

Where Quantum + AI Will Create the First Commercial Impact in the UK

From Research Leadership to Real Industry Adoption

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WHERE QUANTUM + AI WILL CREATE THE FIRST COMMERCIAL IMPACT IN THE UK

Britain has world-class quantum research, over **£2.5 billion committed** through the National Quantum Strategy and one of the strongest startup ecosystems in Europe.

But where will quantum create measurable value first?

This report focuses on the practical opportunities likely to generate real commercial impact over the next **5-10 years**.

Built for enterprise leaders, investors, government, innovators and technology buyers. **Reading Time: 10 Minutes**

What This Report Covers

01

5 areas where quantum adoption is accelerating

02

3 real UK case studies

03

Key barriers slowing adoption

04

Investment and policy signals

05

A Quantum Readiness Checklist for enterprise leaders

5 AREAS WHERE QUANTUM + AI WILL CREATE VALUE FIRST

1

Quantum Security & Post-Quantum Cryptography

Protecting critical infrastructure before Q-Day arrives. Financial services, telecoms, defence and government are already preparing.

2

Drug Discovery & Life Sciences

Quantum simulation could dramatically accelerate molecular modelling and pharmaceutical R&D. One of the strongest long-term commercial opportunities.

3

Advanced Manufacturing & Materials

Discovering new materials, batteries, semiconductors and industrial processes. A major UK industrial opportunity.

4

Optimisation & Logistics

Supply chains, transport networks, scheduling and energy systems. Hybrid Quantum + AI approaches are already being explored.

5

National Infrastructure & Sovereign Compute

Quantum, AI and HPC are converging into the next generation of strategic national infrastructure.

CASE STUDY: BT & TOSHIBA

Building Britain's Quantum Secure Network

BT and Toshiba have successfully demonstrated quantum-secure networking technology across the UK. The initiative explores **Quantum Key Distribution (QKD)** to protect critical communications infrastructure against future cyber threats.

- Demonstrated secure quantum networking over real-world fibre infrastructure
- Created foundations for future quantum-safe communications
- Positioned the UK as a leader in secure networking innovation

Key Takeaway

Quantum security is becoming an **infrastructure conversation**, not simply a research project.

Sector Relevance

- Financial Services
- Telecommunications
- Defence & Government
- Critical National Infrastructure

CASE STUDY: HSBC & QUANTINUUM

Exploring Quantum Advantage in Financial Services

HSBC partnered with Quantinuum to investigate how quantum computing could support **portfolio optimisation and financial modelling**. The collaboration focused on identifying commercially relevant use cases before large-scale fault-tolerant systems arrive.

- Early testing of optimisation workloads
- Improved understanding of practical enterprise applications
- Created internal capability ahead of wider market adoption

Key Takeaway

The first winners may be organisations **building quantum capability before clear ROI exists**.

Sector Relevance

- Banking & Capital Markets
- Insurance & Risk
- Asset Management
- Fintech

CASE STUDY: PHASECRAFT & THE UK NATIONAL QUANTUM ECOSYSTEM

Building Practical Quantum Software

UK-based Phasecraft is developing quantum algorithms designed to deliver value on **near-term quantum hardware**. The company works across chemistry, materials science and industrial simulation.

- World-leading UK quantum software capability
- Commercial partnerships across industry
- Demonstrating how software can unlock value before fault tolerance

Key Takeaway

Quantum adoption may be driven by **software innovation as much as hardware breakthroughs**.

Sector Relevance

- Chemistry & Pharma
- Materials Science
- Industrial Simulation
- Deep Tech Startups

THE TOP 4 BARRIERS SLOWING QUANTUM ADOPTION



Enterprise Readiness

Most organisations still struggle to identify realistic use cases.



Talent Shortage

Demand for quantum skills is significantly outpacing supply.



Infrastructure Gaps

Many organisations lack the systems needed to integrate quantum workflows.



Commercial Uncertainty

Leaders remain unsure when measurable ROI will arrive.

 **Insight:** The challenge is no longer awareness. It is **operational readiness**.

WHERE UK INVESTMENT, POLICY & TALENT ARE POINTING

National Quantum Strategy

£2.5 billion committed to developing a leading quantum-enabled economy.

National Quantum Computing Centre (NQCC)

Building national infrastructure and capability to anchor the UK's quantum ecosystem.

UKQuantum

Creating stronger industry collaboration and commercialisation pathways across the private sector.

Defence & Security Investment

Growing demand for sovereign capability and quantum-safe infrastructure at a national level.

Quantum Skills Programmes

Expansion of workforce development across academia and industry to close the talent gap.

✔ **Insight:** The strongest signals are coming from **infrastructure, security and industrial capability**.

ENTERPRISE TOOL

QUANTUM + AI READINESS CHECKLIST

Use this checklist to assess your organisation's preparedness for the quantum transition.

- ✓ Defined quantum use cases linked to business outcomes
- ✓ Executive sponsorship and long-term commitment
- ✓ Internal quantum literacy programme
- ✓ Partnerships with universities, startups and ecosystem partners
- ✓ Post-quantum security assessment completed
- ✓ Hybrid AI, HPC and quantum roadmap established
- ✓ Focus on capability building before ROI expectations

📄 How many boxes can your organisation check today? Each gap represents a strategic risk as quantum adoption accelerates.

WHAT LEADERS SHOULD DO NOW

✓ DO

- Build awareness across your organisation
- Start use-case discovery now
- Assess quantum security exposure
- Develop internal capability
- Partner with the ecosystem

⊠ DON'T

- Wait for fault-tolerant systems before acting
- Expect immediate transformation
- Treat quantum as a standalone technology

CLOSING

THE REAL WORK STARTS NOW

The UK is entering the transition from **quantum science to quantum industry**.

The organisations creating advantage over the next decade will not necessarily be the first to deploy quantum computers. They will be the first to **build capability, partnerships and readiness**.

Quantum + AI Insiders will continue tracking where commercial adoption is happening, where investment is flowing and where real enterprise value is emerging.

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Let's build Britain's quantum future together.

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