



AI, Data, and Quantum in UK Healthcare

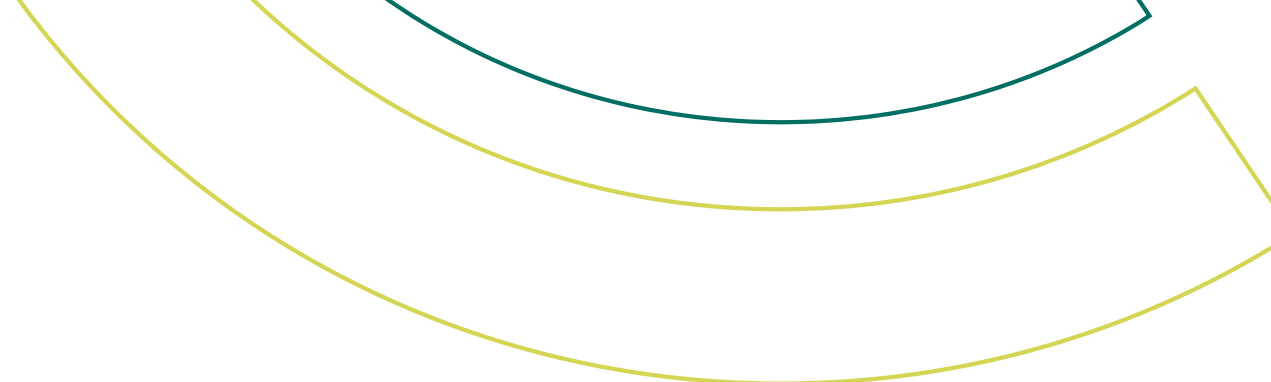
**From Evidence To
Investment**

*Building the Treasury and
Delivery Case for Advanced
Computational Capability in
UK Healthcare*

In partnership with:



Cleveland Clinic
Philanthropy UK



Purpose of This Report

A policy and delivery report informed by a focused parliamentary roundtable, wider evidence, and subsequent Curia analysis to develop a Treasury-facing investment case and practical programme for UK healthcare.

The parliamentary roundtable was convened as a focused expert challenge session within Curia's wider programme of work on AI, data, and quantum-enabled healthcare. Its purpose was not to formally validate a predetermined policy programme or establish consensus on a detailed set of recommendations. Rather, it brought together experienced contributors from healthcare, government, regulation, industry, and research to test whether the overall direction of the work was consistent with developments across the relevant communities, identify significant omissions or areas of disagreement, and challenge assumptions requiring further analysis.

Given the time available, the discussion should be understood as a light-touch expert affirmation and challenge of the direction of travel rather than a formal validation exercise. The session fulfilled this purpose by providing expert challenge to the overall trajectory of the work, broadly affirming the importance of an integrated, problem-led approach while highlighting areas requiring further development – particularly adoption, procurement, regulation, data infrastructure, and cross-government coordination. The subsequent programme design, Treasury analysis, and recommendations in this report have been developed by Curia, drawing on the roundtable and published evidence, international experience, and further analysis. They should not be interpreted as recommendations individually or as collectively endorsed by all roundtable participants.

The primary audience is HM Treasury. Secondary audiences include the Department of Health and Social Care, the Department for Business, Innovation, Science and Trade (DBIST), NHS leaders, research funders, regulators, regional authorities, and organisations responsible for infrastructure and national security.

Acknowledgements

The roundtable was hosted by Rt Hon Lord Kamall and chaired by Professor Gillian Leng CBE. It was sponsored by Cleveland Clinic Philanthropy UK and delivered by Curia. Curia thanks the speakers, contributors, and organisations represented for sharing their experience and challenging the proposed investment case.

Curia retains full editorial control.

Contents

Forewords	2
Turning Scientific Strength Into Patient Benefit	2
Building an Evidence-based Route to Adoption	4
Roundtable Speakers and Contributors	6
Cleveland Clinic London as a UK Translation Partner	7
Executive Summary	9
Themes Emerging From the Roundtable Discussion	10
What the Treasury Case Must Show	11
The Proposed Next Phase	11
From Scientific Strength To Healthcare Value: the Strategic Context	12
A Health and Productivity Challenge	12
A National Capability Opportunity	13
The Translation Gap	13
Institutional Silos do Not Reflect the Technology Landscape	14
A Whole-government Issue	14
Themes Emerging From the Roundtable Discussion	15
AI, Data, and Quantum Should Not be Treated as Isolated Agendas	15
Quantum Sensing Offers Nearer-term Healthcare Value	16
Quantum Computing is Strategically Important but Requires Realism	17
Data Infrastructure is the Enabling Foundation	17
Hybrid Computing Will Shape Future Workflows	17
Procurement is Essential to Industrial Growth	18
Regulation Must Become More Iterative	18
NHS Adoption Remains the Central Delivery Challenge	19
National Coordination Requires Clear Governance	19
Security, Sovereignty, and Intellectual Property Must be Protected	20
Regional Delivery and Growth	20
Why the Current Model Fails to Convert Capability Into Value	21
Technology Silos and Fragmented Departmental Ownership	21
Pilot Programmes Without a Route to Scale	22
Grants Without Sufficient Procurement	22
Infrastructure Without End-user Capability	22

Data That Cannot be Used Consistently	22
Regulation and Evaluation Designed as Linear Processes	22
Insufficient Implementation Capacity in the NHS	23
Short-term Expectations for Long-term Capability	23
Weak Connection Between National Strategy and Regional Delivery	23
Unclear Measures of Public Value	23
Building the Treasury Case	24
Start With the Counterfactual	24
Prioritise a Portfolio, Not a Single Technology	24
Define the Government Role	25
Separate Different Forms of Value	25
Distinguish Cashable Savings From Capacity and Strategic Value	26
Use Staged Investment and Evidence Gates	26
Include Downside and Sensitivity Analysis	26
Measure Additionality	26
Build Evidence Through Delivery	26
Priority Healthcare Use Cases	27
Quantum-enabled Sensing and Brain Imaging	27
Oncology Imaging and Diagnostic Fidelity	27
Molecular Simulation and Drug Discovery	27
Antimicrobial Selection and Precision Treatment	28
Rare Disease Research	28
Complex NHS and Social Care Optimisation	28
Administrative and Back-office AI	28
Research Data and Multi-omics Analysis	28
Use-case Selection Framework	28
A Coordinated Delivery Framework	29
Infrastructure and Trusted Access	29
AI and Data for Discovery and Delivery	30
Quantum Sensing and Computing	30
Translation, Regulation, and Adoption	30
Governance	30
The Route From Idea To Scale	31
Regulation, Assurance, and Public Trust	32
A Proportionate and Iterative Model	32
The Risk of Action and Inaction	33
Context-specific Assurance	33

Continuous Real-world Surveillance and Learning	33
International Recognition and Reciprocity	33
Public Trust and Consent	33
Equity	33
Sovereignty, Infrastructure, and Security	34
Own, Collaborate or Access	34
National Laboratories and Independent Expertise	34
Cybersecurity and Post-quantum Transition	34
Protecting Emerging Companies	34
Energy and Environmental Impact	34
Skills, Workforce, and Regional Growth	35
A Multidisciplinary Workforce	35
Developing Informed End Users	35
NHS Implementation Capacity	35
National and Regional Talent Programmes	35
Regional Growth Model	35
A Proposed Five-year National Programme	36
Programme Objective	36
Proposed Programme Components	36
Proposed Five-year Sequence	37
What Success Would Look Like	37
Recommendations	38
For HM Treasury and Central Government	38
For the Department of Health and Social Care and the NHS	38
For Department of Business, Innovation, Science and Trade, UKRI and National Laboratories	39
For the Medicines and Healthcare Products Regulatory Agency, and Assurance Bodies	39
For Industry, and Investors	39
For Regional Authorities and Clusters	39
What Support and Investment are Needed	40
What the Programme is Trying to Deliver	40
What Public Funding is Needed For	41
The Role of Philanthropic Funding	41
The Role of Industry	41
Independence and Governance	41
References	42



The roundtable was hosted by Lord Kamall, Shadow Minister for Health and Social Care and chaired by Professor Gillian Leng CBE, former Chief Executive of the National Institute for Health and Care Excellence (NICE).

Forewords

Turning Scientific Strength Into Patient Benefit

“ The UK has the ingredients to lead in innovation. The test is whether we can coordinate them to deliver better health outcomes for patients, improve our system of health and care and contribute to the wider economy.”

The UK is not short of ideas or innovation. Across our universities, research centres, hospitals, and businesses, clinical and non-clinical entrepreneurs are developing technologies, services, and products that could transform how disease is prevented, diagnosed and treated. The challenge is ensuring that the best of those technologies reach patients and are used consistently across our system of health and social care.

During my time as Technology, Innovation, and Life Sciences Minister, one of the most persistent questions was how an innovator gets through the front door of the NHS. Start-ups and scale-ups spend time trying to enter the NHS at primary care level, through hospital trusts or integrated care systems. Some succeed; others give up and go elsewhere.

Even where a technology has a strong evidence base and is already proving its benefit in one part of the country, there is no guarantee that it will be adopted in other areas. The NHS can be an extraordinary platform for research and adoption, but its size, complexity, and understandable caution can make the route from promising idea to routine care difficult to navigate.

Artificial intelligence, health data, and quantum technology sharpen this challenge. They create opportunities for earlier diagnosis, more targeted treatment, faster discovery, and more efficient services. They also raise questions about safety, accountability, cyber risk, and the role of human judgement. In healthcare, poor service or a failure is not simply an inconvenience; in some cases, it can mean the difference between life and death. Innovation and public confidence must therefore grow together.

The discussion captured in this report was important because it did not begin with technology for its own sake. It asked what the health system needs and which combination of tools could best meet those needs. It also touched on the role of UK health providers, innovators, and the Government in terms of who should own what, where they should collaborate, and how to build trusted partnerships. Those are strategic choices that cannot be left to individual organisations acting alone.

From experience, government coordination matters. Health innovation cuts across the responsibilities of HM Treasury, the Department of Health and Social Care (DHSC), DBIST, national security bodies, and – for a new government – regional government. Cross-government groups are useful where the right people attend, decisions are connected to funding, and a clearly accountable leader is responsible for delivery.

This report offers a route towards that clarity. It proposes practical use cases, staged investment, procurement, regulatory test beds, and common measures of patient and economic benefit. It recognises that quantum sensing may produce earlier clinical applications while quantum computing will require sustained investment and realistic expectations. Above all, it treats adoption as a core part of innovation policy rather than the final step to be addressed once the science is complete.

Lord Syed Kamall of Edmonton
Shadow Minister for Health and Social Care
Former Minister for Technology, Innovation
and Life Sciences (Roundtable host)



Building an Evidence-based Route to Adoption

“ The opportunity is significant, but the case will be strongest where ambition is matched by discipline: realistic claims, common measures, independent evaluation, and decisions grounded in evidence.”

Healthcare innovation rarely moves as quickly as its advocates expect. Technologies may develop rapidly, but the systems into which they must be introduced include established clinical pathways, professional responsibilities, data systems, budgets, and public expectations. Adoption is therefore not a single decision. It is a sustained process of evidence generation, implementation, and learning.

The roundtable began with five practical questions. What is the five-year investment proposition? What would make the case compelling to HM Treasury? What should the UK build, partner on or access? Which use cases should be prioritised? And how can innovation move from research through regulation, procurement, and scaling into routine NHS care?

Those questions remain the organising framework for this report. They require us to avoid broad claims that every new technology will transform every part of healthcare. Prioritisation is essential. Quantum sensing, for example, may offer nearer-term value in imaging and diagnostics. Quantum computing may be most useful where classical systems struggle with complex simulation, optimisation, or sparse datasets containing many variables. AI and classical computing will remain essential throughout, including in the operation and interpretation of quantum systems.

The investment case must be built around defined problems and measurable outcomes. A successful programme should be able to show how a technology changes clinical decisions, reduces unnecessary activity, improves safety, releases capacity or creates economic value. It should also explain who bears the cost, who receives the benefit, and how long that benefit will take to emerge.

A different approach to evidence may be required for technologies that evolve after deployment. Regulation and evaluation will need to become more iterative, with proportionate entry requirements followed by structured real-world monitoring. This does not mean lowering standards. It means designing assurance around the actual characteristics and risks of the technology.

The NHS should not be expected to absorb innovation without implementation support. Clinical teams need usable workflows, technical assistance, training, protected time, and clear accountability. Demonstrators should begin with an explicit route to procurement and scale, rather than becoming isolated pilots whose learning is never embedded.

The International Investment and Delivery Opportunity

Advanced computational infrastructure should be understood not only as a research asset, but as part of an economic and healthcare development strategy. Cleveland Clinic's experience has shown the value of bringing clinical expertise, data, AI, classical computing, and quantum capability together around real biomedical questions.

The purpose is not to invest in technology without a defined application. It is to create an environment in which clinicians, biomedical researchers, engineers, computer scientists, and industry can identify meaningful problems, access the necessary tools and translate promising results into patient care.

Cleveland Clinic's advanced computing programme forms part of the Cleveland Innovation District, supported through a major public-private investment. The programme has been associated with research infrastructure, high-value employment, education, and additional investment. The lesson for the UK is not that one model can simply be copied from the United States. It is that coordinated infrastructure can attract talent and commercial activity when it is connected to leading healthcare and research institutions.

The UK begins with major advantages: outstanding science, a strong life sciences sector, valuable health data resources, and the NHS. It also has an established quantum programme and growing expertise across sensing, computing, software, and enabling technologies. The opportunity is to combine those assets in a model that supports public benefit while remaining internationally connected.

This will require long-term commitment. Some applications, particularly advanced sensing and hybrid AI workflows, can be developed and tested in the near term. General-purpose, fault-tolerant quantum computing will require a longer horizon. A staged programme should therefore deliver practical value now while building the workforce, infrastructure, and partnerships needed for future capability.

Philanthropy can help government and public institutions take a disciplined approach to this transition. It can support shared infrastructure, research translation, independent evaluation, and collaboration across organisational boundaries. Its role should complement, not replace, sustained public and private investment.

“ The international competition for talent and investment is already under way. The UK can succeed by connecting its scientific strengths to healthcare delivery, economic development, and a clear national strategy.”

Professor Gillian Leng CBE
Advisory Board Member, Curia, Health, Care, and
Life Sciences Research Group; President of the Royal
Society of Medicine; former Non Executive Director for
the Department of Science, Innovation and Technology
(DSIT); and former Chief Executive, National Institute for
Health and Care Excellence (Roundtable Chair)



Roundtable Speakers and Contributors

Name	Job Title	Organisation
Lord Syed Kamall of Edmonton (Host)	Shadow Minister for Health and Social Care; former Parliamentary Under Secretary of State for Technology, Innovation and Life Sciences	House of Lords
Professor Gillian Leng CBE (Chair)	Advisory Board Member, President, former Non-Executive Board Member; former Chief Executive	Curia, Health, Care, and Life Sciences Research Group, Royal Society of Medicine, Department for Science, Innovation and Technology (DSIT), National Institute for Health and Care Excellence (NICE)
Dr Lara Jehi	Chief Research Information Officer	Cleveland Clinic
Professor Sir Peter Knight FRS	Chair	UK National Quantum Technologies Programme Strategic Advisory Board
Roger McKinlay	Chair; former Challenge Director: Quantum Technologies	UKQuantum; Innovate UK, part of UK Research and Innovation
Dame Chi Onwurah MP	Chair	House of Commons Science, Innovation and Technology Committee
Lawrence Tallon	Chief Executive	Medicines and Healthcare products Regulatory Agency (MHRA)
Dr Michael Cuthbert	Director	National Quantum Computing Centre (NQCC)
Nicola Hodson	Chair	IBM UK and Ireland
Professor Charles Knowles	Chief Research and Academic Officer	Cleveland Clinic London
Andrew Moran	President, Medicine and Society Section	Royal Society of Medicine

Professor Mike Lewis, Scientific Director for Innovation at the National Institute for Health and Care Research, sent apologies.

Status of contributions. Participation in the roundtable does not constitute endorsement of the analysis, programme design, or recommendations subsequently developed by Curia. References to the roundtable describe themes raised, challenged or broadly affirmed during the discussion. Unless expressly attributed to an individual contributor, they should not be interpreted as representing unanimous agreement.



Cleveland Clinic London as a UK Translation Partner

Cleveland Clinic London is uniquely well placed to help the UK convert advanced computational and quantum science into tangible patient benefit. Drawing on Cleveland Clinic's international track record of bringing clinical expertise, data, AI, classical computing and quantum capability together around real biomedical questions, it could serve as a linchpin between scientific discovery, clinical evaluation and wider healthcare adoption in the UK.

As a natural partner to the NHS, Cleveland Clinic London could provide a controlled clinical environment in which promising technologies are evaluated at an early stage against defined patient needs, clinical pathways and operational challenges. This would allow developers and clinicians to generate credible evidence on safety, performance, workflow impact and potential patient benefit before technologies progress towards wider deployment.

Its role would not be to suggest that findings from a private healthcare setting are automatically generalisable to the NHS. Rather, Cleveland Clinic London could act as a bridge between industry, private healthcare and NHS adoption: identifying which applications warrant further investigation, testing them under robust clinical governance and working with NHS partners to determine whether the evidence can be replicated across different patient populations, institutions and care settings.

Cleveland Clinic London could contribute:

- A controlled clinical setting for early evaluation and evidence generation.
- A route for connecting technology developers with specialist clinicians and meaningful healthcare problems.
- A bridge between industry, private healthcare, regulators and subsequent NHS evaluation and adoption.
- Internationally connected clinical and research leadership, drawing on Cleveland Clinic's wider expertise and partnerships.
- An anchor institution capable of attracting commercial and philanthropic capital to shared infrastructure, translational research and demonstrator programmes.

This combination of clinical capability, international experience, and convening power gives Cleveland Clinic London a distinctive potential role within a national programme.

Working alongside the NHS, universities, national laboratories, regulators, and industry, it could help the UK move beyond isolated research projects towards a disciplined pathway from scientific capability to evidence, adoption, and improved patient outcomes.



This report was funded in part by Cleveland Clinic Philanthropy and the content contributed to by Cleveland Clinic and Cleveland Clinic London



The roundtable brought together experts from across health, technology, and policy to discuss the opportunities and for the delivery of quantum and AI in the UK ahead.

Executive Summary

The parliamentary roundtable provided a light-touch expert challenge to Curia's emerging direction of travel. It broadly affirmed the value of coordinating AI, health data, classical compute, and quantum capability around priority healthcare problems, while identifying issues requiring further analysis. Drawing on that discussion and wider evidence, Curia has subsequently developed an explicit route from research through regulation and procurement to NHS adoption.

The UK has internationally significant strengths in science, health research, data, regulation, and quantum technology. These strengths will not automatically produce patient benefit or economic value. The programme proposed in this report treats advanced computation as a connected capability: data provides the foundation; AI and classical computing support current discovery and operational improvement; quantum sensing offers nearer-term opportunities in diagnostics and imaging; and quantum computing may add value over a longer horizon in simulation, optimisation, and machine learning.

Curia's analysis is that investment should be problem-led, staged, and technology-neutral. It should focus on use cases where the UK can build credible evidence, protect national advantage and create a route to scale. Public funding should support shared infrastructure, national laboratories, regulatory capability, skills, and early procurement. Industry should lead product engineering and commercial growth. Government should retain specialist technical expertise without allowing administrative technology categories to determine how healthcare problems are framed or how solutions are delivered.

Themes Emerging From the Roundtable Discussion

These themes summarise issues raised, challenged or broadly affirmed during the session. They are not a formal consensus statement and should be read separately from the detailed Curia proposals that follow.

- The discussion supported a problem-led approach in which important opportunities can sit at the intersection of AI, data, and quantum rather than within isolated technology programmes.
- Industry increasingly combines AI, data, software, classical compute, quantum, photonics, and other enabling technologies within the same products and services; government technology categories do not always reflect how capability is developed or deployed.
- Quantum sensing and imaging may create clinically relevant benefits sooner than utility-scale quantum computing.
- Quantum computing should be developed with realistic expectations, with early focus on specialised applications involving simulation, optimisation, machine learning, and sparse datasets with large numbers of variables.
- Data quality, interoperability, metadata, and trusted access are prerequisites. Advanced compute cannot compensate for poorly governed or unusable data.
- The UK is strong in discovery science but weaker in commercialisation, service transformation, and consistent NHS adoption.
- Government procurement can accelerate adoption, give companies revenue and help attract private capital. Grants alone are insufficient.
- Regulation should combine proportionate entry requirements with iterative real-world surveillance, context-specific assurance, and international cooperation.
- The discussion identified coordination across government and regional delivery as important issues; Curia's subsequent analysis develops proposals for accountable leadership, aligned funding, and regionally distributed delivery through NHS systems, universities, businesses, manufacturing clusters, and local government.
- Sovereignty does not mean building everything domestically. The UK should make explicit choices about what to own, where to collaborate, and what to access through trusted partners.
- Security must include post-quantum cryptography, protection of intellectual property, trusted cloud and infrastructure choices, and support for emerging companies that may lack mature security systems.

What the Treasury Case Must Show

- A clear counterfactual describing the cost and opportunity lost through continued fragmentation and delayed adoption.
- A prioritised portfolio of healthcare use cases with realistic technical maturity, delivery requirements, and time to benefit.
- A distinction between patient benefit, NHS productivity, capacity released, private investment, regional growth, and wider strategic value.
- A defined role for government, industry, philanthropy, the NHS, universities, national laboratories, and regulators.
- A build, partner, or access strategy that protects national advantage without locking the UK prematurely into one hardware pathway.
- A staged programme with measurable milestones, independent evaluation, and decisions to continue, increase, redirect or stop investment.

The Proposed Next Phase

Curia proposes a five-year Advanced Computational Healthcare Programme organised around priority healthcare problems and measurable outcomes. It would use four interconnected capability functions: infrastructure and trusted access; data, AI, and software; advanced sensing and computing; and translation into regulation, procurement, and NHS adoption. These are capability functions, not separate technology programmes.

 **Quantum is an “as well as” technology, not an “instead of” technology.”**

Roger McKinlay, Chair, UKQuantum

The programme would begin with a small, regionally distributed portfolio of demonstrators able to draw across those capability functions according to need, supported by national coordination, common outcomes, regulatory test beds, procurement pathways, and independent economic and clinical evaluation. The immediate output is a Treasury-ready proposition specifying the first use cases, infrastructure requirements, governance model, matched funding arrangements, regional delivery partners, and measurable outcomes. The programme produces useful NHS and economic evidence during the current spending period while building longer-term strategic capability.



Dr Lara Jehi, Chief Research Information Officer at Cleveland Clinic, joined the roundtable virtually to share insights from Cleveland Clinic's research.

From Scientific Strength To Healthcare Value: the Strategic Context

The roundtable was deliberately framed as a focused challenge session around coordination, delivery, and investment, rather than a general debate about the potential of AI or quantum technology. Its role was to test Curia's direction of travel against expert experience, not to provide formal validation of the detailed programme subsequently developed in this report.

A Health and Productivity Challenge

The NHS must improve productivity while responding to rising demand, workforce pressures, long waits, and the need to move from treatment towards prevention and earlier intervention. Advanced computational capability is relevant to each of these challenges. It can improve the speed and precision of research, support earlier diagnosis, help target treatment, and optimise complex operational systems.

The opportunity is not limited to direct clinical applications. AI can reduce administrative burden and improve back-office processes. Better optimisation can support workforce scheduling, diagnostic capacity, patient flow, and social care coordination. More sensitive sensing and imaging can improve the information available to clinicians. Molecular simulation and advanced machine learning may accelerate the development of medicines and diagnostics.

However, productivity gains must be demonstrated rather than assumed. A tool that performs well in a technical evaluation may not improve a service if it creates additional workflow, cannot integrate with existing systems or requires scarce specialist staff. The investment case must therefore connect technical performance to operational and clinical outcomes.

A National Capability Opportunity

The UK has a combination of assets that few countries can match: the NHS, research-intensive universities, established life sciences clusters, leading scientific institutions, a national quantum programme, the National Quantum Computing Centre (NQCC),¹ the National Physical Laboratory,² a strong regulatory reputation, and a growing technology industry.

The UK National Quantum Technologies Programme³ has developed coordinated activity across research, industry, government departments, regulators, and standards bodies. Participants described strong academic impact, private investment, and a network of research hubs. This creates a foundation from which healthcare applications can be developed, but a national capability is valuable only when it connects to end users and produces products, services, and economic activity.

The NHS is potentially both a research partner and a lead customer. Its scale can support high-quality evaluation and provide a route to national adoption. Yet that same scale can create complexity where responsibilities for evidence, procurement, data, implementation, and funding are dispersed.

The Translation Gap

A theme raised during the roundtable, and reinforced by wider evidence reviewed by Curia, is that the UK is highly capable in discovery but less effective at turning that capability into commercial products and transformed public services. The path from laboratory result to NHS use includes product engineering, regulatory approval, clinical validation, procurement, information governance, workflow design, training, reimbursement, and ongoing assurance.

Research teams may consider the creation of a spin-out to be the end of translation. In practice, the most demanding work may only be beginning. Companies need experienced leadership, revenue, manufacturing capacity, robust security, quality systems, and access to customers. NHS organisations need implementation support and confidence that the technology will be maintained.

The current model often funds individual stages without governing the whole pathway. A research grant may have no linked procurement route. A pilot may have no budget for scale. A regulator may approve a product without a commissioner having the evidence or resources to adopt it. The result is repeated experimentation without systematic diffusion.

Institutional Silos do Not Reflect the Technology Landscape

Government necessarily divides responsibilities between departments, programmes, and funding streams. However, the resulting categories do not necessarily correspond to the way advanced computational technologies are developed or deployed. AI, data infrastructure, classical computing, quantum technologies, photonics, semiconductors, and software increasingly operate as components of interconnected systems rather than independent markets. The same company may develop capabilities spanning several of these categories, while a healthcare application may rely simultaneously on data infrastructure, AI, conventional compute, and specialist hardware.

Research funding and disciplinary structures can reinforce similar distinctions because programmes and academic communities are often organised around defined technology areas. Specialist expertise remains essential, but institutional categories should not determine how problems are framed or solutions designed. Industry provides an important corrective: companies tend to combine technologies according to the requirements of products, customers, and markets, rather than the administrative boundaries used by government. Healthcare policy should therefore begin with the problem to be solved and assemble the capabilities required around it.

A Whole-government Issue

Advanced computational healthcare cannot be delivered by one department. HM Treasury must assess value for money, productivity, and growth. DHSC and the NHS are responsible for patient benefit, service transformation, and adoption. Since its formation in the recent reshuffle, DBIST will now support research, compute, and quantum capability. It also has an interest in inward investment, company growth, and exports. Regional authorities shape clusters, planning, and skills. Security bodies protect intellectual property and critical infrastructure. Energy and planning decisions influence the location and affordability of compute.

Coordination should therefore mean more than information-sharing. It requires a defined governance structure, connected funding decisions, and an accountable senior leader. It should also retain technical and clinical challenge so that strategic direction is not replaced by centrally selected technologies with insufficient evidence.

“ The question is not whether the UK can succeed, but whether it can translate its assets into economic growth.”

Dr Lara Jehi, Chief Research Information Officer, Cleveland Clinic



Contributors included Dame Chi Onwurah MP, Chair of the House of Commons Science, Innovation and Technology Committee, alongside senior leaders from across healthcare, science, research and technology.

Themes Emerging From the Roundtable Discussion

This section records the principal themes raised, challenged or broadly affirmed during the roundtable. It does not represent a formal consensus statement or validation of the detailed programme. Where the discussion informs a subsequent Curia recommendation, that analysis is identified separately.

AI, Data, and Quantum Should Not be Treated as Isolated Agendas

Professor Leng's opening proposition as Chair was that the three agendas should not be discussed separately. Healthcare problems require data, software, classical computing, specialist hardware, and clinical expertise to work as a system. In quantum computing, AI may support control, error correction, and interpretation. Quantum-generated or quantum-enhanced data will still need usable software and integration into established workflows.

Chief Research Information Officer at Cleveland Clinic, Dr Lara Jehi, described research in which advanced computing and AI were coordinated around biomedical questions rather than technology categories. Her contribution also stressed that physicists and computer scientists cannot work in isolation from biomedical researchers. The first task is identifying a meaningful question, the available data, and the clinical decision that could change.

Curia analysis: this supports a model in which government retains specialist technical expertise while aligning capability through common healthcare use cases, infrastructure decisions, and outcome measures. Separate funding silos risk duplicating infrastructure and producing tools that cannot be combined.



Dame Chi emphasised that successful innovation depends not just on the technology itself, but on the people and processes needed to embed it effectively.

Quantum Sensing Offers Nearer-term Healthcare Value

Chair of the UK National Quantum Technologies Programme Strategy Advisory Board, Sir Peter Knight, and Chair of UK Quantum, Roger McKinlay, both warned against treating quantum technology as synonymous with quantum computing. Quantum sensing can detect extremely small physical changes and may have nearer-term applications in brain imaging, oncology, histopathology, and other diagnostic fields.

Potential value comes not simply from producing more data, but from increasing fidelity. Improved sensitivity could reduce false negatives, while improved specificity could reduce false positives and the unnecessary use of scarce clinical capacity. These benefits would need to be demonstrated in real pathways, including the effect on subsequent tests, treatment, and patient outcomes.

Curia analysis: the UK has dedicated research capability in quantum-enabled healthcare and examples of emerging companies. A national programme could use these strengths to select a small number of clinically credible sensing demonstrators, with early regulatory and procurement involvement.

Quantum Computing is Strategically Important but Requires Realism

Participants distinguished current prototype systems from a utility-scale, fault-tolerant quantum computer. While international roadmaps are ambitious, the timing and eventual architecture remain uncertain.

Curia analysis: government should avoid over-claiming near-term clinical impact or choosing a single platform before there is sufficient evidence.

The NQCC is maintaining a portfolio approach across different modalities and access routes. This enables researchers and end users to test which systems are best suited to specific problem types. It also supports the development of skills and an informed user community before large-scale machines are available.

Nearer-term value may come from single-purpose systems or hybrid algorithms. Problems involving complex simulation, optimisation, machine learning, sparse datasets, or many interacting variables may be particularly relevant. Rare disease research, molecular modelling, and complex scheduling were identified as possible areas for further evaluation.

Data Infrastructure is the Enabling Foundation

Advanced computation depends on data that are usable, well described, and governed. The roundtable identified persistent problems with metadata, interoperability, and fragmented secure data environments. These problems affect current AI adoption and will also limit future quantum applications.

The location and architecture of data matter. Centralised models may make intensive computation easier but can create governance and public-confidence challenges. Federated models can preserve local control but may be harder to optimise and standardise. The right answer may differ by use case and risk level.

Curia analysis: investment should include data curation, common standards, privacy-preserving methods, secure access, and patient involvement. Compute should not be funded without a realistic assessment of the data needed to make the proposed application useful.

Hybrid Computing Will Shape Future Workflows

Quantum will not replace classical computing or AI. Future computational tasks are likely to be orchestrated across CPUs, GPUs, and quantum processors, with each component handling the part of the problem to which it is best suited.

This has practical implications for procurement and infrastructure. A healthcare organisation is unlikely to interact directly with a quantum processor as a standalone device. It will use a service or software layer integrated into existing analytical and clinical systems. The quality of software, algorithms, interfaces, and technical support is therefore as important as hardware performance.

Curia analysis: the UK's strategy should give greater visibility to software and application companies, including those that operate across quantum, AI, photonics, and semiconductors. Technology categories used by government do not necessarily reflect the way industry builds products or the way customers buy solutions; delivery should therefore be organised around problems and outcomes rather than administrative technology labels.



Attendees heard contributions from Professor Sir Peter Knight, Chair of the UK Quantum Technologies Strategic Advisory Board, who shared his perspective on the opportunities presented by quantum technologies.

Procurement is Essential to Industrial Growth

McKinlay described the transition from collaborative grants to larger projects and procurement through the UK Research and Innovation (UKRI) industrial strategy Challenge Fund.⁴ Between 2018 and 2025, £312 million was reported as having supported 263 projects involving 254 organisations, with participating organisations subsequently attracting approximately £1.3 billion of co-investment. These figures should be checked against the final UKRI programme evaluation before publication.

The central lesson was that companies need customers and revenue. A government contract can validate a market, appear as revenue and make a company more attractive to investors. Grant funding remains important for research and early development but can create companies whose primary capability is securing the next grant rather than delivering a product.

Curia analysis: healthcare demonstrators should be designed as pre-procurement and early-procurement programmes. User departments should progressively become the customer, provided that products meet evidence, safety, and value requirements.

Regulation Must Become More Iterative

Chief Executive of the Medicines and Healthcare products Regulatory Agency (MHRA), Lawrence Tallon, argued that discussions about “regulation” often combine formal product rules with procurement, bureaucracy, workforce pressure, and organisational risk appetite. These barriers should be separated so that each can be addressed properly.

For genuinely novel products, the regulatory model may need to move from one very high barrier towards a sequence of proportionate hurdles. An initial threshold would still be required, followed by real-world surveillance, controlled test beds, and clear conditions for wider deployment. This approach recognises that AI-enabled products may change after launch and that evidence can accumulate through use.

Curia analysis: surveillance should not be treated as a short, transitional phase following initial deployment. AI-enabled and hybrid computational systems may change as models, software, underlying data, clinical pathways, and user behaviour evolve. Safety, effectiveness, and equity should therefore be assessed throughout the operational life of the technology, including after material updates, changes in deployment setting, or shifts in the population using it.

Assurance should also consider the producer, professional, and deploying institution, not only the device. An otherwise capable tool may be unsafe if the organisation lacks governance, monitoring, or trained staff. International alignment should be the default where divergence creates no advantage, while UK routes should be developed where novel technology offers a genuine opportunity.

NHS Adoption Remains the Central Delivery Challenge

The roundtable highlighted the gap between pilots and routine use. Enthusiasts and local champions can launch a proof of concept, but sustained adoption requires leadership, integration, funding, and a service model. An overworked workforce cannot be expected to redesign care, while maintaining existing activity, without additional support.

Curia analysis: demonstrators should begin by specifying the clinical or operational workflow, the responsible decision-maker, the evidence needed, the procurement route, and the conditions for scale. They should budget for implementation, technical support, training, evaluation, and ongoing data collection, not only the initial acquisition or development of the technology.

Curia analysis: large-scale adoption may also require national or regional mandates for common tools and standards. Local flexibility remains important, but excessive variation can prevent learning and create an unattractive market for suppliers.

National Coordination Requires Clear Governance

Participants described existing cross-government structures for quantum, including senior representation from multiple departments and an ultimate leadership role for the Government Chief Scientific Adviser. This provides a useful foundation but does not remove the need for a specific healthcare translation mechanism.

Curia analysis: a national programme should include HM Treasury, DHSC, DBIST, NHS representatives, regulators, national laboratories, industry, clinical leaders, and patients. It should connect strategy to decisions about funding, infrastructure, demonstrators, and procurement.

Curia analysis: regional delivery should be aligned to national priorities without becoming a collection of competing initiatives. The programme should identify where capabilities are concentrated and give each region a defined role in a national portfolio.

Security, Sovereignty, and Intellectual Property Must be Protected

Quantum technology creates both security opportunities and threats. Post-quantum cryptography can protect future systems, but organisations must also address the “harvest now, decrypt later” risk, under which encrypted information collected today could be decrypted when more capable systems become available.

Emerging companies may hold valuable intellectual property but lack mature cybersecurity and physical security. National security organisations have an important role in helping these companies protect assets without creating unnecessary barriers to collaboration and investment.

Curia analysis: sovereign capability should be defined precisely. It may mean domestic infrastructure, control over critical software, trusted supply chains, the ability to evaluate foreign technology, or sufficient intellectual property to negotiate partnerships. It does not require the UK to manufacture every component.

Regional Delivery and Growth

Participants identified existing strengths in photonics in Scotland, compound semiconductors in South Wales, and national infrastructure at Harwell, alongside a wider network of universities and companies. The discussion also considered the importance of ensuring that the economic value of investment is not confined to London and the South East.

Curia analysis: regionalisation is also important to the quality of the evidence. Testing technologies across different NHS systems, population groups, workforce models, and levels of digital maturity will help determine whether benefits can be reproduced outside leading research centres. Regions should therefore act as delivery and learning partners, not simply locations for infrastructure or recipients of economic investment.

Regional benefit can arise through research, company formation, manufacturing, adoption, and skills. It should not be reduced to the location of a single machine. A national programme can allocate different roles across regions according to credible strengths and links to healthcare users.

Metrics should include high-value jobs, private investment, manufacturing, research infrastructure, business growth, NHS adoption, and access to training. Regional structures should be simplified where overlapping bodies create unclear accountability.



Dr Michael Cuthbert, Director of the National Quantum Computing Centre (NQCC), was among the senior experts contributing to the roundtable discussion.

Why the Current Model Fails to Convert Capability Into Value

The problem is not a lack of programmes. It is the absence of a connected delivery architecture that links scientific capability to products, procurement, workflows, and measurable outcomes.

Technology Silos and Fragmented Departmental Ownership

AI, quantum, health data, infrastructure, and adoption are funded through different routes with different objectives. The fragmentation is partly structural: government often responds to emerging technologies by creating dedicated strategies, programmes, funding streams, and institutional responsibilities. This can be useful for building specialist capability, but it can also encourage policymakers to treat technologies as self-contained policy domains.

The commercial environment is less neatly divided. Companies increasingly combine data, AI, cloud infrastructure, advanced computing, quantum technologies, software, and specialist hardware within the same products and services. Research funding and disciplinary structures can reinforce similar distinctions, but healthcare systems ultimately purchase capabilities and outcomes rather than abstract technology categories.

A coordinated programme should therefore retain specialist expertise while avoiding a delivery architecture in which each technology develops its own infrastructure, funding logic, procurement route, and adoption programme. Common decisions should be made around healthcare problems, outcomes, and investment, with technical capabilities assembled according to the requirements of each use case.

Pilot Programmes Without a Route to Scale

Proofs of concept are often commissioned without an agreed procurement route, sustainable budget, or accountable national owner. The programme should require every demonstrator to define the decision it is intended to inform and the conditions for expansion, redesign, or closure.

Grants Without Sufficient Procurement

Research grants can create knowledge and prototypes but do not provide a market. Companies need revenue and customer validation. Public procurement should become a deliberate component of translation policy, while remaining evidence-based and competitively neutral.

Infrastructure Without End-user Capability

Access to advanced machines is not enough. Clinical and research teams need technical support, software, data, and the ability to formulate problems appropriately. Infrastructure investment should include user development and shared application teams.

Data That Cannot be Used Consistently

Fragmented data standards, weak metadata, and unclear governance prevent technologies from being evaluated or integrated. Data readiness should be assessed before large compute or application investments are approved.

Regulation and Evaluation Designed as Linear Processes

Traditional pathways assume a product is fixed before approval. AI and hybrid systems may continue to change. Assurance must become iterative while protecting patients and maintaining clear accountability.

Insufficient Implementation Capacity in the NHS

Clinical teams face immediate operational pressure. Even valuable technologies can fail when implementation is treated as an additional task rather than a funded programme. Adoption support should be a core investment line.

Short-term Expectations for Long-term Capability

Emerging technologies need patient capital, and stable policy. Equally, long-term commitment should not mean unconditional funding. Programmes need evidence-based review points that allow government to increase, redirect or stop investment.

Weak Connection Between National Strategy and Regional Delivery

Regional strengths are sometimes celebrated without being integrated into a national portfolio. This can produce duplication and competition for small funding pots. Regions should have defined roles connected to national outcomes.

Unclear Measures of Public Value

Headline estimates of future markets are insufficient for HM Treasury. The case must show which costs are reduced, what capacity is released, what jobs or investment are created, and how patient outcomes improve.

 **Brilliant science does not define a trajectory that is guaranteed to succeed.”**

Roger McKinlay, Chair, UKQuantum



Lawrence Tallon, Chief Executive of the Medicines and Healthcare products Regulatory Agency (MHRA), was among the senior leaders contributing to the roundtable discussion.

Building the Treasury Case

A credible investment case should be ambitious about national opportunity while transparent about uncertainty, delivery risk, and time to benefit.

Start With the Counterfactual

The case should compare the proposed programme with a realistic continuation of current arrangements: fragmented infrastructure, repeated pilots, slow procurement, limited diffusion, and the migration of companies or intellectual property to stronger markets. The counterfactual should include lost patient benefit, avoidable NHS inefficiency, and forgone private investment.

Prioritise a Portfolio, Not a Single Technology

The first spending period should contain a balanced portfolio: nearer-term sensing and AI applications capable of producing clinical or operational evidence; medium-term hybrid computing and application development; and longer-term national capability in quantum computing. This avoids depending on one technical roadmap while preserving strategic ambition.

Define the Government Role

Government should fund public goods and correct coordination failures. These include national laboratories, secure access, standards, regulatory capability, shared datasets, skills, demonstrators, and early procurement. It should not replace private investment in routine product development or protect weak companies from competition.

Separate Different Forms of Value

Value Domain	Illustrative Measures	Treasury Relevance
Patient and clinical benefit	Earlier or more accurate diagnosis; treatment response; quality of life; safety; reduced exposure to invasive tests	Shows whether the programme creates genuine public benefit
NHS productivity	Staff time; diagnostic throughput; waiting time; avoided duplication; bed use; scheduling efficiency	Tests whether capability releases capacity or reduces unit cost
Research productivity	Time to analyse data; model complexity; speed of target identification; trial design; reusable methods	Connects infrastructure to scientific output and translation
Industrial growth	Private investment; company revenue; procurement contracts; exports; manufacturing; intellectual property	Demonstrates growth and crowding-in of capital
Regional value	Jobs, skills, infrastructure, and adoption outside London and the South East	Shows contribution to place-based growth
Strategic capability	Domestic expertise; trusted access; supply-chain resilience; ability to evaluate technology	Captures sovereignty and resilience not reflected in narrow cash savings
Public trust and security	Compliance; cyber readiness; patient confidence; and data-governance performance	Protects adoption and reduces systemic risk

Distinguish Cashable Savings From Capacity and Strategic Value

The programme should not imply that every productivity improvement immediately reduces expenditure. Some technologies will release capacity that is then used to meet unmet demand. Others will avoid future cost or produce economic value through investment and employment. The model should label these effects clearly and state their expected time horizon.

Use Staged Investment and Evidence Gates

Funding should be released in stages linked to evidence. Early gates might assess data readiness, technical feasibility, user demand, and security. Later gates should assess clinical performance, workflow integration, value, procurement readiness, and commercial scale. Review should be independent and include the option to stop unsuccessful projects.

Include Downside and Sensitivity Analysis

The economic model should test different assumptions about hardware maturity, adoption speed, workforce availability, energy costs, data access, and private co-investment. This will show which assumptions drive the result and where risk mitigation is most valuable.

Measure Additionality

The case should explain what would not happen without public or philanthropic support. Investment that merely substitutes for activity already planned by a large company provides limited additional value. The strongest case will support shared infrastructure, high-risk translation, and coordination that individual organisations cannot provide alone.

Build Evidence Through Delivery

The programme should not wait for perfect evidence before acting, nor scale nationally on the basis of technical promise. Demonstrators should generate real-world evidence under NHS conditions, with common methods that allow results to be compared and transferred.



The discussion considered priority healthcare use cases where emerging technologies could deliver meaningful clinical benefit and demonstrate real-world value.

Priority Healthcare Use Cases

Use cases should be selected according to clinical importance, technical fit, data readiness, implementation feasibility, UK advantage, and the possibility of producing evidence within the programme period.

Quantum-enabled Sensing and Brain Imaging

Quantum sensors may improve functional brain imaging and support more portable or patient-friendly approaches. Potential applications include paediatric epilepsy, neuroscience research, and conditions where conventional scanning is difficult. A demonstrator should assess clinical information gained, usability, regulatory requirements, pathway impact, and cost compared with existing approaches.

Oncology Imaging and Diagnostic Fidelity

Improved sensing and AI-supported interpretation could help clinicians make more accurate treatment decisions. The investment case should focus on defined points in the pathway where reduced false positives or false negatives have measurable consequences for biopsies, treatment, waiting times, and patient anxiety.

Molecular Simulation and Drug Discovery

Hybrid advanced computing may accelerate selected modelling tasks in drug discovery. Early programmes should avoid broad claims about replacing current methods and instead identify benchmark problems where performance, cost, or scientific insight can be compared transparently with leading classical approaches.

Antimicrobial Selection and Precision Treatment

Cleveland Clinic described work combining advanced computation and AI to analyse patient records and support faster identification of effective antibiotics. A UK programme could explore whether comparable approaches can reduce time to appropriate treatment, antimicrobial exposure, and length of stay, subject to data and clinical validation.

Rare Disease Research

Rare diseases often involve small datasets and many variables. Quantum and hybrid machine learning may eventually assist with pattern identification, synthetic data, or simulation. The near-term priority should be building high-quality datasets, benchmark tasks, and partnerships between specialist centres and computational teams.

Complex NHS and Social Care Optimisation

Scheduling and flow problems involve multiple constraints, changing conditions, and competing objectives. Potential applications include workforce scheduling, diagnostic capacity, theatre use, discharge, and social care visits. These use cases can be tested against strong classical optimisation methods and may deliver operational evidence earlier than some biomedical applications.

Administrative and Back-office AI

Current AI and automation can reduce repetitive work and create savings that support wider innovation. This should remain part of the programme because advanced technology investment must coexist with practical productivity improvement. Applications should be evaluated for error, staff experience, and whether time is genuinely released.

Research Data and Multi-omics Analysis

The UK's health data and research cohorts could support integrated analysis across clinical, imaging, genomic, and other biological data. The priority is creating secure, interoperable infrastructure, and defined research questions, rather than assuming that more computation alone will produce insight.

Use-case Selection Framework

Criterion	Question for Selection
Patient or system need	Is the problem important and clearly defined?
Technical fit	Is there a credible reason advanced sensing or computing may outperform current methods?
Maturity	Can the programme produce meaningful evidence within five years?
Data readiness	Are the required data available, governed, and sufficiently high quality?
Workflow and adoption	Is there an identifiable NHS user, decision, and implementation pathway?
UK advantage	Does the UK have relevant science, companies, infrastructure, or clinical leadership?
Economic value	Could the use case release capacity, reduce cost, attract investment or support exports?
Equity and trust	Will the application improve access and maintain public confidence?



The new No.10 administration will need to drive a coordinated approach across government, bringing together the Treasury, Department for Business, Innovation, Science and Trade (DBIST) and wider departments to support the infrastructure needed to turn innovation into measurable healthcare outcomes. (Photo: Simon Dawson / No 10)

A Coordinated Delivery Framework

The programme should be organised around healthcare problems and measurable outcomes, not around individual technologies. Specialist capabilities can be maintained for administrative and technical purposes, but demonstrators should draw across them according to need. The four workstreams below should therefore be understood as interconnected capability functions rather than independent technology programmes, governed by shared use cases, outcomes, and investment decisions.

Infrastructure and Trusted Access

This workstream should provide researchers, NHS users, and companies with access to classical, AI, and quantum resources through secure on-premises and cloud arrangements. It should include technical support, benchmarking, data governance, energy assessment, and a process for deciding what should be located domestically.

AI and Data for Discovery and Delivery

This workstream should improve data readiness and develop applications that can produce near-term benefit. It should include common standards, metadata improvement, secure data environments, privacy-preserving approaches, patient involvement, and interoperability with NHS workflows.

Data infrastructure must also support evaluation after deployment. Demonstrators should collect agreed baseline and longitudinal data on safety, clinical effectiveness, workflow impact, patient outcomes, equity, workforce experience, and cost. This should enable performance to be compared over time and across different NHS organisations and population groups.

Quantum Sensing and Computing

This workstream should maintain a portfolio across sensing, imaging, computing, software, and algorithms. It should distinguish technical maturity and avoid presenting all quantum activity as one market or timeline. Independent benchmarking should guide future down-selection, and larger procurement decisions.

Translation, Regulation, and Adoption

This workstream should connect every demonstrator to clinical validation, regulation, procurement, implementation, and evaluation. It should include regulatory sandboxes, early health-economic advice, adoption teams, and commercial pathways for successful companies.

Governance

Body	Suggested Role
Ministerial and Treasury board	Set outcomes, approve funding and resolve cross-departmental barriers
Independent programme board	Oversee portfolio, evidence, ethics, conflicts, and public value
Scientific and technical advisory group	Benchmark technology and advise on infrastructure and maturity
Clinical and NHS adoption group	Select use cases, define workflows and support implementation
Regulatory and assurance group	Coordinate MHRA, data, cyber, and professional assurance
Regional delivery network	Connect clusters, demonstrators, skills, and manufacturing
Patient and public panel	Shape data use, acceptable risk, outcomes, and communication

The Route From Idea To Scale

Stage	Core Activity	Decision Output
1. Problem definition	Define patient or system problem, users, baseline, and current pathway	Validated use case
2. Readiness	Assess data, technology, workforce, regulation, security, and economics	Go/no-go for demonstrator
3. Co-development	Build and integrate with clinical, technical, and patient input	Usable prototype and evaluation plan
4. Controlled deployment	Test in regulated real-world settings with surveillance	Evidence of safety, performance, and workflow impact
5. Procurement and scale	Competitive purchasing, implementation support, and commercial plan	Regional or national adoption decision
6. Continuous assurance	Continuously collect and review data on safety, effectiveness, equity, workflow impact, model or software updates, data drift, and cyber risk	Maintain, modify, restrict, retrain, revalidate or withdraw the technology



Experts from quantum technology and the healthcare sector were in attendance.

Regulation, Assurance, and Public Trust

The programme must treat regulation and trust as enabling infrastructure, not as issues to address after technical development.

A Proportionate and Iterative Model

Novel technologies require a route to market that is demanding enough to protect patients but sufficiently adaptive to support innovation. The “hurdles rather than a high jump” model described at the roundtable would combine an initial threshold with repeated checks as evidence accumulates.

The Risk of Action and Inaction

Regulators and policymakers should consider the harm caused by delaying a beneficial technology, as well as the harm that could follow deployment. This does not justify speculative adoption. It requires both risks to be made explicit and compared using the best available evidence.

Context-specific Assurance

Assessment should cover the product, producer, professional user, and deploying institution. Developers should demonstrate quality, security, and model maintenance. Professionals need defined responsibilities and training. NHS organisations need monitoring, incident management, and governance.

Continuous Real-world Surveillance and Learning

Post-market monitoring should be a continuing requirement rather than a time-limited phase following initial deployment. It should assess safety, clinical effectiveness, workflow impact, and equity across patient groups, deployment settings, changing data, and subsequent product updates. Monitoring arrangements should identify model drift, unexpected outcomes, changes in user behaviour, and performance differences between institutions or populations. The programme should agree minimum datasets, reporting intervals, update triggers, and escalation routes, with clear responsibility for acting on emerging evidence. Learning should be shared across the system without compromising patient confidentiality or legitimate commercial interests.

International Recognition and Reciprocity

Alignment with major markets can reduce duplication and help UK companies scale. Divergence should be purposeful and focused on areas where the UK can offer a better or faster route without lowering standards. The emerging cooperation between the MHRA and US FDA provides a potential platform for innovative health technologies.

Public Trust and Consent

Patients should understand how data are used, what role technology plays in decisions, and who remains accountable. Public involvement should shape use-case selection, consent, access, and acceptable risk. Trust will be damaged if commercial value is extracted from NHS data without visible public benefit.

Equity

Performance should be evaluated across population groups and settings. Technologies trained on incomplete or unrepresentative data can widen inequalities. Access to advanced diagnostics or research should not be limited to a small number of highly resourced centres without a plan for wider benefit.

Sovereignty, Infrastructure, and Security

The UK needs sufficient capability and leverage to protect essential services, evaluate technology and participate as a strong partner in a global ecosystem.

Own, Collaborate or Access

Strategic Choice	When it is Appropriate	Illustrative Application
Own	Capability is critical to national security, evaluation, bargaining power, or continuity of service	Domestic expertise, national test beds, critical software, and secure data capability
Collaborate	Value depends on shared science, markets, supply chains, or infrastructure	International research, standards, clinical studies, and interoperable platforms
Access	Existing commercial or partner capability offers better value than duplicating infrastructure	Cloud-based compute and selected specialist machines
Retain options	Technology is immature and premature selection would create lock-in	Portfolio of quantum computing modalities and benchmark access

National Laboratories and Independent Expertise

The UK needs expert institutions capable of evaluating competing claims, supporting end users, and advising government. National laboratories should have sufficient technical depth to act as informed customers and partners, not simply facility managers.

Cybersecurity and Post-quantum Transition

Health and research organisations should identify cryptographic systems that may be vulnerable to future quantum attacks and develop transition plans. Priority should be given to long-lived sensitive data. The programme should align with national guidance and avoid creating new infrastructure that will require expensive retrofitting.

Protecting Emerging Companies

Security support should be proportionate to company size and risk. Early engagement with National Cyber Security Centre (NCSC)⁵ and the National Protective Security Authority⁶ can help companies protect intellectual property, staff, and facilities while maintaining international collaboration.

Energy and Environmental Impact

Compute and data storage have energy and carbon implications. Every major infrastructure proposal should state expected demand, utilisation, and alternatives. The programme should consider frugal AI, efficient data retention, and the relative energy performance of different computational approaches.

Skills, Workforce, and Regional Growth

Technology will not translate without people who can connect clinical problems, data, engineering, regulation, and implementation.

A Multidisciplinary Workforce

The programme needs clinicians, biomedical researchers, physicists, quantum engineers, data scientists, software developers, informaticians, product engineers, regulators, procurement specialists, implementation experts, and health economists. These capabilities should be organised around shared problems rather than working in parallel.

Developing Informed End Users

Quantum literacy should not mean turning every clinician into a physicist. End users need enough understanding to identify relevant problems, interpret evidence and work effectively with technical teams. Shared application specialists can translate between domains.

NHS Implementation Capacity

The NHS needs protected time, training, and adoption support. Each demonstrator should fund local clinical leadership, programme management, technical integration, and evaluation. These costs should not be hidden within existing service budgets.

National and Regional Talent Programmes

Fellowships, secondments, and joint appointments can connect the NHS, universities, national laboratories, regulators, and companies. Regional programmes should build on existing strengths and provide clear routes into high-value employment.

Regional Growth Model

The programme should operate through a nationally coordinated network of regional delivery partnerships. Each partnership should connect relevant NHS organisations, universities, companies, skills providers, and local or combined authorities. Their roles should reflect evidenced capabilities, but all should work to common evaluation standards so that results can be compared and learning can be transferred between regions.

Regional Asset*	Potential Programme Role
Scotland photonics and quantum expertise	Sensing, imaging, laser technology, and manufacturing
South Wales compound semiconductor cluster	Enabling hardware, fabrication, and supply-chain development
Harwell and NQCC	Quantum computing test beds, evaluation, access, and user development
London and South East life sciences institutions	Clinical research, regulation, finance, and international partnerships
Northern and Midlands health and digital clusters	NHS demonstrators, data, manufacturing, adoption, and regional productivity

**Additional programmes should validate these and other regional roles through a formal capability map rather than relying on illustrative examples alone.*

A Proposed Five-year National Programme

The programme should deliver near-term evidence and adoption while building the capability required for longer-term applications.

Programme Objective

To establish a problem-led UK advanced computational healthcare capability that brings together the combination of data, AI, classical computing, quantum technologies, and other enabling capabilities required to improve patient outcomes, NHS productivity, and economic growth – supported by trusted infrastructure, proportionate regulation, procurement, and a skilled workforce.

Proposed Programme Components

- A national portfolio of 6–10 healthcare demonstrators selected through the use-case framework and distributed across regions with different clinical, economic, and technical strengths.
- A regional delivery network connecting NHS systems, universities, businesses, skills providers, and regional authorities through common outcomes, evaluation standards, and routes to national procurement.
- Shared infrastructure and access through national laboratories, secure cloud, and partner facilities.
- Specialist sensing, imaging, and hardware capability available to demonstrators according to clinical need, including quantum-enabled sensing where it offers a credible advantage.
- Advanced computing application and readiness capability spanning classical, AI, hybrid, and quantum approaches, focused on benchmark problems, software, and end-user development.
- A data-readiness programme covering metadata, interoperability, secure environments, and patient involvement.
- A continuous assurance and outcomes-monitoring framework, with common baseline measures, longitudinal data collection, update reporting, and mechanisms for identifying safety, effectiveness, equity, and implementation concerns throughout the life of deployed technologies.
- Regulatory sandboxes and test beds coordinated with MHRA and NHS assurance bodies.
- A procurement pathway moving successful projects from demonstrator to Contracts for Innovation and, where evidence supports it, routine NHS purchasing.
- A skills and secondment programme spanning clinical, technical, regulatory, and commercial roles.
- Independent health-economic, industrial, and regional evaluation.
- A public engagement and security programme, including post-quantum transition planning.

Proposed Five-year Sequence

Phase	Timing	Main Activity	Principal Outputs
Mobilise and select	Months 0–6	Governance, capability map, use-case selection, baseline, and matched funding	Treasury business case and initial portfolio
Build and benchmark	Months 6–18	Data readiness, prototypes, infrastructure access, regulatory, and technical benchmarking	Validated demonstrator plans and early results
Deploy and procure	Months 18–36	Controlled NHS deployment, surveillance, procurement and implementation support	Clinical, operational, and commercial evidence
Scale successful models	Months 36–48	Regional expansion, larger procurement, manufacturing, and international partnerships	Scaled services and company growth
Evaluate and renew	Months 48–60	Independent programme evaluation and next-decade capability decision	Treasury evaluation and future investment plan

What Success Would Look Like

- At least three healthcare applications have moved beyond pilot stage into sustained NHS procurement or deployment.
- The UK has a recognised route for evaluating and regulating novel AI and quantum-enabled health technologies.
- National laboratories and NHS users can benchmark competing systems and access them securely.
- Private and philanthropic investment has been crowded in without weakening public value or editorial independence.
- Participating companies have increased revenue, employment, manufacturing, or exports in the UK.
- Regional delivery partnerships have defined roles and measurable gains in NHS adoption, patient access, jobs, skills, infrastructure, private investment, and company growth, with evidence that successful models can be transferred between different regions and healthcare settings.
- The programme has published transparent evidence, including unsuccessful results, and decisions to stop projects.
- Health and research organisations have begun an organised transition towards post-quantum security.

Recommendations

The following recommendations are Curia's conclusions. They have been developed following the parliamentary roundtable through further analysis of the issues raised, published evidence, and relevant national and international experience. They should not be interpreted as recommendations formally agreed or endorsed by individual roundtable participants. Curia recommends a coordinated programme of action across government, the NHS, regulators, research institutions, and industry.

For HM Treasury and Central Government

- Establish a five-year Advanced Computational Healthcare Programme with staged funding and independent evidence gates.
- Require the business case to distinguish cashable savings, capacity released, research productivity, industrial growth, regional value, and strategic capability.
- Align departmental funding through a ministerial and Treasury board with accountable senior leadership.
- Use public procurement, not grants alone, to help validated UK technologies reach revenue and scale.
- Organise funding and accountability around priority healthcare problems and measurable outcomes, rather than around technology categories alone.
- Adopt an explicit own, collaborate or access framework for critical infrastructure and capability.

For the Department of Health and Social Care and the NHS

- Select a limited portfolio of high-value clinical and operational use cases with clear users and adoption pathways.
- Fund implementation capacity, data integration, workforce training, and evaluation as part of every demonstrator.
- Create common evidence, interoperability, and continuous-monitoring standards, including baseline and longitudinal data on safety, clinical effectiveness, equity, workflow impact, and cost, to inform continued use and wider adoption.
- Use NHS procurement to scale technologies only where clinical, workflow, and value evidence are sufficient.
- Ensure patient and public involvement shapes data use, risk, outcomes, and access.

For Department of Business, Innovation, Science and Trade, UKRI and National Laboratories

- Maintain a portfolio approach across quantum modalities until evidence supports down-selection.
- Strengthen independent technical capability within national laboratories and government.
- Invest in application software, algorithms, and end-user development alongside hardware.
- Avoid treating quantum, AI, data, and compute as separate delivery silos; organise cross-programme investment around shared healthcare use cases while retaining specialist technical expertise.
- Publish roadmaps and benchmark results that allow government and users to make informed decisions.

For the Medicines and Healthcare Products Regulatory Agency, and Assurance Bodies

- Develop iterative regulatory pathways combining proportionate entry requirements with real-world surveillance.
- Assess the developer, professional, and deploying institution as well as the product.
- Use regulatory sandboxes and test beds for novel AI and quantum-enabled technologies.
- Pursue international recognition where alignment improves access and scale without weakening standards.
- Clarify accountability for technologies that change after deployment.
- Define when updates, retraining, changes in underlying data, or deployment in a new setting require notification, reassessment, or renewed validation.

For Industry, and Investors

- Organise development around healthcare problems and evidence rather than technology labels.
- Invest in security, quality, product engineering, and implementation capability as companies grow.
- Share appropriately governed evidence and participate in transparent benchmarking.
- Use UK procurement and clinical partnerships as a route to global markets, not as a substitute for commercial discipline.
- Support skills, manufacturing, and regional supply chains where these create sustainable value.

For Regional Authorities and Clusters

- Define regional roles according to evidenced strengths and links to NHS users.
- Coordinate skills, infrastructure, manufacturing, and adoption rather than creating overlapping initiatives.
- Measure jobs, private investment, company growth, research infrastructure, and NHS benefit.
- Ensure that patients and institutions outside leading centres can access successful technologies.



The Chancellor of the Exchequer, Rt Hon John Healey MP, will be central to decisions on the public investment given the October Budget. (Photo: Kirsty O'Connor / HM Treasury)

What Support and Investment are Needed

The immediate requirement is to convert the report into a costed, Treasury-ready programme with confirmed use cases, partners, governance, and matched funding.

What the Programme is Trying to Deliver

Curia and partners should convene a national programme that connects policy, healthcare, science, industry, and philanthropy. The first phase should select demonstrators, establish the evaluation framework and secure formal engagement from government, NHS users, regulators, and national laboratories.

What Public Funding is Needed For

- Shared infrastructure, secure access, and independent technical evaluation.
- Data readiness, interoperability, and public-interest governance.
- Regulatory capability, sandboxes, and real-world surveillance.
- NHS implementation support and early procurement.
- Skills, fellowships, and secondments.
- Independent economic, industrial, and regional evaluation.
- Cybersecurity and post-quantum transition planning.

The Role of Philanthropic Funding

Philanthropy can support areas where value is distributed and no single organisation has an incentive to lead. These areas include coordination, shared application teams, early translation, patient involvement, public-interest data infrastructure, and independent evidence. Matched funding can also provide discipline by requiring government and delivery partners to make clear commitments.

The Role of Industry

Industry should provide product engineering, technical expertise, private investment, manufacturing, and commercial routes to market. Participation should be competitively neutral and governed transparently. Sponsorship or partnership must not determine use-case selection, clinical decisions, or report findings.

Independence and Governance

- Curia retains editorial independence and publishes declarations of interest.
- An independent board oversees programme selection, evidence, and public value.
- Companies cannot control clinical eligibility, evaluation methods, or recommendations.
- Negative and inconclusive findings are reported.
- Data access follows clear legal, ethical, and patient-informed governance.
- Procurement remains competitive and proportionate.

 **The task is to move from research capability to healthcare impact.”**

Central purpose of the policy roundtable

References

- 1 <https://www.nqcc.ac.uk/>
- 2 <https://www.npl.co.uk/>
- 3 <https://uknqt.ukri.org/>
- 4 <https://www.ukri.org/what-we-do/ukri-challenge-fund/>
- 5 <https://www.ncsc.gov.uk/>
- 6 <https://www.npsa.gov.uk/>

