

Close to S\$300 million invested to drive Singapore's National Quantum Strategy over five years

A National Quantum Strategy (NQS), with funding of close to \$300 million from Singapore's Research, Innovation and Enterprise 2025 (RIE 2025) plan, has been launched to strengthen Singapore's position as a leading hub in the development and deployment of quantum technologies over the next five years.

Funded by the National Research Foundation, Singapore (NRF), the NQS comprises four Funding Initiatives (FIs), namely the Centre for Quantum Technologies (CQT), the Quantum Engineering Programme 3.0 (QEP 3.0), the National Quantum Processor Initiative (NQPI), and the National Quantum Scholarships Scheme (NQSS).

Under the NQS,

- The Centre for Quantum Technologies (CQT) that was a research centre of excellence¹ hosted by the National University of Singapore, will be elevated to a flagship national research centre.
- A new National Quantum Sensor Programme will be established under QEP 3.0, while existing national-level quantum programmes² will enhance their current suite of capabilities to meet industry needs.
- A new National Quantum Processor Initiative (NQPI) will be set up to enable Singapore to design and build its own practical quantum processor.
- The National Quantum Scholarships Scheme (NQSS) will be launched to develop Singapore's talent pipeline in quantum research & development (R&D).

¹ [About the Centre for Quantum Technologies](#): The Centre for Quantum Technologies (CQT) in Singapore brings together physicists, computer scientists and engineers to do basic research on quantum physics and to build devices based on quantum phenomena. CQT was established in December 2007 by Singapore's National Research Foundation and Ministry of Education under the Research Centres of Excellence programme. CQT is hosted by the National University of Singapore (NUS).

² [NQO programmes](#): Existing national-level quantum programmes include the Quantum Engineering Programme (QEP), the Centre for Quantum Technologies (CQT), the National Quantum Safe Network (NQSN), the National Quantum Computing Hub (NQCH), and the National Quantum Federated Foundry (NQFF).

Singapore's National Quantum Strategy (NQS) and the National Quantum Office (NQO)

Supported by NRF, the NQS is driven by the National Quantum Office (NQO), hosted by the Agency for Science, Technology and Research (A*STAR). The NQO serves as the Programme Office to manage and coordinate quantum RIE activities in Singapore, and NQO has developed the NQS under the guidance of the National Quantum Steering Committee.

There are four strategic thrusts under the NQS:

- i. **Scientific Excellence**
- ii. **Engineering Capabilities**
- iii. **Talent**
- iv. **Innovation & Enterprise Partnerships**

More details on the four strategic thrusts as follows:

i. Scientific Excellence

The first thrust focuses on bolstering scientific excellence in high impact areas of quantum research, such as quantum communications and security, quantum processors, and quantum sensing.

The Centre for Quantum Technologies (CQT) was established in December 2007 as Singapore's first Research Centre of Excellence hosted by the National University of Singapore. Under the NQS, the CQT will be elevated to a flagship national R&D centre for quantum technologies, to coordinate research talent across the country.

The Centre will have nodes at different institutions, including A*STAR, the National University of Singapore (NUS), Nanyang Technological University, Singapore (NTU), Singapore University of Technology and Design (SUTD) and others, to conduct investigator-led research that positions Singapore at the forefront of scientific enquiry and innovation. CQT will also train scientists and engineers undertaking PhD and Master-level degrees.

ii. Engineering Capabilities

The second thrust focuses on strengthening Singapore's engineering capabilities in quantum technologies, to accelerate the translation of quantum research into real world solutions.

The following national-level quantum programmes serve as focal points to drive translational quantum activities:

- ***NEW*** A new **National Quantum Sensor Programme (NQSP)**, will be established to enhance the Quantum Engineering Programme – Singapore's translational vehicle for quantum research outcomes. Research performers and industry partners will collaborate on industry-

centric research projects in the focal areas of Position, Navigation & Timing (PNT), Biomedical Sensing & Imaging, and Remote Sensing. These research projects can be applied in a wide variety of areas, such as environmental monitoring, civil engineering, precise navigation systems, and biomedical imaging & sensing, and will provide further economic opportunities for Singapore.

- ***NEW*** A new **National Quantum Processor Initiative (NQPI)** will also be set up to build local capabilities in the design and build up of Singapore's own quantum processor(s). This ensures that Singapore develops and retains key capabilities in an internationally competitive environment. The quantum processor(s) expected to result from this programme will be made accessible to researchers and collaborators through the National Quantum Computing Hub.
- The National Quantum Federated Foundry (NQFF) will own and operate fabrication tools essential to the design, fabrication and characterisation of critical quantum components and technologies. NQFF will also play an important role in supporting the technical needs of other national-level quantum programmes, including the new NQSP and NQPI.

To further quantum engineering capabilities and the development of innovative quantum technologies, NQO will also launch thematic grant calls with a focus on three main application areas: **Quantum Communications & Security, Quantum Processors, Computation & Simulation, and Quantum Sensing & Metrology**. These thematic grant calls will be open to researchers in A*STAR and the Autonomous Universities.

iii. Talent

The third thrust aims to attract, develop, and retain talent to support quantum research and commercialisation.

Talent is a fundamental enabler of the National Quantum Strategy, and the key to realising Singapore's quantum vision. A National Quantum Scholarships Scheme (NQSS) will be set up to develop a pipeline of up to 100 PhD- and 100 Master-level talent over the next five years to meet industry and research needs in Singapore, and build a quantum-ready workforce that can tap on the potential of quantum technologies.

iv. Innovation & Enterprise Partnerships

The fourth thrust centres on building a vibrant and resilient quantum industry, with the national-level quantum programmes anchoring company partnerships and ecosystem development.

NQO leverages the national-level quantum programmes to drive industry partnerships and enable the growth of the quantum ecosystem, including the nurturing of startups in quantum technologies.

- The National Quantum Computing Hub (NQCH) will strengthen its innovation & enterprise partnerships and ecosystem-building efforts. The NQCH will drive synergistic partnerships with industry (solution providers), end-users (to derive industry problem statements) and the research ecosystem in quantum computing. For a start, the NQCH will strengthen its expertise in the use of quantum computing to support the translation of quantum R&D into solutions for use cases in Finance, Drug Discovery and Development, and Logistics³.
- The National Quantum Safe Network (NQSN) will evolve into a testbed for continued scientific and engineering research in quantum communications by public and private sector end-users, and complement the NQSN+ initiative under the Infocomm Media Development Authority (IMDA)⁴. The NQSN Testbed will provide a comprehensive suite of facilities for supporting Singapore's research into free-space⁵ and fibre-based⁶ quantum communications.

NQO will continue to support companies in the following ways:

- Foster partnerships with the national-level quantum programmes and public agencies that could meet their quantum R&D needs,
- Help companies develop a translation plan with the relevant research performer,
- Develop a collaboration and business model for companies anchoring in Singapore, and
- Collaborate on use-case development for quantum technologies.

Companies keen to collaborate with the national-level quantum programmes and other research performers in the local ecosystem can reach out to the National Quantum Office (NQO): <https://nqo.sg/contact-us/>.

³ For instance, in Finance, quantum algorithms can be used to optimise portfolio weights to achieve a pre-defined investment outcome. In Drug Discovery and Development, quantum simulations using quantum chemistry and computational biology can be used to model novel therapeutic drug molecules. In Logistics, quantum computing using combinatorial optimisation can be used to optimize the delivery routes of a fleet of vehicles to service a set of customers while minimising transportation costs.

⁴[Singapore launches Southeast Asia's first quantum-safe network infrastructure to help businesses tap on quantum-safe technologies](#)

⁵ Free-space quantum communications can enable long-distance, quantum-secured communication and large-scale networking with existing technologies. In particular, free-space quantum communications have the unique advantages and prospects for practical large-scale application, as it does not require a material medium to conduct or transmit information.

⁶ Fibre-based quantum communications leverages optical fibre, which can enable long-distance, quantum-secured information transfer between metropolitan areas, and is a major advance towards building the future quantum internet.

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About the National Quantum Office (NQO)

The National Quantum Office (NQO) was established with the support of the National Research Foundation (NRF) to drive the development and implementation of the Research, Innovation and Enterprise (RIE) strategy for Quantum in Singapore. The Office was set up in April 2022 and is hosted by A*STAR, the Implementing Agency for Quantum. NQO, as a control tower, supports fundamental and translational research in Quantum through various strategic programmes that it oversees. It partners both public and private sectors to create a vibrant RIE quantum ecosystem in Singapore. For more information, visit <https://nqo.sg>.

About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector R&D agency. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit the economy and society. As a Science and Technology Organisation, A*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by improving societal outcomes in healthcare, urban living, and sustainability. A*STAR plays a key role in nurturing scientific talent and leaders for the wider research community and industry. A*STAR's R&D activities span biomedical sciences to physical sciences and engineering, with research entities primarily located in Biopolis and Fusionopolis. For ongoing news, visit www.a-star.edu.sg.

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About the National Research Foundation, Singapore (NRF)

The National Research Foundation, Singapore (NRF), set up on 1 January 2006, is a department within the Prime Minister's Office. The NRF sets the national direction for research and development (R&D) by developing policies,

plans and strategies for research, innovation and enterprise. It also funds strategic initiatives and builds up R&D capabilities by nurturing research talent.

Learn more about the NRF at www.nrf.gov.sg.