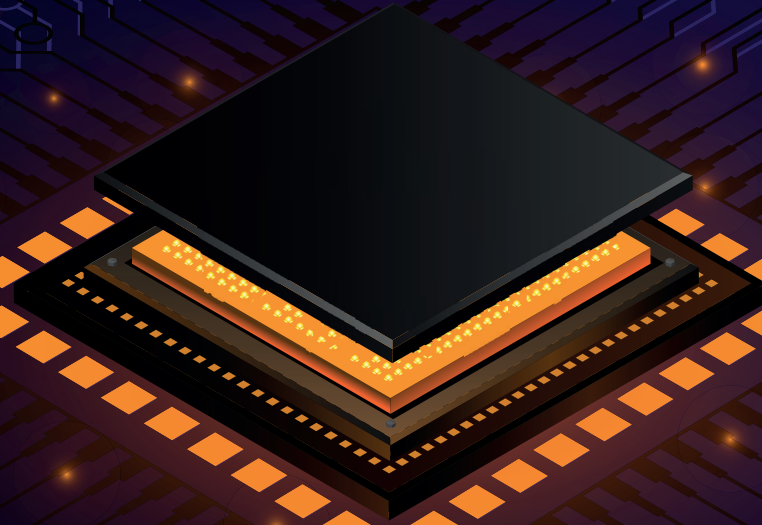


Quantum Technologies Strategy Summary

Our Quantum Technologies Vision

To use our **strengths and capabilities** on behalf of the UK to drive the creation of a **vibrant, impactful, and sustainable Quantum Technologies ecosystem** that propels scientific discovery, delivers technological innovation, creates a long-term skills base, and accelerates the route from laboratory to applications.



What is Quantum Technology?

Quantum devices, systems and algorithms rely on the quantum-mechanical principles of entanglement and superposition for their operation. Quantum technologies will enable new applications in sensing, data processing, and communications, which are likely to have profound impacts on society, industry, and science.

National Quantum Strategy

The UK National Quantum Strategy outlines a vision for UK global leadership in the quantum sector by 2033. The aim is to integrate Quantum Technologies into the UK's digital and manufacturing infrastructure to drive economic growth and resilience. £2.5 billion has been committed over ten years from 2024. The Strategy has four primary goals:

1. World-leading research and skills:

Ensure the UK is home to world-leading quantum science and engineering, growing UK knowledge and skills.

2. Supporting business:

Support business, making the UK the go-to place for quantum businesses and an integral part of the global supply chain, as well as a preferred location for investors and global talent.

3. Driving adoption:

Drive the adoption of quantum technologies in the UK to deliver benefits for the economy, society and for national security.

4. Regulation and protection:

Create a national and international regulatory framework that supports innovation and the ethical use of quantum technologies, and protect UK capabilities and national security.

Five national quantum missions provide focus for near-term innovation: quantum computing advancements, quantum networks, healthcare applications of quantum sensing, quantum navigation systems, and networked quantum sensors.

Quantum Technologies for Fundamental Physics (QTFP)

The QTFP programme initiative is revolutionising our understanding of the universe by addressing profound questions in fundamental physics.

The STFC community has a long experience of designing, engineering and operating complex instruments for demanding environments. The EPSRC-funded Quantum Hubs funded by the Engineering and Physical Sciences Research Council (EPSRC) have a major role in bridging the gap between proof-of-concept and complete system operation. QTFP has brought these communities together in a synergistic relationship.

Hartree National Centre for Digital Innovation (HNCDI)

HNCDI is a collaborative programme with IBM which enables businesses to acquire the skills, knowledge and technical capability required to adopt digital technologies like supercomputing, data analytics, artificial intelligence and quantum computing.

HNCDI provides a safe and supportive environment for organisations to explore the latest digital technologies and skills, develop proofs-of-concept and apply them to industry and public sector challenges.

STFC and Quantum Technologies

Quantum technologies will impact every aspect of STFC's mission in the years to come. We are already playing a leading role in the UK's National Quantum Technologies Programme by:

- providing core national capability in quantum computing via the National Quantum Computing Centre
- establishing the Quantum Technologies for Fundamental Physics programme, which focuses on quantum sensing.

Support for Industry

Quantum Clusters and the Quantum Business Incubation Centre provide a framework for businesses to transition ground-breaking research into market-ready solutions, acting to secure the UK quantum supply chain. These mechanisms include incubation services, funding opportunities, and mentorship programs, all aimed at demystifying the commercialisation process for quantum enterprises. We provide routes for industry to directly access our facilities.

National Quantum Computing Centre (NQCC)

The NQCC is a focal point of innovation, designed to tackle the challenges of scaling Quantum Computing. Its mission is to spearhead R&D efforts that enhance QC scalability and to foster a collaborative environment for academia, industry, and government. NQCC will:

- build, host and deploy quantum computers,
- focus on technology, infrastructure and workforce readiness
- deliver technological advancement, supply chain optimisation, and skill development.

More broadly than this, the UK's National Laboratories support a diverse range of research into quantum technologies, at a range of technology readiness levels.

STFC, as part of UK Research and Innovation, support academia, industry, public sector partners and government through:

- Our **significant convening power** for the research community working on quantum materials and technologies.
- Our ability to **broker the early cross-disciplinary adoption of quantum technologies**, e.g. quantum for net-zero, quantum for topological matter, linking advanced simulation with materials discovery and characterisation.
- Sustaining the **skills base** for highly relevant capabilities in cryogenics, vacuum engineering, clean manufacturing, device characterisation, advanced control and readout systems, and deployment of technologies into hostile environments including space.
- Our role as **potential early adopters of QT** for sensing. This may range from improved particle detection for facilities, to cutting edge sensors for studying biological systems.
- Exploitation of **advanced computing and software** in support of our research and innovation and the use of large and complex datasets.
- Supporting and collaboration with industry as partners via our **campus, cluster, innovation and start-up incubation programmes**.
- Our expertise in designing, building and operating **national and international science infrastructure**, and active collaborations with leading international partner agencies and laboratories around the world.
- Playing a full part in supporting and delivering the quantum missions where they overlap with our capabilities and strategy priorities.

Strategic Themes

Our strategy identifies four strategic themes:

Building the Ecosystem:



Nurturing a thriving quantum community by providing access to our state-of-the-art facilities and fostering collaborations across our centres of excellence. This will ensure a continuous flow of knowledge and innovation, sustaining the UK's position as a world leader.

Science and Discovery:



Pushing the boundaries of science and exploring the limits of quantum computing and sensing, to accelerate the pace of QT evolution through co-supporting developments in science and technology in a 'virtuous circle'.

Accelerating Applications:

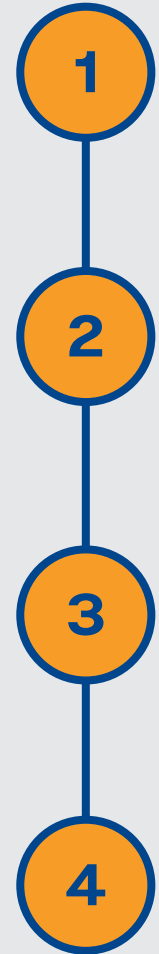


We will translate high-quality research into tangible societal and commercial benefits. Through supporting the adoption of quantum technologies, we aim to catalyse advancements that address urgent societal needs and contribute to global prosperity.

Materials, Devices, and Engineering:



Revolutionising the development and deployment of QT materials and devices is at the heart of our strategy. By enhancing capabilities in materials discovery, fabrication, characterisation, and process engineering, we will lay the foundations for next-generation quantum devices.



Skills for Quantum

STFC science programmes, facilities, and laboratories support development of skills for a **quantum-ready workforce** for academia, industry, the public sector and government. This includes our quantum-enabled apprenticeship programme, training for early career Quantum Technology practitioners, support for business workforce development and skills enhancement for a quantum-ready workforce.

