UNIVERSITY OF AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

KOI TŪ:
THE CENTRE FOR
INFORMED FUTURES

Foresight and technology assessment

Long-term opportunities and challenges for Aotearoa New Zealand

Briefing for the incoming Prime Minister and Government

October 2023

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Introduction

In a period of unprecedented technological change Aotearoa New Zealand lacks the capacity to anticipate the implications for society, the environment and the economy of emerging technologies. New Zealand needs to follow the lead of other nations in putting in place standardised mechanisms for the assessment of future technology challenges and opportunities.

Key points

- Anticipatory foresight is a toolkit that can be used in policy development in place of traditional scenario-based futures thinking.
- Rapidly advancing technologies require thorough assessments. Technology assessment is a systematic and comprehensive analysis of the potential benefits and risks of a technology.
- Technology assessment examines social, economic, environmental, national security and ethical implications and helps technology-investment decisions.
- Technology assessment can help engage the public in discussions about new technologies and achieve social license.
- New Zealand's technology assessments tend to be *ad hoc* and are largely confined to the Ministry of Foreign Affairs and Trade, the Ministry of Business, Innovation and Employment and the Department of the Prime Minister and Cabinet.
- New Zealand relies on partner assessments and impact analysis that lack local context.
- New Zealand has no formal mechanism for disseminating assessments to key stakeholders or a governance framework to provide oversight.
- **There is an urgent need for a national foresight and assessment unit to fill this gap.**

Context

Foresight

- Foresight has moved away from traditional futures approaches and scenario framings that have limited use.
- Anticipatory foresight takes a systems-level view of desirable and undesirable future influences and devises actions that promote positive outcomes.
- It uses diverse inputs and takes account of mega-trends and local factors.
- Anticipatory foresight has a role in all aspects of policy development.
- It overlaps with risk analysis and technology assessment, both of which are deficient in New Zealand, and mitigates against short-term thinking.

Technology assessment

- Technology assessment is a systematic way of identifying and evaluating potential effects of a technology or technological development. It draws on methods and concepts from science, engineering, economics, sociology and ethics.
- Technology assessment aids decision-making about the development, deployment and use of emerging technology, can raise awareness of technology effects and promote public participation in decisions about new technologies.
- Technology assessment can help establish a baseline of risks and benefits in a local context.
- Its core objective is to provide evidence to guide the governance of new and emerging technologies taking account of technology trends and societal views.

- Technology assessments can range from literature reviews to convening and consulting with relevant experts, modelling and simulation.
    - Established technology assessment centres include the OECD's Technology Assessment Program and the European Commission's Joint Research Centre.

Emerging technologies

- Governments are grappling with the potential benefits and risks of several key emerging technologies to determine how best to regulate and promote their development and use.
- The constantly changing technology landscape calls for agility and adaptability of response to maximise the benefits and minimise the risks of adoption.
- Artificial intelligence is under review globally with both opportunities and risk requiring consideration.
- Quantum technology, which applies the power of quantum mechanics to problems too complex for traditional computers, is among other technologies in the assessment queue (see Box 1).

Box 1: The quantum revolution

Quantum computing has potential for combating climate change and disease, creating new industries and jobs but also can undermine financial security and privacy.

Globally, nations including the US, China, UK and the European Union are leading quantum technology research, while computing companies Microsoft and IBM are testing real-world applications of the technology.

Potential applications include:

- Using quantum computers for the development of new drugs, the design of new materials and creation of new encryption algorithms.
- Quantum sensing, which could be the basis of new medical imaging devices and navigation systems and could be used to detect gravitational waves.
- Quantum communications, which could be used to create secure and tamper-proof communication channels.

The University of Otago's Dodd-Walls Centre for Photonic and Quantum Technologies is home to world-class quantum expertise but New Zealand could take better advantage of the technology's economic opportunities and do more to mitigate its risks.

Although on the sidelines of the AUKUS security pact between Australia, the UK and US, a consideration in evaluating New Zealand's possible future AUKUS involvement is the alliance's focus on quantum as a key technology. Assessment of our relationship with AUKUS should include economic and social consequences as well as the geostrategic and defence outcomes.

New Zealand context

- In New Zealand foresight activities and technology assessments are carried out by several government agencies each with bespoke roles and responsibilities.
- Technology assessment tends to be resource-intensive and New Zealand's expertise is limited and dispersed across agencies. It is often *ad hoc* and reactive, typically in response to a national security concern related to an emerging technology or application.
- There is no established governance or policy framework to provide technology assessment oversight resulting in duplication of effort by different agencies or assessments that are too narrow for application elsewhere.

- Rather than repeat the retrospective policy and regulation exercise done for the country's new space industry, we need to be proactive to get the full benefits of the technology sector. Such technologies as artificial intelligence, quantum, synthetic biology and the evolving information environment will extend across all sectors demanding a systematic co-ordinated approach.
- Given New Zealand's size and reliance on trade and international investment, establishing robust technology assessment processes will help ensure our interests and values are reflected in the development and implementation of technology. Technology assessment also helps provide strategic intelligence for purposes such as drafting Long-Term Insights Briefs (LTIB).
- A dedicated Technology assessment unit would be a national asset that could better link to the international technology assessment community.

Actions for consideration

- **Do a state-sector stocktake to determine the capability, resources and mechanisms for anticipatory foresight and technology assessments and identify strengths and capability gaps.**
- **Determine the key requirements for a national unit (either within or without government) for foresight and technology assessment.**
- **Conduct a stakeholder assessment to identify government, academic, industry and public expectations of a technology assessment unit.**
- **Establish a cross party governmental group to regularly review technology assessment and their implications for Aotearoa New Zealand.**

References

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Koi Tū: The Centre for Informed Futures is a research centre and an independent, non-partisan think tank at Waipapa Taumata Rau, University of Auckland with associate members across New Zealand and the world.

We address critical long-term national and global challenges arising from rapid and far-reaching social, economic, technological, and environmental change.

Our name, Koi Tū, was gifted by Ngāti Whātua Ōrākei. It means 'the sharp end of the spear'. Like our namesake, Koi Tū aims to get to the heart of longterm issues challenging our future.

This document was developed as part of a comprehensive briefing to the incoming prime minister and government. The full document is available informedfutures.org/briefing-to-incoming-government-2023

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We engage with people and organisations focused on the long-term development of New Zealand, and on core issues where trustworthy and robust analysis can make a real difference.

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