health Board level (in devolved nations), reducing fragmentation across secondary care, primary care and local authorities.

### **Simplify Secure Access to the National Health Data Infrastructure:**

Develop a single, secure access point to the National Health Data Infrastructure through the Health Data Research Service. The HDRS should provide the necessary services and tools needed to provide the required insights needed for AI development purposes from individual data sources. Trusted Research Environments (TREs) and Secure Data Environments (SDEs) should be expanded to ensure nationwide coverage, explore data-sharing obligations, and maintain privacy, transparency, and governance. This infrastructure should go beyond streamlining research access to also accelerate clinical trials, and enable AI innovation.

### **Create Central DPIA and DSA Repository:**

Develop a centralised repository for Data Protection Impact Assessments (DPIAs) and Data Sharing Agreements (DSAs), enhancing transparency of healthcare data flows.

### **Establish Clear Anonymisation Standards:**

Set transparent standards for anonymised healthcare data utilisation to maintain public confidence and support AI development.

## ✓ **Proposal 9: Foster a Synthetic Data Industry**

**Effort:** 2

**Value:** 2

To develop a domestic synthetic data industry, the UK should:

### **Invest in Synthetic Data Capabilities:**

Develop UK expertise in synthetic data generation to complement real-world datasets.

### **Address Edge Cases and Privacy Concerns:**

Utilise synthetic data to manage rare or sensitive scenarios while safeguarding privacy.

### **Build on Existing Pilots:**

Expand initiatives already piloted by NHS England, MHRA, and internationally.

### **Position as an AI Ecosystem Enabler:**

Establish synthetic data as crucial infrastructure supporting broader AI development.

### **Develop Export Opportunities:<sup>75</sup>**

Leverage synthetic data generation expertise as a standalone export industry.

<sup>74</sup> Sudlow, CLM Uniting the UK's Health Data: A Huge Opportunity for Society November 2024  
<https://www.hdruk.ac.uk/wp-content/uploads/2024/11/Executive-Summary-Uniting-the-UKs-Health-Data-1.pdf>

<sup>75</sup> The Health Foundation [Priorities for an AI in health care strategy](#) June 2024 (Accessed 10 March 2025)

## **Proposal 10: Create Economic Incentives for UK-Based Development**

**Effort:** 3**Value:** 4

To encourage the establishment and success of domestic development, the UK should:

### **Use the National Wealth Fund to co-invest in strategic health data infrastructure:**

De-risk early-stage research, development, and deployment of AI through shared investment in infrastructure, incentivising vendors to build in the UK.

### **Establish Preferential Access Frameworks:**

Provide priority data access for organisations developing AI solutions in partnership with the NHS.

### **Create Tangible Economic Incentives:**

Encourage domestic and international companies to base R&D functions within the UK.

### **Implement a “Data Dividend” Approach:**

Generate economic returns through job creation, investment attraction, and intellectual property development.

## **Proposal 11: Develop Sustainable Energy Infrastructure for AI**

**Effort:** 5**Value:** 3

To address the substantial energy requirements for Generative AI development and deployment, the UK should:

### **Accelerate Energy Infrastructure Development:**

Rapidly expand energy infrastructure, particularly nuclear and renewable sources, to meet the increasing computing demands of healthcare AI.

### **Prioritise Green Energy Solutions:**

Ensure healthcare AI computing facilities prioritise green energy, aligning innovation with national environmental sustainability goals.

### **Leverage NHS Estate:**

Utilise underused NHS properties for renewable energy generation and co-located data centres, enabling local heat transfer to adjacent healthcare facilities, enhancing energy efficiency.

### **Invest in Efficient AI Research:**

Fund research initiatives focused on developing computationally efficient AI methods that deliver high performance with lower energy requirements.

**Implement Energy-Efficient Data & Model Strategies:**

Adopt data strategies that optimise AI model design and support research in computationally efficient solutions such as Quantum computing<sup>76</sup>, balancing performance with reduced power consumption.

**Develop Sustainability Standards:**

Establish clear sustainability standards and metrics for healthcare AI, driving energy-efficient innovation as a competitive advantage for the UK.

**Address Planning and Infrastructure Constraints:**

Create a coordinated national strategy to overcome planning and infrastructure barriers for data centre expansion, directly linking healthcare AI computing needs with broader national energy policies.



<sup>76</sup> DataCenter Frontier Quantum Computing Advancements Leap Forward In Evolving Data Center and AI Landscape 20 Feb 25 (Accessed 26 Mar 25)

## 2.3. Secure Public Trust and Responsible Implementation

The economic potential of Generative AI in healthcare can only be realised within a framework of robust public trust and meaningful engagement. Our stakeholder interviews consistently revealed that public confidence is not merely a desirable addition but a fundamental prerequisite for successful adoption and sustainable economic growth in this sector. The shadow of historic missteps in NHS England data initiatives, particularly care.data<sup>77</sup> looms large and provides a stark reminder that technical capability without public mandate can lead to significant setbacks and wasted investment. Recent Health Foundation polling data shows that while over half of the public is supportive of the use of AI in healthcare, 1 in 6 feel it might make care worse<sup>78</sup>.

This dynamic creates both a critical imperative and a strategic opportunity: by establishing world-leading approaches to public engagement and transparent governance, the UK can not only enable domestic Generative AI adoption but potentially develop exportable frameworks and methodologies that address one of the most significant global barriers to healthcare AI implementation.

### 2.3.1. Opportunities

#### Public Mandate as Competitive Advantage

The UK's unified healthcare system provides a distinctive opportunity to develop comprehensive, system-wide approaches to public engagement that could become a significant competitive advantage. Stakeholders identified the potential for the UK to establish global leadership in creating trusted AI ecosystems through transparent governance frameworks, meaningful public involvement, and clear benefit-sharing mechanisms. This expertise could become an exportable asset, positioning the UK as the global centre for ethically-implemented healthcare AI that maintains robust public support.

#### Patient Data Integration and Empowerment

Stakeholders highlighted significant opportunities to enhance the value proposition of healthcare AI by integrating patient-generated data from wearables and other personal devices. By developing frameworks that enable patients to contribute their own data while maintaining appropriate control, the UK could potentially create richer, more comprehensive datasets that support more effective AI development while addressing public concerns about data ownership and control. This approach simultaneously enhances technical capabilities while building public trust through genuine empowerment.

#### Benefit-Sharing Models

The development of clear, equitable frameworks for sharing benefits derived from commercial applications of NHS data represents both an ethical imperative and an economic opportunity. Stakeholders noted that transparent mechanisms ensuring the NHS receives preferential access to products developed using its data, or receives other tangible benefits from commercial partnerships, could simultaneously address public concerns while creating sustainable funding models for ongoing AI development. This approach transforms potential public resistance into active support by ensuring clear public benefit from all data utilisations.

#### Co-Production Methodologies

The systematic involvement of patients and the public in AI development represents a significant opportunity to improve both technical effectiveness and public acceptance. Stakeholders identified potential for the UK to develop structured methodologies for meaningful co-production – moving beyond tokenistic consultation to genuine partnership in determining priorities, designing solutions, and evaluating outcomes. This approach not only enhances technical quality through diverse input but builds legitimacy and trust that supports sustainable implementation. Ensuring wide-ranging involvement across different socioeconomic groups and populations can further strengthen this trust, mitigate biases, and ensure equitable representation of perspectives.

### 2.3.2. Challenges

#### Legacy of Previous Data Initiatives

Previous NHS data initiatives, particularly care.data, have created significant legacy challenges for public trust. Stakeholders consistently referenced these historical missteps as creating an environment where public scepticism about data sharing is the default position. This historical context means that any new Generative AI initiative must overcome not only natural concerns about emerging technology but also the memory of past failures—creating a higher threshold for establishing public trust than might otherwise exist.

#### Commercial Involvement Concerns

Public anxiety about commercial involvement in NHS data represents a substantial challenge to economically sustainable Generative AI development. Stakeholders noted widespread public concern about “selling NHS data” and commercial profit-making from public resources without clear reciprocal benefit. This resistance to commercial involvement creates potential barriers to essential private sector investment and expertise – potentially limiting both innovation capacity and economic growth potential if not effectively addressed.

<sup>77</sup> BMJ Controversial database of medical records is scrapped over security concerns Jul 16 (Accessed 16 Mar 25)

<sup>78</sup> The Health Foundation AI in health care: what do the public and NHS staff think? Jul 24 (Accessed 16 Mar 25)

## Transparency and Communication Deficits

Current approaches to transparency and communication about healthcare data usage were identified as inadequate. Stakeholders noted a lack of clear, accessible information about how data is used, insufficient explanation of safeguards, and limited visibility of resulting benefits. This opacity creates fertile ground for mistrust and speculation, with stakeholders warning that technical developments are currently outpacing communication capabilities, creating growing risks of public rejection or resistance.

## Balancing Innovation with Ethical Safeguards

Achieving appropriate balance between enabling innovation and maintaining ethical safeguards presents substantial challenges. Stakeholders identified tensions between commercial imperatives for rapid development and public expectations for thorough evaluation and transparent governance. This balancing act becomes particularly complex in a competitive global environment where excessive restrictions could potentially hamper UK economic competitiveness, while inadequate protections could undermine public trust and long-term sustainability.

## Data Quality and Bias Concerns

Technical challenges related to data quality, comprehensiveness, and potential bias create significant risks for both effective AI development and public confidence. Stakeholders noted concerns about “poisoning the well” with poor quality data or reinforcing existing healthcare inequalities through biased datasets. These technical limitations have direct implications for public trust, as early implementation failures or evidence of bias could significantly damage confidence in healthcare AI more broadly.



### 2.3.3. International Perspective

#### France



France promotes “trustworthy AI” aligned with GDPR and EU values, emphasising transparency, open-source development, and public involvement. The UK could collaborate on participatory governance, benefit-sharing models, and alignment around AI assurance under the evolving EU AI Act.

#### Denmark



Denmark integrates public trust and democratic values into national AI deployment, with extensive citizen engagement and transparent governance. UK policymakers can learn from Denmark's structured co-production approaches and explore joint frameworks for public involvement in AI implementation.

#### United States



The United States regulatory and ethical AI landscape remains dynamic and unpredictable. While the White House initially launched an Executive Order on AI Safety<sup>79</sup> and secured voluntary safety pledges from companies, this was rescinded in early 2025<sup>80</sup>. Private-sector actors such as OpenAI and Anthropic continue to shape the discourse through initiatives like Superalignment<sup>81</sup> and Claude's Constitution<sup>82</sup>. This creates a fragmented governance model where safety leadership is driven by corporate norms rather than statutory oversight. The UK has an opportunity to position itself as a stable, publicly accountable counterweight, offering frameworks grounded in transparency, clinical safety, and public engagement that could inform bilateral dialogue and influence emerging global norms.

#### China



China's enforces ethical AI mandates through centralised regulation, focusing on explainability and bias control, though citizen-facing transparency is limited. While governance styles diverge, the UK could engage via multilateral platforms to influence global standards on fairness, safety metrics, and data provenance.

#### Saudi Arabia



Saudi Arabia promotes AI ethics through SDAIA-led guidelines, with trust framed around national reputation and strategic control. UK partnerships could support capacity-building in transparency and public engagement.

#### United Arab Emirates



United Arab Emirates (UAE) has established ethical AI principles and prioritises trust through performance and strategic communication. UK collaboration could enhance participatory governance and benefit-sharing frameworks.

#### Qatar



Qatar is beginning to formalise ethical approaches to digital health. UK support could help embed transparency, co-production, and responsible data stewardship as its ecosystem develops.

<sup>79</sup> White House. [Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence](#) (2023) (Accessed 25 Mar 25)

<sup>80</sup> White House [REMOVING BARRIERS TO AMERICAN LEADERSHIP IN ARTIFICIAL INTELLIGENCE](#) 25 Jan 25 (Accessed 25 Mar 25)

<sup>81</sup> OpenAI. [Introducing Superalignment](#) Jul 23 (Accessed 25 Mar 25)

<sup>82</sup> Anthropic [Claude's Constitution](#) 9 May 23 (25 Mar 25)

## 2.3.4. Proposals

### **Proposal 12:** Engage the Public in Shaping the Future of Healthcare AI

**Effort:** 3

**Value:** Key Enabler

To build essential public confidence in healthcare AI, the UK should:

#### **National Public Engagement Strategy:**

Develop a structured, national approach to public engagement in healthcare AI, leveraging specialist expertise in public communication and deliberative democracy methodologies.

#### **Continuous Public Dialogue:**

Establish ongoing mechanisms for meaningful public dialogue, moving beyond one-off consultations to create continuous feedback loops that directly inform AI policy and development.

#### **Transparent Influence Reporting:**

Implement transparent and accessible reporting on how public contributions have shaped decision-making processes, demonstrating genuine responsiveness and building credibility.

#### **Prioritise Underrepresented Communities:**

Actively prioritise engagement efforts with underrepresented communities, ensuring diverse perspectives inform AI development and proactively addressing potential biases.

#### **Accessible Technical Communication:**

Create clear, accessible explanations of complex technical concepts, ensuring public understanding keeps pace with rapid technological advances in AI.

#### **Proactive Public Attitude Research:**

Invest in ongoing research to track and understand evolving public and staff attitudes toward Generative AI in healthcare. Partner with organisations such as the Health Foundation, King's Fund, Ada Lovelace Institute, and the Nuffield and Wellcome Trusts to explore not only perceptions and concerns, but also the values and trade-offs people are willing to accept – such as balancing speed of access against diagnostic accuracy. These insights will support the design of proactive, evidence-led communication strategies and ensure that AI deployment aligns with what matters most to those who use and deliver NHS services.

### **Proposal 13: Ensure Transparent, Accountable Benefit-Sharing & Data Use**

**Effort:** 2**Value:** Key Enabler

To lock in public confidence while unlocking economic value from NHS data, the UK should:

#### **Publish benefit-sharing agreements in plain English:**

Set out preferential pricing, revenue-sharing, reinvestment and knowledge-sharing terms so everyone can see how value flows back to patients and the NHS.

#### **Establish a Federated, Real-Time AI Transparency Dashboard:**

Mandate all implementing healthcare organisations to maintain a local AI Transparency Dashboard/Registry detailing their specific AI applications, status, and performance. This local data must seamlessly feed into a centralised, national public dashboard, ensuring real-time transparency while distributing the data management effort and reflecting local impact.

#### **Create an independent oversight body with statutory powers and meaningful public representation:**

To verify that agreements deliver proportionate value, monitor compliance with data-governance standards and impose sanctions for breaches.

#### **Embed a single, easy-to-understand governance framework across the system:**

Updated as technology evolves, so all organisations handling NHS data for AI know exactly what is expected of them.

### **Proposal 14: Empower Patients Through Data Integration and Control**

**Effort:** 2**Value:** Key Enabler

To transform patients from passive data subjects to active participants, the UK should:

#### **Centralise Data Access via National Patient-Facing Apps (e.g. the NHS App in England):**

Establish the NHS App as the primary, unified channel for patients to securely access and manage their personal health data.

#### **Integration of Personal Device Data:**

Develop governance frameworks enabling patients to seamlessly integrate data from validated personal wearables and devices into NHS systems under robust, transparent oversight.

#### **Enhanced Patient Data Control:**

Introduce mechanisms providing patients greater visibility and granular control over their data use, fostering trust through empowerment and transparency rather than restriction.

#### **Tiered Consent Models:**

Implement nuanced, tiered consent systems allowing patients to make informed and detailed choices about various forms of data sharing and usage.

**Clear Withdrawal Processes:**

Establish straightforward, accessible procedures enabling patients to easily withdraw consent, reinforcing ongoing personal autonomy, with particular safeguards ensuring appropriate protection for children, vulnerable adults, and groups at risk of harm.

**Intuitive Patient Dashboards:**

Create intuitive, user-friendly dashboards that transparently display individual patient data and clearly illustrate how this data contributes to broader healthcare advancements.



✓ **Proposal 15: Embed Co-Production in Generative AI Development**

**Effort:** 1**Value:** 3

To ensure healthcare AI meets genuine needs while maintaining public confidence, the UK should:

**Co-production Throughout AI Lifecycle:**

Establish comprehensive co-production methodologies actively involving patients and the public at every stage of AI development, from conception and build, through testing and validation, to implementation and post-market surveillance.

**Diverse Public Priority-Setting:**

Integrate diverse public voices in the prioritisation of AI development efforts, ensuring initiatives align with societal values and public expectations.

**Patient-led Evaluation Mechanisms:**

Create specific mechanisms to incorporate patient perspectives into the evaluation of AI applications, providing practical reality-testing from end-user experiences.

**Supported and Compensated Participation:**

Ensure co-production methodologies provide appropriate support and fair compensation to public participants, facilitating genuinely meaningful engagement rather than tokenistic involvement.

## 2.4. Accelerate Innovation through Novel Investment Models

The economic potential of Generative AI in healthcare cannot be fully realised without appropriate investment structures and market infrastructure. Our stakeholder interviews revealed a complex landscape where the UK's considerable assets – unified healthcare system, world-class research institutions, and established funding mechanisms – are counterbalanced by significant structural limitations in scaling innovations beyond the pilot stage. The “getting to orbit” problem was consistently identified as a critical barrier, with the UK excelling at early-stage funding but struggling to provide the growth capital necessary for companies to achieve meaningful scale. Addressing these investment and market infrastructure challenges is essential to transforming the UK's considerable healthcare AI innovations into sustainable economic growth and global competitiveness.

### 2.4.1. Opportunities

#### Novel Funding Models

The UK has significant opportunities to develop innovative funding approaches tailored to healthcare AI's unique characteristics. However, caution is essential when considering models that involve NHS data. Research by the National Data Guardian<sup>83</sup> and other public consultations consistently shows profound public concern about NHS data being used in ways that primarily generate corporate profits without direct benefits returning to the NHS and patients. With this important consideration in mind, stakeholders identified several promising directions that could balance innovation with public trust: carefully structured equity stakes in companies that improve NHS services while using NHS data assets, public-private partnerships modelled after initiatives like KHP Ventures<sup>84</sup>, and special purpose vehicles designed specifically for healthcare AI applications that demonstrably benefit patients. These novel structures could help bridge the gap between early-stage innovation and commercial scale while maintaining public confidence.

#### NHS Estate Utilisation

The extensive NHS physical infrastructure represents an underutilised asset that could support healthcare AI development. Stakeholders suggested models such as The London Institute for Healthcare Engineering (LIHE)<sup>85</sup>, where facilities house development teams, computing infrastructure, and innovation hubs. This creates co-location benefits similar to successful “innovation cities” models

seen internationally, particularly in Paris. This approach would maximise returns on existing public assets while facilitating collaboration between clinicians, developers, and researchers.

#### Global Export Potential

The UK's comprehensive healthcare data assets, combined with AI expertise, create significant export opportunities. Validated solutions developed for the NHS context could be adapted for international markets, generating revenue streams that extend beyond domestic implementation. Several stakeholders noted that UK-developed solutions addressing common global healthcare challenges could find substantial international markets, particularly in systems with similar structures.

#### Cost Reduction Through Early Intervention

Generative AI applications focused on preventive care and early intervention present dual economic opportunities—reducing long-term healthcare costs while creating marketable solutions with significant commercial potential. This alignment between economic interests and health outcomes creates particularly attractive investment opportunities that could appeal to both traditional investors and impact-focused funding sources.

### 2.4.2. Challenges

#### Venture Capital Environment

The UK venture capital environment for healthcare AI remains underpowered relative to international peers. It is characterised by low pension fund allocations, fragmented growth capital, and a risk aversion towards pre-revenue ventures. Stakeholders highlighted that, while recent reforms to research funding have improved upstream cost recovery, equivalent innovation in downstream investment models has yet to emerge.

A further constraint is that UK and European VC funds tend to be smaller and more price-sensitive, limiting their ability to offer competitive early-stage funding. As a result, UK AI startups often raise less capital and struggle to offer market-rate salaries to early employees. This dynamic contributes to drain on talent, with skilled innovators moving into better-remunerated sectors such as financial services and law. Without coordinated mechanisms linking public research reforms to scalable commercial finance, the UK risks losing its innovation pipeline before it reaches sustainable economic impact.

<sup>83</sup> Gov.uk Data saves lives: reshaping health and social care with data (Accessed 31 Mar 25)

<sup>84</sup> KHP Ventures (Accessed 11 March 2025)

<sup>85</sup> LIHE (Accessed 16 March 2025)

## NHS Implementation and Market Fragmentation Barriers

Despite the theoretical advantage of the UK's relatively unified health system, practical realities significantly constrain the scaling and commercialisation of healthcare AI innovations. Stakeholders consistently identified "pilot purgatory"<sup>86</sup>, where successful innovations fail to transition from localised pilots into broader, system-wide implementation due to highly variable and often conflicting decision-making processes across NHS Trusts and Health Boards. This fragmentation creates high transaction costs and complexity for innovators seeking wider adoption, undermining economic sustainability. Additionally, monopolistic or duopolistic structures in existing healthcare IT further limit innovation, driving up costs and slowing adoption. Addressing these combined implementation and fragmentation barriers through more coherent decision-making, streamlined procurement processes, and clearer pathways for system-wide adoption is crucial to unlocking the NHS's full potential as a unified market and accelerating economic growth through healthcare AI.

## Healthcare-Academia-Industry Disconnect

While the UK possesses world-class academic institutions with significant AI expertise, stakeholders noted persistent barriers that hinder translating academic innovation into commercially viable healthcare applications. Healthcare organisations themselves compound these challenges through restrictive data governance practices, limited capacity for collaborative validation, and procurement processes misaligned with agile academic-commercial innovation cycles. Cultural gaps such as divergent incentive structures, risk tolerance, and expectations of speed and evidence further exacerbate the friction among academia, industry, and healthcare. Collectively, these factors impede the efficient flow of innovation from research discovery through healthcare validation to successful commercial implementation, limiting both patient benefit and economic impact.



<sup>86</sup> Stakeholder interview

## 2.4.3. International Perspective

### France



France blends public and private capital through Bpifrance<sup>87</sup> and France 2030, investing in national AI champions like Mistral and Hugging Face<sup>88</sup>. It is deploying €500 million to scale national AI champions, and at the recent AI Action summit, over €109 billion in investments for AI infrastructure projects were announced<sup>89</sup>. This approach to sovereign investment and strategic co-location (e.g. Station F<sup>90</sup>) offers models the UK could adapt to support domestic scaling, cluster development, and mission-aligned AI ventures.

### Denmark



Denmark channels AI investment through the Novo Nordisk Foundation and Danish Growth Fund<sup>91</sup>, targeting healthcare, biotech, and sustainability. The UK could explore similar co-investment vehicles tied to national health missions and draw on Denmark's success in bridging translational research and SME growth.

### United States



The United States accounts for nearly 90% of global Generative AI investment, with mega-projects like Stargate, and a dominant venture capital ecosystem. Federal programmes (e.g. NSF<sup>92</sup>, ARPA-H<sup>93</sup>) catalyse early-stage R&D but leave scaling to venture markets. The UK could differentiate by offering more stable, mission-driven capital and positioning NHS infrastructure as a national platform for responsible AI growth—turning public assets into economic multipliers.

### China



China deploys large-scale public investment through state and provincial funds, with strong alignment to national industrial policy. Thousands of AI firms benefit from city-level incentives and infrastructure support. While the governance model differs, the UK could engage through multilateral dialogues to ensure fair competition, transparency in public funding use, and safeguards around health-related AI exports.

### Saudi Arabia



Saudi Arabia is deploying significant capital into AI through its Public Investment Fund, with healthcare AI positioned as a strategic growth area. The UK could collaborate on assurance frameworks, joint ventures, and co-investment in trusted validation infrastructure.

### United Arab Emirates



United Arab Emirates (UAE), through Mubadala and G42, is actively backing AI ventures and sovereign compute. Its focus on health tech aligns well with UK strengths in regulation, data access, and exportable assurance services.

### Qatar



Qatar is scaling investment via public R&D funds, with growing interest in bio-AI and digital health. UK collaboration on evidence generation, academic-industry translation, and validation could support Qatar's ambitions in health innovation.

### Australia



Australia's pension-led model is exemplified by Aware Super's investment in Harrison.ai<sup>94</sup>, enabling domestic innovation and international scaling. The UK could learn from this approach to unlock long-term capital through pension reforms and create similar conditions for export-oriented healthcare AI firms.

<sup>87</sup> Bpifrance <https://www.bpifrance.com/> (Accessed 25 Mar 25)

<sup>88</sup> Politico France bets big on open-source AI 4 Aug 23 (Accessed 25 Mar 25)

<sup>89</sup> Élysée Make France an AI Powerhouse 11 Feb 25 (Accessed 25 Mar 25)

<sup>90</sup> StationF <https://stationf.co/> (Accessed 25 Mar 25)

<sup>91</sup> [https://en.digst.dk/media/lz0fbt4/305755\\_gb\\_version\\_final-a.pdf](https://en.digst.dk/media/lz0fbt4/305755_gb_version_final-a.pdf) The Danish Government – National Strategy for Artificial Intelligence – March 2019 [Accessed 25 Mar 25]

<sup>92</sup> United States National Science Foundation (Accessed 27 Mar 25)

<sup>93</sup> Advanced Research Projects Agency for Health (ARPA-H) (Accessed 27 Mar 25)

<sup>94</sup> Harrison.AI secures US \$112 million in Series C funding round 11 Feb 25 (Accessed 27 Mar 25)

## ✓ **Proposal 16: Establish a UK Data Sovereign Wealth Fund**

**Effort:** 4**Value:** 5

To create long-term returns from healthcare data assets while ensuring public benefit, the UK should:

### **Create a Sovereign Fund:**

Establish a UK Health Data Sovereign Wealth Fund, seeded through public capital and licensing revenues derived from approved uses of NHS data. The fund would strategically invest in UK-based healthcare AI companies and infrastructure that depend on access to NHS data, ensuring alignment with national health priorities. All financial returns would be transparently reinvested into NHS services, creating a closed-loop system that captures value for the public from this sovereign asset.

### **Structure Governance:**

Ensure governance includes representatives from the DHSC, investment experts, and patient groups, providing balanced oversight and safeguarding public trust.

### **Take Strategic Stakes:**

Acquire strategic stakes in UK-based healthcare AI companies leveraging NHS data, promoting growth and securing long-term benefits for the UK economy.

### **Expand Remit of National Wealth Fund:**

Explicitly mandate the NWF to prioritise healthcare AI, ensuring investments align with NHS strategic transformation goals.

### **Mandate Reinvestment:**

Require a substantial majority of fund returns to be reinvested in NHS infrastructure and service delivery, with exact proportions determined through detailed economic analysis and consultation.

### **Deploy Specialist Investment Teams:**

Utilise specialist investment teams that combine healthcare, AI, and commercial expertise to ensure effective investment decisions and robust returns.

### **Prioritise Strategic Investments:**

Target investments aligned with the triple aim of transitioning from "hospital to community," shifting from "sickness to prevention," and moving from "analogue to digital," enhancing both equitable patient care and economic value.

### **Implement Transparent Reporting:**

Maintain transparent public reporting on all fund investments, returns, and resulting NHS benefits, promoting equity, accountability, and public confidence.

### **Develop Co-investment Relationships:**

Build co-investment relationships with international sovereign wealth funds, enhancing investment capacity and promoting the global competitiveness of UK healthcare AI.

## ✓ **Proposal 17: Enhance Funding Pathways for UK Healthcare AI Ventures**

**Effort:** 3**Value:** 4

To address the critical “getting to orbit” challenge for SMEs, and to ensure UK healthcare AI ventures are globally competitive, the UK should undertake targeted reforms to the broader financial and investment ecosystem:

### **Streamlined Investment via British Business Bank:**

To accelerate the scaling and adoption of healthcare AI innovations, enhanced funded pathways should incorporate streamlined access to strategic investment from key public institutions, such as the British Business Bank (BBB). This should include:

- **Prioritisation of Healthcare AI:** Mandate BBB to explicitly prioritise healthcare AI, particularly Generative AI, aligning closely with NHS strategic triple aims.
- **Dedicated Specialist Teams:** Establish healthcare and AI-specialised investment teams within BBB to accelerate decision-making and ensure effective capital deployment aligned with innovation cycles typical of healthcare AI ventures.
- **Streamlined Investment Processes:** Reduce bureaucratic delays by creating agile funding processes within BBB to match the pace required by AI technologies.
- **Transparent Accountability:** Ensure publicly available reporting on all BBB-funded healthcare AI investments, their outcomes, and NHS benefits, maintaining public confidence through demonstrable accountability.

### **Increase Public and Private Sector Fund Allocations:**

Encourage UK pension and insurance funds to raise their allocations to venture capital, private equity, and infrastructure beyond the current estimated 6%<sup>95</sup>, aligning more closely with international peers. This increase would create a substantial new pool of growth capital for scale-ups.

### **Engage New Public Pension Megafunds<sup>96</sup>:**

Establish early dialogues with emerging consolidated pension funds to align investment mandates with national healthcare AI objectives, ensuring UK-based health tech innovators have access to strategic growth capital.

### **Develop Specialised Investment Vehicles:**

Create investment structures tailored to the unique characteristics of healthcare AI and evidence generation, incorporating appropriate risk-sharing mechanisms and aligning timeline expectations with the sector’s development cycles.

### **Address Talent Drain through Competitive Capital:**

Recognise that smaller, price-sensitive UK and European VC funds constrain salary offers at early-stage startups. This limits competitiveness and drives top AI talent into financial services, law, and other better-remunerated sectors. Reformed investment models must enable startups to offer globally competitive compensation to retain innovators.

### **Create Tax Incentives:**

Introduce tax benefits for funds and established companies that invest in healthcare AI ventures, potentially including credits for developing tangible solutions addressing pressing healthcare challenges.

### **Develop Public-Private Partnership Models:**

Build on exemplars like Our Future Health<sup>97</sup> to create public-private partnerships that combine government funding with industry expertise, fostering a collaborative investment environment

<sup>95</sup> <https://www.newfinancial.org/reports/comparing-the-asset-allocation-of-global-pension-systems>  
(Accessed 20 March 2025)

<sup>96</sup> <https://www.newfinancial.org/reports/comparing-the-asset-allocation-of-global-pension-systems>  
(Accessed 20 March 2025)

<sup>97</sup> [Our Future Health](#) (accessed 16 Mar 25)

## **Proposal 18: Fix Market Fragmentation to Enable Scalable AI Deployment**

**Effort:** 3**Value:** Key Enabler

To address fragmentation challenges and improve market function, the UK should:

### **Develop a Coherent UK-wide AI Strategy:**

Implement a unified, UK-wide strategic approach to Generative AI adoption in healthcare, reducing fragmentation and enhancing collaborative innovation.

### **Address Market Dominance:**

Actively tackle vendor data lock-in behaviours in existing healthcare IT markets to create a more competitive environment that encourages innovation.

### **Improve Market Dynamics:**

Support new market entrants, foster parallel innovation pathways, and develop platform and infrastructure-based approaches to stimulate dynamic growth and competition. Adopt flexible and dynamic procurement approaches that can absorb new innovations on a regular, ongoing basis.

### **Clarify NHS Technology Roles:**

Clearly define the NHS's role in technology development, establishing distinct boundaries between internal solution development and external market procurement to avoid conflicts and inefficiencies.

### **Create Protected Innovation Funding:**

Establish funding mechanisms explicitly insulated from short-term budget pressures, providing stable support for implementation and long-term innovation in healthcare AI.

## **Proposal 19: Bridge the divide between Healthcare, Academia, and Industry**

**Effort:** 2**Value:** 3

To capitalise on the UK's academic strengths and foster collaboration with healthcare and industry, structural reforms should:

### **Reduce Healthcare-Academia-Industry Barriers:**

Facilitate smoother data and model use between healthcare and academia, enabling secure access to data within academic platforms for model training and easy deployment in healthcare environments for model evaluation.

### **Establish Bridging Career Pathways:**

Create defined career progression pathways for specialists bridging academic and commercial sectors, ensuring attractive and sustainable career opportunities.

### **Create Co-location Initiatives:**

Establish UK-wide "innovation cities" by co-locating academic institutions, industry partners, and healthcare providers, inspired by successful international models.

### **Standardise Collaboration Frameworks:**

Develop standardised frameworks to streamline academic-commercial collaborations, including clear intellectual property arrangements and data access protocols, facilitated in England by the Health Innovation Networks (HINs)<sup>98</sup>.

## **Proposal 20. Implement Sustainable Commercial Models for Healthcare AI**

**Effort:** 2**Value:** 4

To create economically sustainable returns from healthcare AI investments, the UK should:

### **Develop Comprehensive Licensing Frameworks:**

Establish NHS data licensing frameworks incorporating equity stakes or revenue-sharing mechanisms, securing sustainable long-term returns on public investment while recognising implementation complexities.

### **Implement Transactional Access Models:**

Introduce transactional, pay-per-use models for organisations requiring discrete validation engagements rather than continuous access, providing flexible pathways to NHS validation resources.

### **Create Strategic Partnership Models:**

Develop strategic partnerships with foundation model developers and specialised industry sectors (e.g., pharmaceuticals), ensuring UK access to cutting-edge technologies and clearly demonstrating value through targeted, domain-specific applications.

### **Develop Novel Healthcare AI Insurance Products:**

Support the creation of tailored insurance products that address liability and deployment risks for AI developers and providers. These would help reduce uncertainty, de-risk adoption, and enable safer, faster scaling of AI in healthcare.

### **Adopt Membership-Based Models:**

Implement membership-based access arrangements similar to Our Future Health, differentiated for large companies and SMEs, creating sustainable revenue streams. To ensure effective reinvestment, these should be established outside conventional government fiscal structures. As highlighted in "A New National Purpose: Harnessing Data for Health" (Tony Blair Institute)<sup>99</sup>, current NHS financial rules discourage commercialisation by clawing back surpluses and restricting multi-year budgeting. A separate entity, operating independently with Treasury oversight, could retain and reinvest revenues strategically into NHS projects over longer time horizons.

### **Prioritise Direct Income Generation:**

Emphasise approaches that generate direct income or achieve clear cost recovery, acknowledging these are more financially tangible and preferable to productivity improvements, which are challenging to monetise directly.

### **Enable Revenue Retention:**

Allow NHS organisations to retain surplus revenue for reinvestment over extended periods, incentivising sustainable cost-saving initiatives and revenue-generating activities.

## 2.5. Develop World-Class Healthcare AI Workforce and Leadership

The successful integration of Generative AI into healthcare depends fundamentally on workforce capability, leadership expertise, and implementation frameworks. Our stakeholder interviews revealed significant gaps in AI literacy across the healthcare ecosystem – from frontline professionals to executive leadership – creating barriers to effective adoption and economic realisation. Addressing these capability gaps represents both a fundamental requirement for successful Generative AI implementation and a significant economic opportunity in itself. By developing world-leading expertise in healthcare AI implementation, the UK can not only transform its own health service but potentially create exportable knowledge assets, educational programmes, and implementation frameworks that generate economic value while improving global healthcare delivery.

### 2.5.1. Opportunities

#### Workforce Development and Professionalisation

The UK is uniquely positioned to lead in the development of a specialised healthcare AI workforce, thanks to its integrated public health systems and globally respected education system. Stakeholders noted that, unlike fragmented systems in other countries such as the US, the UK's health systems enable scalable, work-based postgraduate training such as NHS England's Topol<sup>100</sup> and Clinical AI Fellowship Programmes<sup>101</sup>, and other embedded placements. This creates a strategic opportunity to professionalise the healthcare AI workforce by establishing formal career pathways, nationally recognised competencies, and modular training programmes that blend clinical, data, and AI literacy.

By aligning digital upskilling with NHS service transformation, the UK can cultivate a new class of hybrid professionals that are clinically experienced, technically fluent, and operationally embedded, and create a workforce asset that drives both healthcare improvement and economic growth.

#### Implementation Expertise and Knowledge Assets

The successful deployment of AI in healthcare is dependent on robust implementation practice. Stakeholders emphasised the opportunity to systematise the UK's emerging expertise in AI integration by codifying change management approaches, workflow redesign, and implementation playbooks. These

assets could form the basis for a nationally endorsed AI implementation framework, underpinned by a commitment to transparent learning from both success and failure. When developed through NHS exemplars and real-world pilots, this structured implementation expertise could be exported through consultancy models, training programmes, or international capacity-building partnerships.

#### Leadership Development

The cultivation of expert leaders who understand both clinical requirements and technological possibilities represents a significant opportunity. Stakeholders noted that effective leadership is the critical enabler for successful AI implementation, suggesting that targeted development programmes for healthcare executives and clinicians could accelerate adoption while creating models that could be replicated internationally.

The UK already benefits from several established leadership development initiatives such as the NHS England's Digital Academy<sup>102</sup>. By building upon these while addressing identified gaps in technical depth, implementation methodologies, and specialised AI ethics training, the UK can accelerate the development of world-class healthcare AI leadership, potentially creating exportable expertise through leadership exchange programmes, executive education offerings, and advisory services.

#### Enhanced Operational Efficiency

By freeing highly skilled data analysts from routine reporting tasks through AI automation, healthcare organisations can redirect analytical talent toward higher-value activities that drive decision-making and service improvement. Stakeholders consistently identified this "liberation of talent" as a significant opportunity to improve productivity while enhancing job satisfaction and career development. This operational efficiency gain represents both an economic benefit through productivity improvement and a workforce retention strategy in a competitive talent market.

<sup>100</sup>NHSE Topol Programme for Digital Fellowships (accessed 27 Mar 25)

<sup>101</sup>Guy's & St Thomas' Foundation NHS Trust Clinical AI Fellowship Programme (Accessed 27 Mar 25)

<sup>102</sup>NHSE NHS Digital Academy (accessed 27 Mar 25)

## 2.5.2. Challenges

### Widespread AI Literacy Gaps

Current AI literacy levels across the health and social care workforce were consistently described as inadequate for effective engagement with Generative AI technologies.

These gaps exist at all levels – from frontline clinicians to senior leadership—and span both technical understanding and appreciation of potential applications. Undergraduate curricula lack dedicated teaching on Digital Health, AI, and Data Science, meaning that doctors entering training today will emerge in 5 years without having had a compulsory component dedicated to a critical aspect of their workplace setting. Without addressing these fundamental knowledge gaps, stakeholders indicated that organisations will struggle to effectively commission, implement, and evaluate AI solutions, limiting economic potential and potentially wasting resources on poorly specified or implemented technologies.

### Absence of Structured Career Pathways

The lack of clearly defined career structures for critical roles such as data analysts, data scientists, clinical informaticians, and digital health specialists creates significant barriers to attracting and retaining talent essential for effective AI implementation. Stakeholders noted that talent often flows away from healthcare toward better-structured opportunities in other sectors, creating persistent capability gaps and clinical workforce attrition. Without addressing these structural workforce issues, healthcare organisations will face ongoing challenges in building and

maintaining the expertise required for successful AI adoption.

### Leadership Capability Deficits

A significant barrier to effective AI implementation is the limited technical literacy among healthcare leadership, coupled with an ingrained risk-aversion approach. Stakeholders consistently identified the gap between clinical and technological understanding at executive levels as a critical constraint on strategic decision-making around AI investments. Without expert leaders who can bridge these domains, organisations struggle to develop coherent AI strategies, evaluate potential solutions effectively, or drive the cultural changes required for successful adoption—creating significant barriers to realising economic benefits<sup>103</sup>.

### Liability and Indemnity Uncertainties

Significant uncertainty exists regarding professional liability and indemnity coverage for AI-assisted decision-making. This is particularly acute in primary care, where GPs as data controllers face potentially unlimited liability without clear state-backed indemnity coverage (which varies across the four nations). These unresolved legal and financial risks create substantial barriers to adoption, particularly for smaller organisations without the resources to manage complex risk assessments or negotiate specialised insurance coverage.



<sup>103</sup>Goodall, A. *Credible: the power of expert leaders* Basic Books 22 Jun 2023

## 2.5.3. International Perspective

### France



France is doubling its AI graduate output and aims to train 100,000 people by 2030<sup>104</sup> through initiatives like 3IA and AI for Health. The UK could collaborate on clinician upskilling, joint curriculum development, and mutual recognition of digital health qualifications.

### Denmark



Denmark embeds AI across public service delivery, supported by the Pioneer Centre and the Danish Centre for AI<sup>105</sup>. Its integration of research, education, and practice offers lessons for UK training pathways, especially in interdisciplinary leadership development.

### United States



The United States benefits from a large, mobile talent pool and elite AI programmes, supported by federal AI institutes and industry labs. The UK could position itself as a global leader in applied health AI by focusing on implementation expertise, clinical AI fellowships, and exportable training models rooted in public sector experience.

### China



China is rapidly scaling AI capacity through thousands of scholarships, new universities, and early curriculum integration. While strategic goals differ, the UK can track best practices in technical training and collaborate on global workforce standards, particularly for healthcare AI safety and interpretability.

### Saudi Arabia



Saudi Arabia is investing in AI workforce development through SDAIA's Centre of Excellence, KAUST AI Center<sup>106</sup>, and international scholarship schemes aligned to Vision 2030. Healthcare applications are gaining focus, with potential for UK collaboration on safety training, clinical AI fellowships, and leadership development.

### United Arab Emirates



United Arab Emirates (UAE) is scaling AI talent through MBZUA and targeted upskilling programmes. With a growing interest in health AI, the UK is well positioned to offer partnership on clinician training, co-designed curricula, and digital leadership pathways.

### Qatar



Qatar is building AI capacity through academic and research institutions, with early focus on precision medicine and digital health. UK expertise in healthcare informatics and AI career pathways could support Qatar's efforts to grow a clinically aligned AI workforce.

<sup>104</sup> Medscape France Bets on Medical AI, to Train 100,000 Doctors Yearly 23 Feb 25 (Accessed 25 Mar 25)

<sup>105</sup> Pioneer Centre for Artificial Intelligence Interdisciplinary and at the forefront of fundamental AI research (Accessed 25 Mar 25)

<sup>106</sup> King Abdullah University of Science & Technology KAUST Center of Excellence for Generative AI 12 Sep 24 (Accessed 31 Mar 25)

## 2.5.4. Proposals

### **Proposal 21:** Transform Healthcare Education for the Digital Age

**Effort:** 2

**Value:** 1 / Key Enabler

To create a workforce equipped for an AI-enabled healthcare ecosystem, the UK should:

#### **Redesign Core Healthcare Curricula:**

Integrate digital health, AI literacy, and data science as mandatory components in all undergraduate healthcare programs.

#### **Establish National Digital Competency Standards:**

Develop standardised learning outcomes for digital capabilities across healthcare disciplines with consistent assessment methods, in partnership with academic and professional bodies.

#### **Create Interdisciplinary Learning Pathways:**

Design educational experiences that blend clinical, technological, and ethical perspectives through collaborative projects between healthcare and technical students.

#### **Specialised Educational Programmes:**

Develop targeted educational programmes that integrate strong mathematical foundations (rather than computer science alone) with healthcare domain expertise, cultivating professionals capable of effectively bridging clinical and technical disciplines.

#### **Implement Clinical-Technical Rotations:**

Reform clinical placements to include dedicated time with digital health teams, industry, and innovation units

#### **Enhance Faculty Capabilities:**

Invest in educators who bridge clinical and technological domains through joint appointments between healthcare and technical departments.

#### **Healthcare AI Track in National Scholarship Programme:**

Integrate healthcare AI talent development into the national AI scholarship programme, creating a dedicated healthcare-focused pathway for the selected scholars.

## **Proposal 22: Professionalise the Healthcare Data Workforce**

**Effort:** 2

**Value:** Key Enabler

To leverage the full economic potential of healthcare AI, the UK should establish a comprehensive workforce development programme:

### **Defined Career Pathways:**

Establish clearly structured career pathways for data engineers, analysts, scientists, clinical informaticians, and digital health specialists, featuring defined progression routes, transparent professional standards, and recognised competencies.

### **Central Professional Leadership:**

Appoint the NHS England Chief Data & Analytics Officer as the central professional lead for England, with devolved nations establishing equivalent leadership for specialised data roles, ensuring consistent professional standards, oversight, and access to development opportunities.

### **AI Automation to Empower Analysts:**

Automate routine, low-value reporting tasks through appropriate AI systems, freeing data analysts to concentrate on high-impact analytical activities that directly enhance decision-making and service quality.

### **Increase Specialist Training Capacity:**

Increase training capacity in key specialisms by expanding domestic education programmes and attracting international students to develop expertise in healthcare AI.

### **Develop Specialised Progression Routes:**

Establish formal professional accreditation specifically for Digital Health and Clinical AI specialists, creating recognised standards that enhance NHS capability and offer exportable professional credentials internationally.

### **Global Healthcare AI Talent Headhunting:**

Create a healthcare-specific AI talent recruitment function, modelled after the government's internal headhunting initiative, proactively targeting international experts in healthcare AI to relocate and contribute to the UK's AI ecosystem.

## ✓ **Proposal 23: Enhance Leadership Capabilities**

Effort: 1

Value: Key Enabler

To drive strategic direction and cultural change, the UK should:

### **Specialised Leadership Training:**

Develop targeted leadership training programmes that integrate AI literacy with effective change management skills, tailored specifically for clinicians and healthcare executives.

### **Expert Clinician Leadership:**

Strengthen clinician leadership in healthcare AI by embedding specialised AI and digital health competencies within undergraduate and postgraduate medical training curricula.

### **Evidence-Based Assurance Culture:**

Drive organisational culture transformation from reassurance-focused to evidence-based assurance in AI adoption, guided by executive-level sponsorship and leadership initiatives.

### **Cross-Sector Leadership Forums:**

Establish leadership forums that integrate clinical, technical, and operational expertise, facilitating the collaborative development of comprehensive and coherent AI strategies.

### **Mentoring Programmes for Capability Building:**

Launch structured mentoring programmes pairing experienced AI leaders with emerging clinical and operational leaders, accelerating the development of system-wide AI capabilities and literacy.

## ✓ **Proposal 24: Build Procurement Expertise**

Effort: 1

Value: Key Enabler

To ensure effective investment in AI technologies, the UK should:

### **Targeted Buyer Capability Training:**

Enhance organisational competencies to act as informed and discerning buyers of AI solutions through targeted training programmes and shared expertise initiatives.

### **Comprehensive and Agile Procurement Frameworks**

Establish dynamic procurement frameworks that systematically evaluate both technical capabilities and practical implementation factors, ensuring balanced and informed decision-making.

### **Shared Evaluation Methodologies:**

Develop standardised methodologies for evaluating AI solutions, assessing both economic returns and measurable clinical impact.

### **AI Procurement Communities of Practice:**

Create dedicated communities of practice for procurement professionals to exchange experiences, insights, and proven strategies in AI procurement.

### **Structured Contract and IP Guidance:**

Provide detailed, structured guidance on negotiating AI-related contracts, intellectual property arrangements, and adopting value-based procurement approaches, enhancing organisational confidence and effectiveness.

## 3. Priority Actions

While many of the proposals outlined in this report will require sustained effort and long-term investment to realise their full potential, the urgency of the moment demands immediate action. To capitalise on the UK's current advantages and maintain momentum in a rapidly evolving global landscape, it is important to identify and act upon those interventions that can deliver the greatest near-term impact.

This section highlights a subset of proposals that offer high strategic or economic value relative to their implementation effort – either because they are low-effort with high return, or because they function as critical Key Enablers (KE) for broader system transformation. These actions represent the UK's most immediate opportunities to generate visible results, build confidence, and lay the foundations for longer-term success.





## 1. Stand-up a UK-wide Health Data Resource & API Gateway

Provide a single point of access to existing TRE/SDE estate, publish national metadata catalogue, launch live developer sandbox with synthetic test data.

Turns the NHS' "biggest data pool on earth" into a usable economic asset for tech development, while de-risking real-data access through high-fidelity synthetic variants.

*Lead/Partners:*  
DHSC/HDR UK with NHS England, NHS Scotland, NHS Wales, HSC Northern Ireland, DSIT

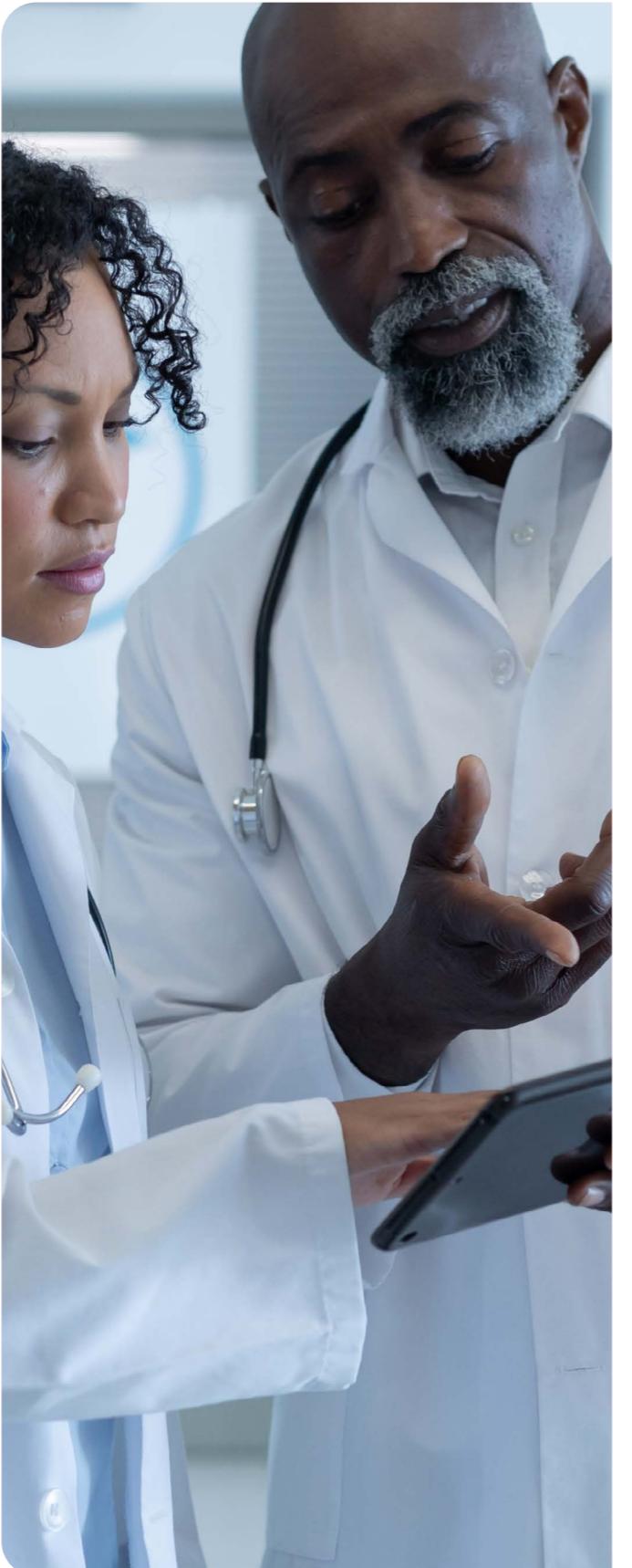


## 2. Create the UK Evidence & Assurance Hub for Healthcare-AI

Initiate inside a small network of "AI Ready" NHS sites. Common protocols, shared REC, rapid-cycle prospective studies, linked to MHRA's AI Airlock.

Makes the UK the default place to validate and CE/UKCA-mark health Gen-AI – cutting 12-24 months off time-to-market and anchoring jobs, trials and inward investment here.

*Lead/Partners:*  
MHRA + NIHR + local Trusts



## 3. Launch a risk-based, multi-regulator sandbox

Issue joint 12-month pilot licences from MHRA, ICO, CQC, NICE, and their counterparts across the UK, with shared liability cover and publication duty.

Provides the regulatory clarity industry keeps asking for, while keeping the most sensitive use-cases under tight real-world monitoring.

*Lead:*  
Regulatory Innovation Office (RIO)



## 4. Seed the Health-Data Sovereign Wealth Fund

Launch with initial £500m from the British Business Bank and first wave of licensing receipts, to take minority equity in companies that train/validate on NHS data and to co-finance compute & green power in AI Growth Zones.

Converts licensing rent into compounding national wealth and guarantees UK patients a financial return on their data.

*Lead/Partners:*  
HMT / DBT / UK Infrastructure Bank





## 5. Green-light high-volume “quick-win” deployments

Green light ambient voice technology (AVT) at pace and adopt the latest in digital therapeutics for both supportive and wrap-around care (and for direct clinical delivery where services have the appropriate regulatory approvals – typically Class IIa).

Achieves rapid productivity lift, highly measurable ROI, and generates the implementation playbooks others can reuse.

*Lead/Partners:*  
NHS England Transformation



## 6. Mandate the Digital & AI skills core-curriculum

Mandate the Digital & AI skills core-curriculum for every undergraduate health-professional programme starting September 2026, quadrupling capacity in programmes modelled on the Topol/Clinical-AI Fellowships.

Creates the first national workforce that is “AI-native”, closing the safety gap created by low frontline literacy and becoming an exportable training product.

*Lead/Partners:*  
DHSC / NHS England (formerly HEE) & UK equivalents, Regulators & Royal Colleges



## 7. Publish the Public Benefit & Transparency Charter

Develop and publish a clear template for commercial data-sharing agreements, a federated, real-time public dashboard of all AI uses (fed by local registries), and annual independent audit.

Answers the Care.data legacy head-on, secures the social licence and therefore long-run economic value of the data.

*Lead/Partners:*  
National Data Guardian + NHSE/DHSC



## 8. Fix the “pilot-purgatory” market

Establish a national agile framework of assessed market-ready solutions with volume-based pricing, interoperability clauses and revenue-share back to service providers; plus enforcement powers to stop vendor lock-in.

This should cut sales cycles from years to months, let SMEs scale, and ensure savings flow back into care better.

*Lead/Partners:*  
Cabinet Office CCS + NHS Commercial



## 4. Conclusion

Generative AI in healthcare represents a transformative economic opportunity that the UK is uniquely positioned to lead. The UK's collective health dataset – “the biggest data pool on Earth with a single payer system”<sup>107</sup> – combined with our world-class institutions offers distinctive competitive advantages and a critical sovereign resource in the global AI landscape.

Acting decisively on these proposals will establish the UK as the premier global healthcare AI incubator, creating high-value jobs, attracting international investment, and developing exportable expertise. However, this window of opportunity is narrowing as international competitors make substantial strategic investments in healthcare AI.

To realise this opportunity sustainably, it is imperative that innovation is grounded in ethical implementation and meaningful public inclusion. Public

trust is not a passive backdrop but a crucial enabler of success in this domain. The UK must lead not only in technical capability but in setting the global benchmark for responsible, transparent, and participatory approaches to healthcare AI. Embedding co-production, equitable benefit-sharing, and clear governance from the outset will not only accelerate adoption – it will define the UK's global reputation in this critical emerging field. We can become the standard-bearer for healthcare AI: the place where innovations are built, tested, validated, and certified for global deployment.

The time to act is now. With focused resources, clear governance, and a compelling economic vision, the UK can transform healthcare AI into a significant driver of economic growth while improving health outcomes for generations to come.

## Appendix A: Acknowledgements

The project team would like to thank all of those that contributed their time, knowledge and insights to this report, including the following people:

- **Dr Steven Duffield** – NICE
- **Professor Amanda Goodall** – Professor of Leadership, Bayes Business School, City St Georges, University of London
- **Dr Rahul Goyal** – Chief Medical Officer, Elsevier
- **Dr Hugh Harvey** – Managing Director, Hardian Health
- **Tommy Henderson-Reay** – NHS England
- **Professor Pearse Keane** – University College London
- **Emma Lagerstedt** – Policy and Engagement Manager, Understanding Patient Data
- **Professor David J Lowe** – University of Glasgow / NHS Greater Glasgow & Clyde
- **Dr Harriet Leyland** – Clinical Safety Officer, Palantir

Group, Department of Health, Northern Ireland

<sup>107</sup> Interviewee statement

- **Dan Mannix** – Advisor, Brain Capital Alliance
- **Pritesh Mistry** – Independent Contributor
- **Brishni Mukhopadhyay** – Independent Contributor
- **Iain Cameron O'Neill** – NHS England
- **Nicola Parry** – Head of Marketing, Healthcare UK
- **Dr Ali Parsa** – Quadrivia.ai
- **Dr Umang Patel** – Chief Clinical Information Officer, Microsoft
- **Russell Pearson** – Regulatory Expert
- **Dr Dom Pimenta** – CEO, Tortus AI
- **Fiona Reddington** – Our Future Health Programme
- **Dr Harpreet Sood** – GP partner in southeast London and former NHS England deputy CCIO
- **Professor Sam Shah** – Professor of Digital Health, CoMD, Ulster University
- **Mike Short** – Chair – UK Telecoms Lab
- **Aphrodite Spanou** – Managing Director, Healthcare UK
- **Dr Muhunthan Thillai** – Qureight
- **James T Teo** – Chief Medical Officer, Cogstack
- **Matthew Trainer** – CEO, Barking, Havering and Redbridge, University Hospitals NHS Trust
- **Erica Warp** – Head of Product, Curistica
- **Dr Neville Young** – Health Innovation Yorkshire & Humber

## Appendix B: Project Governance and Declarations

### Project Team

This report was produced as part of a strategic initiative commissioned by the Healthcare UK to explore the economic opportunities presented by Generative AI in healthcare.

Healthcare UK is a joint initiative of the UK Government's Department for Business and Trade (DBT), the Department of Health and Social care (DHSC) and NHS England. Healthcare UK promotes the UK healthcare sector to overseas markets and supports healthcare partnerships between the UK and overseas healthcare providers.

The project was jointly led by Dr Keith Grimes & Haris Shuaib, with research and delivery conducted jointly by:

- **Curistica**<sup>108</sup>, a healthtech innovation consultancy specialising in AI safety and data protection
- **Newton's Tree**<sup>109</sup>, a UK healthtech company working in AI deployment and monitoring

### Funding and Independence

This work was funded by Healthcare UK. The research, analysis, and proposals contained within this report were developed independently by the project team and do not necessarily represent the views of the UK Government. No funding was received from private corporations, commercial vendors, or external lobbying bodies.

108 <https://www.curistica.com>

109 <https://www.newtonstree.ai/>

## Declaration of Interests

The authors declare no conflicts of interest—financial or non-financial—relevant to the content of this report.

The authors declare the following interests:

- **Dr Keith Grimes** – CEO and Founder of Curistica Ltd, visiting lecturer on Digital Health & AI at Bayes Business School, University of Warwick, UCL, commercial partnership with 6 AI vendors, advisor and shareholder with 2 AI vendors.
- **Haris Shuaib** – shareholder and director of Newton's Tree Ltd, director of NHS Fellowships in Clinical AI, commercial partnerships with over 20 AI vendors, recipient of research grants from UKRI and NIHR, academic collaborations with NVIDIA, Annalise.ai, Qure.ai, and Infervision.
- **Robin Carpenter** – employed by and shareholder of Newton's Tree Ltd, and visiting lecturer on AI at King's College London.
- **Dr Youssof Oskrochi** – Head of Safety at Curistica Ltd, Consultant in Public Health Medicine at the London Borough of Sutton, Honorary Lecturer on Digital Health at University College London Global Business School for Health, Member of NICE Health Technology Assessment Committee A.
- **Madhukar Bose** – Head of Digital Health at Healthcare UK, Imperial AI Policy Fellow.

Expert interviews were conducted with individuals across healthcare, academia, industry, regulation, and investment. All interviewees participated in a personal capacity, and none were remunerated for their contributions.

## Methodology and Assurance

This report synthesises findings from:

- Over 40 structured interviews with experts in healthcare, artificial intelligence, data governance, clinical leadership, regulation, and investment
- A review of international policy documents, published literature, and publicly available data sources
- Internal peer review processes

Insights have been integrated thematically across five strategic imperatives. All findings and proposals reflect the consensus views of the project team based on the evidence gathered. The report is intended to inform strategic policy development, investment decisions, and cross-sector collaboration to support the UK's leadership in healthcare AI.

This report was commissioned by 'Healthcare UK,' and its recommendations are intended for a UK-wide audience. To ensure a comprehensive perspective, we actively sought and obtained insights from stakeholders across all four devolved nations. While many of the specific organisational examples cited (such as NHS England, NICE, and CQC) are specific to England as the largest of the four systems, the strategic principles and actions outlined are designed to be applicable UK-wide and should therefore be adapted and implemented in collaboration with the devolved administrations.

## Use of Generative AI Tools

Generative AI tools were utilised during the preparation of this report to support research synthesis, drafting, and editing processes. The following AI systems were employed:

- **OpenAI<sup>110</sup> ChatGPT (GPT-4.5, o1-pro)** – for structured drafting, refining proposals, research, infographic generation, and synthesis of key insights.
- **Anthropic<sup>111</sup> Claude 3.7** – for analytical summarisation, critical review, and enhancement of strategic coherence.
- **Google<sup>112</sup> Gemini & NotebookLM Pro** – to organise, annotate, and summarise source documentation and interview content.
- **Fireflies.AI<sup>113</sup>** – for transcription of expert interviews.

All final content and proposals were reviewed and validated by the human authors to ensure accuracy, appropriateness, and compliance with UK Government standards<sup>114</sup>.

<sup>110</sup> OpenAI <https://openai.com/>

<sup>111</sup> Anthropic <https://www.anthropic.com/>

<sup>112</sup> Google <https://notebooklm.google.com/?pli=1>

<sup>113</sup> Fireflies.AI <https://fireflies.ai/>

<sup>114</sup> Gov.uk AI Guidance: Playbook for the UK Government (30 Mar 25)

## Appendix C: Abbreviations

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- **AI:** Artificial Intelligence
- **AIGZ:** AI Growth Zones
- **API:** Application Programming Interface
- **ARIA:** Advanced Research and Invention Agency
- **ARPA-H:** Advanced Research Projects Agency for Health
- **BBB:** British Business Bank
- **CE:** Conformité Européenne
- **CQC:** Care Quality Commission
- **DBT:** Department of Business & Trade
- **DHSC:** Department of Health and Social Care
- **DPIA:** Data Protection Impact Assessment
- **DSA:** Data Sharing Agreement
- **DSIT:** Department for Science, Innovation, and Technology
- **EHR:** Electronic Health Records
- **EU:** European Union
- **FDA:** Food and Drug Administration (USA)
- **FDP:** Federated Data Platform
- **FEC:** Full Economic Cost
- **Generative AI:** Generative Artificial Intelligence
- **GDPR:** General Data Protection Regulation
- **GP:** General Practitioner
- **GPU:** Graphics Processing Unit
- **HDR UK:** Health Data Research UK
- **HEE:** Health Education England
- **HIN:** Health Innovation Networks
- **HMT:** His Majesty's Treasury
- **HPC:** High-Performance Computing
- **HTA:** Health Technology Assessment
- **ICO:** Information Commissioner's Office
- **IMDRF:** International Medical Device Regulators Forum
- **IP:** Intellectual Property

- **ISO/IEC:** International Organization for Standardization / International Electrotechnical Commission
- **KAUST:** King Abdullah University of Science & Technology
- **KE:** Key Enabler
- **KHP:** King's Health Partners
- **LIHE:** London Institute for Healthcare Engineering
- **LLM:** Large Language Model
- **MBZUAI:** Mohamed bin Zayed University of Artificial Intelligence
- **MHRA:** Medicines and Healthcare products Regulatory Agency
- **NHS:** National Health Service
- **NICE:** National Institute for Health and Care Excellence
- **NIHR:** National Institute for Health and Care Research
- **NSF:** National Science Foundation (USA)
- **NWF:** National Wealth Fund
- **OBR:** Office for Budget Responsibility
- **PIF:** Public Investment Fund (Saudi Arabia)
- **R&D:** Research and Development
- **RCT:** Randomised Controlled Trial
- **RIO:** Regulatory Innovation Office
- **SDAIA:** Saudi Data & AI Authority
- **SDE:** Secure Data Environment
- **SME:** Small and Medium-sized Enterprises
- **TRE:** Trusted Research Environment
- **UK:** United Kingdom
- **UKCA:** United Kingdom Conformity Assessed
- **UKRI:** UK Research and Innovation
- **UCL:** University College London
- **US:** United States
- **VC:** Venture Capital



## Legal Disclaimer

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