Preamble

During a two-day planning workshop, the leadership team met to develop the 2027 Annual Plan and inform the Centre rebid strategy. These discussions were complemented by consultations with a range of stakeholders from academia, industry, government and the wider innovation ecosystem to identify New Zealand's emerging opportunities and priorities in photonics and quantum technologies. A clear outcome of these discussions was the need for a mission-led framework that integrates world-leading research, talent development, industry engagement and national impact. The research missions outlined below have therefore been identified as strategic themes to guide the 2027 new ideas process, support the development of the rebid, and help shape the emerging New Zealand Innovation and Advanced Technologies (NZIAT) platform. Together, these missions provide a framework for prioritising research investment, fostering collaboration across the ecosystem, and positioning Aotearoa New Zealand to capitalise on future opportunities in critical technologies.

Mission (from the mid-term review)

To advance globally distinctive research into photonic and quantum technologies to future-proof critical capabilities and infrastructure for Aotearoa's economy and well-being.

Vision

To establish Aotearoa New Zealand as a globally recognised leader in photonics and quantum technologies, where world-class science, exceptional talent, trusted partnerships, and innovative industries create lasting economic, societal, environmental and cultural benefits.

We envision a nationally connected ecosystem that brings together researchers, industry, government, communities and Te Ao Māori to translate scientific discovery into real-world impact. Through this ecosystem, New Zealand will develop the knowledge, people and technologies needed to address major challenges in communication, health, sustainability, energy and economic resilience.

Research missions

Our mission areas focus research effort on the challenges and opportunities where photonic and quantum technologies can deliver the greatest benefit to Aotearoa New Zealand, while strengthening the talent, partnerships and innovation pathways needed for long-term impact.

Our research is focused on five mission areas. We are aiming to **support Photonic and quantum technologies** for:

A: Fast, secure and resilient communications, including technologies that enable the future of space-based and global communication networks.

B: Quantum computing, helping establish the foundational technologies required for next-generation computing and sensing.

C: Health diagnostics and outcomes, enabling earlier, more accurate and more accessible detection and monitoring of disease and improved surgical outcomes.

D: Monitoring the environment, climate and agriculture, supporting evidence-based management of New Zealand's built environment, natural resources and food production systems.

E: Renewable energy and advanced materials, accelerating the transition to sustainable energy systems and enabling new technological capabilities.

Long-term outcomes

Through these mission areas, we will:

- Generate internationally leading science and technology.
- Develop a highly skilled workforce of researchers, innovators and entrepreneurs.
- Create new opportunities for New Zealand industry and high-value economic growth.
- Strengthen New Zealand's capability in critical and emerging technologies.
- Support evidence-based responses to challenges in health, sustainability, food production, energy and security.
- Build public trust and understanding of emerging technologies through responsible and inclusive innovation.
- Position New Zealand as a globally connected hub for photonic and quantum research, innovation and talent.

New Zealand’s Customer/Industry Need

In 2025, the Centre conducted a series of “Quantum Meets” inspired by the efforts of Australia’s former Chief Scientist, Dr Cathy Foley. Workshopping with stakeholders in the infrastructure, space, sustainability, health and agriculture industries, some clear needs were identified. These are summarised below, along with a list of industries of particular interest that are adopting photonic and quantum technologies abroad.

- Predictive modelling in infrastructure
- Mature quantum timing solutions, low size, weight and power (SWaP) sensing and other technologies for resilience and security.
- Agriculture, health and environmental monitoring companies seeking to access time on a quantum computer for optimisation, problem simulation
- Post quantum security.

Key customer segments

Quantum computing companies, defence, infrastructure, telecommunications, space, finance, energy, health, agriculture. These are all in need of sensing, optimisation, computing and simulation, as well as security components and systems.

Success will be measured not only by scientific excellence, but also by the tangible impact of our research: improving lives, strengthening communities, enabling new industries, and helping create a more sustainable, resilient and prosperous future for Aotearoa New Zealand.