

Towards a Digital Strategy for Aotearoa – REANNZ response

REANNZ is excited for the opportunity to contribute to the discussion on *Towards a Digital Strategy for Aotearoa* (the Digital Strategy). The development of a digital strategy for the benefit of all New Zealanders presents an opportunity for cross sector collaboration to support the proposed vision, goals and measures outlined in the discussion paper.

Digitalisation is bringing change to all parts of the community, including the Research, Science and Innovation (RSI) and Education sectors that we support. This convergence of science and technology is creating a demand for new skills to drive the growth of R&D in New Zealand and REANNZ contributes to this through our participation in the sector.

REANNZ is in a unique position to support the Digital Strategy through our role as New Zealand's NREN (National Research Education Network). NRENs provide networks designed for high performance to meet the unique needs of research communities. But NRENs are more than a network, they are a community of over 122 connected entities with the goal of working together to support the global RSI and education sectors. This non-competitive approach allows the NREN community to deliver solutions that enable the cross-sector interaction and collaboration that underpins these sectors.

Responses to questions:

Q: What do you think of the proposed vision, goals and measures?

REANNZ is supportive of the opportunities and success factors outlined in the Digital Strategy discussion document.

However, we note the specific capabilities of the RSI sector are missing from this initial thinking. For example, **Pillar 3 Mahi Aki - Growth** talks about a vibrant tech sector from a commercial perspective only, omitting the RSI sector that underpins a thriving tech sector.

We believe there is an opportunity to broaden the discussion to include the RSI sector for three reasons:

1. One way the RSI sector delivers value to New Zealand is through delivering a pipeline of innovations and ideas that drive research and development both nationally and globally. Because of this, the sector is intrinsically linked to the vision, goals and measures outlined in this document.
2. Current investment - in 2020 the level of investment in the RSI sector was over \$4.5bn an increase of 90% from 2010¹. Of this c40% was from Universities, Crown Research Institutes and government agencies. Ensuring the right digital infrastructure is in place to realise the benefit from these investments is key.

¹ <https://mbienz.shinyapps.io/research-science-innovation-report/>, Figure 1 page 10.

3. Digitisation of science and research - science is being digitalised at pace and the resultant impact on Government policy and investment must be considered. A 2020 report² from the OECD stated:
- Digitalisation is bringing change to all parts of science, from agenda setting, to experimentation, knowledge sharing and public engagement.
 - Greater policy coherence and trust between research data communities are needed to increase sharing of public research data across borders.
 - Co-operation is required to build and provide access to cyber-infrastructure internationally³.
 - Governments should also support platform technologies for science, such as distributed research and development networks, and storage for digital/genetic data. Room exists to better exploit advanced digital technologies in science.

This convergence of science and technology is creating a demand for new skills to drive the growth of R&D in New Zealand. The Research Science and Innovation Report states that “Increasing the R&D workforce is essential to achieve the government’s goal of growing R&D to 2 per cent of GDP by 2027⁴.” Acknowledging this REANNZ supports the focus on inclusion and growth objectives as outlined in the Digital Strategy.

Q: How could these be improved?

REANNZ recommends the inclusion of an additional success factor to assess the impact of the digital strategy for New Zealand. That is:

- The RSI sector is underpinned by digital infrastructure that grows meaningful local and global collaboration.

This can be measured using existing capability⁵ to monitor the changing scope of science collaborations and their impact towards supporting a digitally enabled New Zealand. Today’s RSI outcomes are the result of much broader collaboration, often on a global scale, evidenced by this example from the OECD report “...digitalisation is making science more collaborative and networked. In 2015, for instance, researchers working on the Large Hadron Collider published a paper with a record-breaking 5,154 authors⁶.” Digitalisation makes collaboration on this scale possible, in an increasing number of areas that have direct impact on the wellbeing and capability of New Zealanders to participate and contribute to new discovery and economic opportunity.

² <https://www.oecd.org/going-digital/digitalisation-of-STI-summary.pdf>

³ REANNZ currently supports international collaboration for high volume data transfer to enable the RSI sector <https://www.reannz.co.nz/about/nrens/>

⁴ Above n1, page 83.

⁵ Using NZRIS capability - <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/research-and-data/nzris/>

⁶ <https://www.oecd.org/going-digital/digitalisation-of-STI-summary.pdf>, page 9

Pillar 1: Mahi Tika - Trust

Q: What do you think about the issues and opportunities for trust?

REANNZ is supportive of both the issues and opportunities.

Q: What do you think of the immediate priorities, as outlined?

REANNZ is supportive of the immediate priorities outlined in the consultation document. We would like to comment on three of the immediate priorities:

Priority 9 - Digital Identity: REANNZ wants to ensure that work to establish a “digital identity infrastructure” is not done in isolation but is aligned with existing protocols and federations already in use.

REANNZ runs a national identity federation service “Tuakiri”⁷ that allows an end-user to consume services, access resources, and otherwise collaborate within New Zealand (globally via eduGAIN) while using their home institution’s identity. This means that the end-user does not require a unique identity with every remote organisation that they are working with, simplifying collaboration as the service being accessed gets a trusted identity that has been verified by the home organisation.

This capability is in use across New Zealand RSI and education sectors, some examples of how this capability is used today are:

- Researchers - ORCID researcher registry. A global registry that identifies each researcher, making it easier to distinguish the work of one researcher from another with the same, or a similar, name.⁸
- Academic credentials - accepted internationally and with every major Australian and New Zealand university participating, My eQuals is the trusted platform for viewing, sharing and verifying tertiary credentials. This allows New Zealand graduates achievements to be recognised wherever in the world they want to work or study⁹.

Today the existing Tuakiri capability is limited to the RSI and higher education sectors, but that does not necessarily have to be the case going forward. REANNZ would welcome the opportunity to discuss how Tuakiri could potentially be used more widely across New Zealand. For example, Tuakiri could be used to provide federated identity services to schools in support of lifelong learning objectives.

Priority 1 Digital Government for a Digital Society and Priority 11 International

Agreements: REANNZ is very supportive of the use of international agreements to build trust and drive global collaboration. REANNZ is a National Research Education Network (NREN) and is part of a principle-based network that links over 120 NREN’s globally. As an

⁷ <https://www.reannz.co.nz/products-and-services/tuakiri/>

⁸ <https://www.royalsociety.org.nz/orcid-in-new-zealand/what-is-orcid>

⁹ <https://www.myequals.edu.au/>

NREN REANNZ has access to services developed for the community designed to enable connectivity and facilitate collaboration across the RSI and education sectors.

Today these services are focused on the RSI and higher education sector, but this is not the case across other NRENs where they are used to deliver a country wide impact. This is achieved by enabling the digitalisation of the Government sector with benefits such as reducing digital inequity across school children. Examples of where REANNZ's existing services can be used to add more value are:

- eduroam - a free, secure, world-wide wifi service. It provides researchers, staff and students from participating institutions the ability to roam and access free wifi services. Today, 30 New Zealand institutions are using and providing eduroam with up to 18,000 unique devices connecting in New Zealand each month. This capability has been used by HEANet¹⁰ (Ireland's NREN) to reduce digital inequity across school children. It has also been used by JISC¹¹ (UK's NREN) to enable movement of government workers between sites - more detail of how this service has been used to integrate health and social care is in our responses to **Pillar 2 Mahi Tahi - Inclusion**.
- eduGAIN - enables researchers, educators, and students to collaborate with their colleagues and access applications, tools and datasets in other countries. Using eduGAIN¹² researchers can connect in 73 different countries to over 8,000 entities through its global federation of national identity federations.

Pillar 2: Mahi Tahi - Inclusion

Q: What do you think about the issues and opportunities for Inclusion Mahi Tahi?

REANNZ is in full support of the goal to make sure that all New Zealanders are connected. For the RSI sector digital inclusion is key, particularly across school children as they are the future talent pipeline for our Universities and Crown Research Institutes. As discussed above, eduroam and associated services are a key national capability that can be used to deliver initiatives for digital inclusion. HEANet's "eduroam everywhere" initiative is an example that demonstrates how this capability can be deployed widely for the benefit of the community with the support of Government agencies.

Q: What do you think of the immediate priorities, as outlined?

We are supportive and would like to comment on one of the immediate priorities.

Priority 1 Reliable and resilient infrastructure: The infrastructure that underpins the RSI sector has extended over time to enable access for New Zealanders to both national and international connectivity.

¹⁰ <https://www.heanet.ie/>

¹¹ <https://www.jisc.ac.uk/>

¹² <https://technical.edugain.org/entities>

- Considerable investment has been allocated to develop digital infrastructure in the 2021 Budget. Under the Strategic Science Investment Fund - Infrastructure category, REANNZ received additional funding. The funding has been allocated as a part of the Enabling Digital Research: Securing Core Network Infrastructure for the Research and Education Sector initiative. The additional funding will enable REANNZ to review and futureproof the network and the above network offering we support.
- REANNZ is an anchor tenant of the Hawaiki cable system, the procurement of which was centrally funded via REANNZ. This investment provided a second international cable that created competition in the market, increased capacity and reduced international connectivity costs for all New Zealanders.
- Internationally, the REANNZ network connects directly into the US, Australia, Hawaii and Guam. Guam is a landing point for multiple subsea cable systems and hosts the GOREX (Guam Open Research & Education Exchange) that offers a rich array of NREN connectivity and services, especially into Asia. Supporting systems like the GOREX peering exchange allows for traffic to easily transverse partnering networks to reach its global destination. Through the network, REANNZ members have direct access to this community of innovative people and research organisations, as well as the technologies and tools supported by NRENs around the world. This in turn supports growth and opportunity for collaboration. These direct paths have been used to support collaboration and the sharing of radioastronomy data with overseas organisations like NASA.

Q: What might we focus on in the longer term?

We believe that there are opportunities for REANNZ to increase its impact for New Zealand by supporting the objectives of the Government’s digital strategy and expanding into areas where our unique position as an NREN can add value on behalf of public good. Below are examples from other NRENs that show how Governments’ have leveraged the NREN capability they support to drive their digitalisation strategies.

1. GovRoam¹³ - the UK Government use their national version of Tuakiri and eduroam capability to enable government workers to move seamlessly between Government sites. The following case studies show how this connectivity has enabled the digitisation of Government services:
 - **Integrating Health & Social Care using GovRoam** - for the Mid Yorkshire Hospitals NHS Trust and Wakefield Council, the ability to connect seamlessly at GovRoam enabled locations was key to their vision of connecting health and social care, as it allows multidisciplinary teams to work effectively across the district¹⁴.

¹³ <https://www.jisc.ac.uk/govroam>

¹⁴ <https://repository.jisc.ac.uk/8084/1/integrating-health-and-social-care-in-wakefield-using-govroam.pdf>

- **How GovRoam simplifies multi-site working in Kent** - from libraries to fire stations and from council offices to community centres, Kent public sector staff can connect effortlessly across multiple sites¹⁵.
2. eduroam everywhere¹⁶ - in Ireland their national version of Tuakiri and eduroam are used in tandem to reduce digital inequity across school children by enabling “eduroam everywhere.” This allows children to access the internet and school systems at school, at libraries and even on buses. The ambition of this programme is to ensure that no matter what the circumstance, every student has the opportunity to access the resources that they need to succeed.

REANNZ would welcome the opportunity to discuss these services and the impact they may have in supporting a Digital Strategy for New Zealand.

Pillar 3: Mahi Ake - Growth

Q: What do you think about the issues and opportunities for growth?

The importance of continued support of and investment in digital infrastructure cannot be understated. For reliable and fit for purpose service, whether you are at home connecting with friends and family online, a student on campus accessing resources, or a researcher transferring terabytes worth of data at scale in the support of research collaboration – digital technologies enable growth across all communities of New Zealand.

REANNZ supports the need to enable vibrant international connections. As an NREN, REANNZ’s key purpose and value is to facilitate international research collaboration – research that is supported by the network, digital technologies, expertise and has substantial impact for all New Zealanders. Having an aligned digital strategy and access to new opportunities through technology enables people to participate in international research while still residing in New Zealand. Digital connection is facilitated by REANNZ and acts as a solution to support global participation. In a carbon constrained world where travel may become more selective, digital connection is our solution to physical isolation. Access to international skills augment New Zealand’s workforce and provide opportunity and innovation. Promoting New Zealand’s research involvement with international science and innovation partners better connects New Zealand’s science system to the rest of the world.¹⁷ The research, science and innovation sector are a key element of New Zealand’s growth as suggested in the REANNZ recommendation above to include an additional success factor to assess the impact of the digital strategy for New Zealand (page 2).

Q: What do you think of the immediate priorities as outlined?

¹⁵ <https://repository.jisc.ac.uk/7993/1/how-govroam-simplifies-multi-site-working-in-kent.pdf>

¹⁶ <https://www.heanet.ie/services/connectivity/eduroam-everywhere>

¹⁷ <https://www.mbie.govt.nz/science-and-technology/science-and-innovation/international-opportunities/international-science-partnerships/>

Digital Technologies Transformation Plan: The focus on supporting the growth of the digital technologies sector is defined as “*businesses whose core activity is creating and selling digital solutions.*” These businesses and opportunities are also being developed from within the RSI sector, with firms in this sector more likely to invest in R&D and expansion than the New Zealand average. Members of the sector are proactively seeking opportunities in new digital markets and supporting them here in New Zealand. For example, New Zealand universities establishing research, training and developing opportunities in the digital creative industries, including video game design, to support centres of digital excellence.¹⁸

A key feature of the Global NREN community is the open-source software that underpins it, enabling global development at scale of key services for our members. This encourages interoperability and collaboration which in turn drives growth as it allows the global community to have a bigger impact than if each member were working alone. For example, REANNZ services eduVPN and Tuakiri were based on software developed by Global NREN and federation organisations GÉANT and AAF. REANNZ thinks that omitting a discussion around the benefit of open-source, and the controls needed to manage it in support of growth opportunities in a trusted way, may limit the impact of this pillar. We note that open source is a key principle of digital development in the Digital Nations (DN) alliance that New Zealand supports¹⁹.

REANNZ members are the creators and innovators that are using transformative digital technologies and the network for the betterment of New Zealand. For example, researchers working with portable sequencing technologies to enable bedside diagnostics and many other use cases. REANNZ is supporting them through the development of a remote connectivity solution that will have impacts across the sector.²⁰ Members are also innovating in ways that can support the use of technologies, for example creating future networking capabilities by applying techniques like Machine Learning that will have a significant impact on the accuracy of network monitoring.

Q: What might we focus on in the longer term?

As highlighted in the OECD report -

- Governments should also support platform technologies for science, such as distributed research and development networks, and storage for data. Room exists to better exploit advanced digital technologies in science.

This includes national storage solutions for research and citizen data and allows for Māori data sovereignty considerations. Having the technologies in place to enable citizen data science in research in a trusted way will ensure that all New Zealanders can participate in research for public benefit.

¹⁸ <https://www.otago.ac.nz/news/news/otago721903.html>

¹⁹ <https://www.digital.govt.nz/digital-government/international-partnerships/digitalnations/>

²⁰ <https://www.reannz.co.nz/case-studies/next-generation-sequencing-compute-connectivity-and-collaboration/>

Q: How can government and industry best work together to realise the growth potential for New Zealand?

With the release of the Te Ara Paerangi Future Pathways Green Paper 2021²¹ there is an opportunity for cross sector collaboration that would support the reach of both a digital strategy for New Zealand and the impact of science and research for all New Zealanders. Working with the RSI sector to tap into the knowledge and capability of these groups will help to develop new approaches, technologies and pathways to support a trusting, growing, digitally able New Zealand. Working in collaborative groups has helped REANNZ to identify gaps in the system that give rise to new opportunities, those that can be filled with new technologies or addressed through new collaborations.

REANNZ brings a pan-sector view across Government, the RSI community and our international perspective to key areas as identified by the discussion document, including cybersecurity. We can support the digital strategy by bringing this global and local insight to help us deliver innovation and growth to NZ Inc. Another key area to consider, and where the RSI sector is actively involved, is data integrity and the development of standards to ensure that data is secure and can be curated and shared. This is key to reproducible research, alongside initiatives to implement FAIR and CARE principles in the sharing of research data and ensuring trusted data protection and sovereignty.

Conclusion

In summary REANNZ fully supports the intent and principles outlined in the *“Towards a Digital Strategy for Aotearoa”* discussion document. However, we think a digital strategy for Aotearoa also needs to encompass the RSI sector, the global collaboration opportunities and open-source principles that underpin it. REANNZ would be happy to talk to officials further about any of the points raised in this submission.

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²¹ <https://www.mbie.govt.nz/dmsdocument/17637-future-pathways-green-paper>