

Quantum technologies:

How to prepare your organization for a quantum advantage now

Quantum technologies



Quantum computing

Use of quantum properties to perform computations.



Quantum comms and security

Transmitting and controlling information using laws of quantum mechanics in the most secured manner

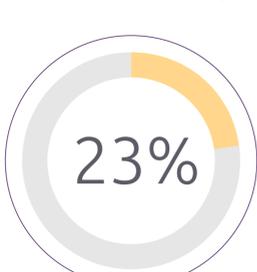


Quantum sensing

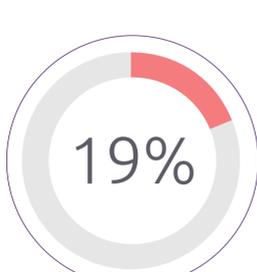
Use of quantum properties or phenomena to measure a physical quantity with high precision

Advances in quantum technologies are gathering pace

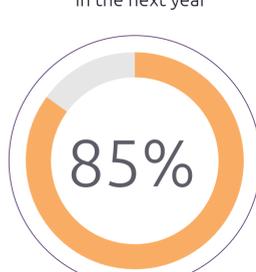
Nearly one in four organizations are working with, or planning to work with quantum technologies



Nearly one in five organizations believe early commercial applications will arrive within five years

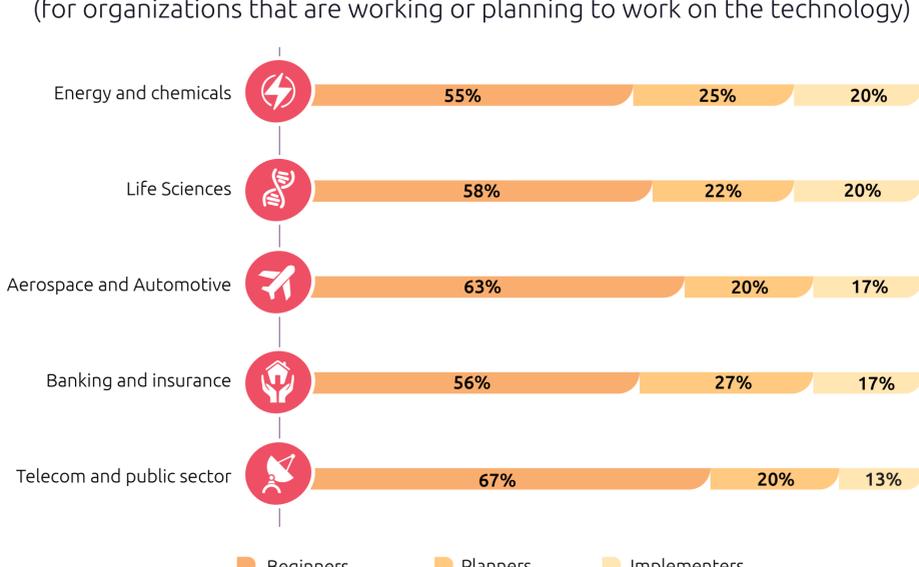


85% of the organizations working/planning to work with quantum expect to increase investments in the technology in the next year



Energy and chemicals, Life Sciences, and Aerospace & Automotive lead in quantum implementation

State of quantum technology implementation by industry (for organizations that are working or planning to work on the technology)



Source: Capgemini Research Institute survey, N=200 organizations working or planning to work on quantum technologies

Note: The data points are directional in nature.

Definitions:

Implementers: Organizations which are conducting experiments with quantum technologies

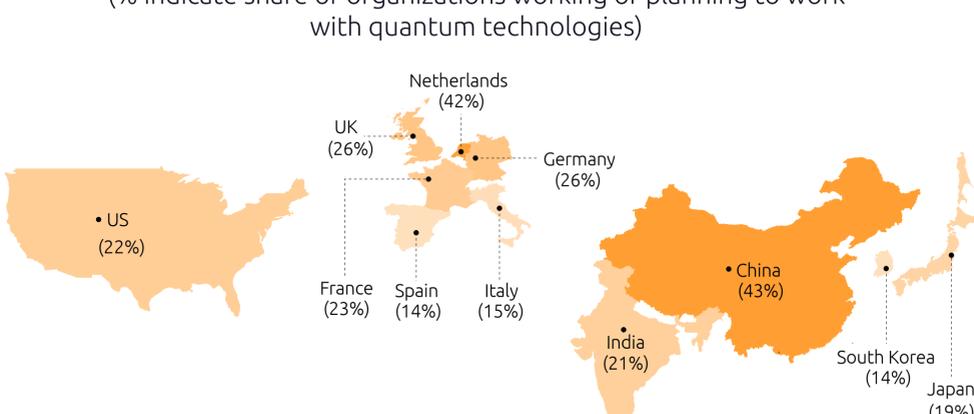
Planners: Organization which have identified the right problems and are now integrating quantum technologies in their tech/R&D agenda/roadmap.

Beginners: Organizations which are identifying the right problems to solve with quantum technologies or started the research to understand their fundamentals.

China and the Netherlands have the largest share of companies working on or planning to work on quantum technologies, well ahead of Germany and the UK

Quantum technology adoption by country

(% indicate share of organizations working or planning to work with quantum technologies)



Color gradient from light to dark indicate weak to strong adoption, respectively.

Organizations are already securing their critical infrastructure and information using quantum



BT and Toshiba have collaborated to deploy a quantum-secure network, based on the QKD system. The system was deployed to generate thousands of quantum-secure cryptographic keys per minute over **6 km of fiber-optic cable, with a range extending up to 120 km.**¹

Netherlands-based **KPN** ran test traffic between Delft and the Hague using QKD from a central node in Rijswijk.

Current range between the nodes is **150 km, but KPN is aiming to upgrade the system to reach 250 km.**²



58% of organizations are waiting for standards to emerge before prioritizing quantum-safe security, yet solutions are already available

¹BT press release, October 1, 2020.

²Capacity Media, "KPN aims for quantum-secure network across Netherlands on existing fiber," July 6, 2021.

Several industries stand to be revolutionized with the next generation of quantum sensors



Quantum Gravimeters for prospecting or surveying land or water



Sensors and Oscillators for GPS-free navigation



Magnetometers for biomedical imaging



Quantum sensors for process control and safety

How can your organization prepare for the quantum advantage now?

Assess the potential of quantum technologies for your business

1

Translate the most potent use cases to small-scale quantum algorithms that can run on today's hardware, to demonstrate future value

2

Build a small team of experts

Strike long-term partnerships with technology providers to tide over technical obstacles

3

Develop a long-term strategy to scale up the talent and skill base

4

5

The road to quantum advantage

Source: Capgemini Research Institute analysis.

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