Frontier technologies: powering the UK’s digital innovation

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The UK is accelerating growth by developing six frontier technologies that strengthen digital capabilities and boost long-term competitiveness.

The UK is advancing a world-leading digital and technology sector underpinned by six frontier technologies. These priority areas play an essential role in strengthening national resilience, boosting productivity, and enabling innovation across the economy.

The UK Government has published its Modern Industrial Strategy in 2025, and in the accompanying Digital and Technology Sector Plan, the UK Government have identified six frontier technologies that will be prioritised. These technologies offer the greatest growth potential for the UK while also strengthening our national security and technological sovereignty.

1. Advanced Connectivity Technologies (ACT)
2. Artificial Intelligence (AI)
3. Cyber Security
4. Engineering Biology
5. Quantum Technologies
6. Semiconductors

1. Advanced Connectivity Technologies (ACT)

Advanced Connectivity Technologies are foundational to the UK’s digital economy, enabling secure, high-performance data transmission across sectors including transport, defence and future telecoms. ACT-linked activity accounts for around a quarter of the UK telecoms sector, generating an estimated £26.2 billion in revenue and £11.1 billion in global GVA. The UK has a globally competitive ACT research base, with strengths spanning 5G, future 6G, satellite and optical networks. Since 2022, government has invested over £300 million through programmes including theOpen Networks R&D Fund and Technology Missions Fund, alongside new national infrastructure such as the UK Telecoms Lab. Looking ahead, the government is committing £240 million to a four-year targeted ACT research programme and £130 million to strengthen lab and testbed infrastructure. By shaping international standards and securing spectrum ahead of World Radio Conference 2027, the UK aims to ensure future connectivity is open, secure, resilient and exportable.

2. Artificial Intelligence (AI)

Artificial intelligence is a transformative, economy-wide technology with the potential to reshape productivity, public services and scientific discovery. In 2023, the UK AI sector generated £14.2 billion in revenue, contributed £5.8 billion in GVA and employed 64,500 people. The UK is ranked first in Europe and fourth globally for AI capability and has attracted over £44 billion in private AI investment since July 2024.Through the AI Opportunities Action Plan, government has committed over £2 billion to expand compute, data and skills, including a £1 billion expansion of the AI Research Resource and up to £750 million for a new national supercomputer in Edinburgh. New AI Growth Zones will unlock large-scale AI infrastructure by streamlining planning and access to power. Alongside investment, the UK is progressing a pro-innovation regulatory and copyright

framework and committing to upskill 7.5 million people in AI by 2030, ensuring adoption across the economy.

3. Cyber Security

Cyber security underpins trust, resilience and growth in an increasingly digital economy. The UK cyber sector is world-leading, generating £13.2 billion in revenue, contributing £7.8 billion in GVA, and supporting 67,300 jobs in 2023-24. Exports have grown rapidly, reaching £7.2 billion in 2023, up from £4.2 billion in 2020. Government is strengthening this position by accelerating commercialisation and innovation through programmes such as CyberASAP, which has supported 34 academic spin-outs raising over £40 million to date. The Cyber Security and Resilience Bill, alongside the Cyber Growth Action Plan (published in 2025) will further strengthen market confidence. Investment includes £21 million to promote secure-by-design hardware based on CHERI architecture and the creation of the National Cyber Innovation Centre in Cheltenham, expected to catalyse £1 billion in private investment. Together, these measures will reinforce the UK's role as a global hub for trusted cyber security.

4. Engineering Biology

Engineering biology applies advanced biological design to create new products and more sustainable manufacturing processes across healthcare, agriculture and industry. Globally, engineering biology could deliver a £1.6–£3.1 trillion economic impact by 2040, with the UK recognised as the strongest ecosystem outside the US and China. The UK biotechnology sector attracted 40% of European VC investment and raised £3.7 billion in 2024, more than doubling year-on-year. The UK Government is investing £196 million in a National Engineering Biology Programme to support researcher-led innovation and £184 million in scale-up infrastructure to address manufacturing bottlenecks. Regulatory reform is central, supported by the Engineering Biology Regulators Network, regulatory sandboxes and the Genetic Technology (Precision Breeding) Act, which creates new routes to market for agritech. By combining long-term R&D investment, regulatory leadership and international collaboration, the UK aims to translate scientific strength into commercial success and sustainable growth.

5. Quantum Technologies

Quantum technologies - spanning computing, sensing and communications - offer transformative capabilities for healthcare, defence, energy and finance. The UK ranks second globally in quantum investment and has received over £1.1 billion in public funding since 2014 through the National Quantum Technologies Programme. Quantum computing alone could add £11 billion to UK GDP by 2045 and support over 126,000 jobs. Building on this foundation, the UK Government is launching an ambitious long-term programme with a goal of securing 15% of the global quantum market by 2033. This includes £670 million to support quantum computing development and a 10-year funding commitment for the National Quantum Computing Centre. Five National Quantum Missions will drive adoption in areas such as NHS diagnostics, navigation and secure communications. Through sustained investment, early-adopter markets and strong international partnerships, the UK is accelerating the journey from research excellence to real-world impact.

6. Semiconductors

Semiconductors are critical enablers of AI, advanced connectivity, clean energy and modern electronics. In 2022, the UK semiconductor sector generated £9.6 billion in revenue, contributed £7.4 billion in GVA, and employed around 15,000 people, with productivity of approximately

£460,000 GVA per employee. Revenues are projected to reach up to £17 billion by 2030. Rather than pursuing mass manufacturing, the UK's strategy focuses on areas of comparative advantage, including chip design, compound semiconductors and photonics. The UK Government is establishing a UK Semiconductor Centre with up to £19 million to provide sector leadership, alongside £25 million for new Innovation and Knowledge Centres and £35 million to strengthen the skills pipeline. Strategic investments, such as a £60 million National Wealth Fund stake in Pragmatic Semiconductor, aim to reinforce supply-chain resilience while positioning the UK as a trusted partner in the global semiconductor ecosystem.

Ready to engage with the UK's frontier technology ecosystem? Contact us at investinuk.jp@fcdo.gov.uk

https://www.gov.uk/government/news/frontier-technologies-powering-the-uks-digital-innovation