

Artificial Intelligence Researchers Association

Te Ara Paerangi - Future Pathways submission

The Artificial Intelligence Researchers Association (AIRA) is a not-for-profit representative body established to support the production and dissemination of artificial intelligence research.

We have over 325 members across all eight Universities, the Crown Research Institutes, and private research organisations in Aotearoa New Zealand.

The Association connects, supports and provides a voice for the artificial intelligence research community, with all its sub-disciplines, to position Aotearoa New Zealand as a frontrunner internationally in leveraging this transformational technology to benefit society.

Contact

Professor Albert Bifet

Secretary

Privacy - 9(2)(a)

www.airesearchers.nz

Our vision

Our overarching vision is for AI to be a major tool for good in Aotearoa New Zealand:

- AI is embedded into the research system of Aotearoa New Zealand, and is harnessed to solve difficult problems, increase productivity, protect and enhance our natural resources and improve our social wellbeing.
- AI expertise, tools, and infrastructure are scaled-up and shared openly across the entire RSI, and more widely via international collaborations, to accelerate capability and multiply the effects of all research and development.
- Aotearoa New Zealand's research, science and innovation system experiences a step change in impact by using AI to extract maximum value and knowledge from research efforts and data.

On November 16, 2021 we released "Aotearoa New Zealand Artificial Intelligence: A Strategic Approach", a white paper that articulates our vision for Artificial Intelligence (AI) in New Zealand. The main message of this paper is that universities and other research institutes (including the Crown Research Institute's) have very strong AI research that has a huge breadth and potential. It is imperative to create and invest in an AI ecosystem where industry and research organisations can work together more closely for the benefit of Aotearoa New Zealand. We describe the realisation of this vision through a set of key recommendations:

- Scientific Research: increase funding for public AI research by developing a network of new research centres, hubs, and programmes in basic and applied AI research.
- AI Talent Development: augment capacity to attract, retain, and train domestic and international AI talent.

- Industrialisation of AI Technologies: create opportunities and partnerships to encourage private sector adoption of AI technologies, including investments in strategic sectors.
- Ethical AI Standards: create a task force to establish standards and regulations for the ethical use of AI, including culturally appropriate AI.
- Data and Digital Infrastructure: create an effective national data infrastructure with open data partnerships and datasets, while enabling and supporting Māori data sovereignty obligations, as well as commitments to create test environments and regulatory sandboxes. AI needs fit-for-purpose data and digital infrastructure to be successful.
- AI in the Government: government leading the adoption of AI in administration, healthcare, infrastructure and regulation in ways that give effect to Te Tiriti o Waitangi.
- Inclusion and Social Wellbeing: use AI to promote socially inclusive growth and encourage an AI community that is inclusive of diverse backgrounds and perspectives.

These recommendations are relevant to the questions posed in the Green Paper. In particular, how to organise and fund AI research in Aotearoa New Zealand in a way that maximises its impact in driving research and innovation across the entire RSI system from Universities to research institutes to industry and other end-user stakeholders. Whilst we are primarily concerned with the place of AI in the RSI system and how its benefits can be maximised, we propose that the structure of the RSI system as a whole needs to change to encourage meaningful collaboration and knowledge sharing, and to reduce wasteful competition and duplication.

Summary of recommendations

- **A funding model which distinguishes between funding for National Research Priorities and Investigator-led Research** We agree that there should be a clear and explicit distinction and ideally these should be funded separately. There should be a balance between government priorities (which are essentially determined via a political process) and scientific priorities (which are determined by active researchers that have a deep familiarity with the challenges and opportunities within their fields). We therefore agree with separating funding for national priorities (“top-down”) versus investigator-led (“bottom-up”) research.
- **Apportion base funding across all levels of the RSI system** Excessive competition wastes substantial time and money. The current SOE model for CRIs has led to precarious funding and excessive overheads competing for, and managing, revenue streams, with a negative effect on researchers’ productivity and morale. Significantly more research needs to be funded through non-competitive base funding. This base funding should be apportioned across all levels of the RSI system, from national capability groupings, through regions and institutions, to individual researchers. Whilst this is most urgently needed for the research institutes, TEOs could also benefit from a nominal level of base funding for individual researchers.
- **Structure the public research organisations around capabilities** We acknowledge that the RSI system has become highly fragmented. The CRIs (and Callaghan Institute), having been originally aligned to key aspects of the economy and environment, have since broadened in scope, often overlapping (and competing) in both research scope and capabilities. We support the reconsideration of both the number and organisation of these research institutes to reduce overheads and minimise unnecessary duplication. We suggest structuring the public research organisations into *capabilities*, rather than research areas, the latter being addressed through *national priority portfolios*, which

cross-organisation research groups brought together to address a specific research question of national priority. To retain talented research staff despite shifting national research priorities, we support base funding of the capability groups, rather than tying all funding to the transient research priorities.

- **Base fund core *capability* groups** We support the funding of core functions. In addition to those defined in the Green Paper, we propose to also base fund core *capability* groups, these being research activities that achieve major impact by being relevant to, and enablers of, a wide range of research and innovation activities. AI, and the broader fields of Data Science and eResearch, is an example of such a core capability.
- **Establish a national centre of AI** We acknowledge the important role played by the various parts of the RSI system: Universities for conducting basic research; research institutes (such as CRIs) for applying fundamental research and techniques in the Aotearoa New Zealand context; industry, government, iwi and other stakeholders for translating research into impact. We propose to strengthen collaboration of these entities through the establishment of national centres of excellence that bring together practitioners of key capabilities, such as a national centre for AI. These centres are not tied to specific institutes. Each centre would have some level of base funding.

Starting on the next page we have provided input and responses on some of the consultation guiding questions as set out on pages 13-15 of the Green Paper.

Funding

Q7: How should we decide what constitutes a core function and how do we fund them?

The Te Ara Paerangi Green Paper states the need to consider how to properly fund important activities or 'core functions' such as critical research functions, high priority services, emergency response, and databases and collections.

We argue that one measure of a "critical research function" is the extent to which it drives innovation and impact in the RSI system as a whole. We believe AI meets this definition of a critical research function.

The application of AI in a real-world setting involves much more than applying an AI algorithm to some data. Like Data Science more generally, it is a combination of techniques, processes and software tools and pipelines for accessing and preparing data; exploring, applying, evaluating and tuning one or more AI techniques; deploying, monitoring and tuning the outputs. AI research (both basic and applied) generates collateral such as software that achieves maximum impact when it is generalised, socialised and maintained. Current AI research is funded primarily through individual research projects, with funding ceasing upon completion of the project.

To solve this issue, we propose the creation and funding of national "centres of excellence" for core capabilities such as AI. Such centres are not separate research institutions, which would create silos and divorce the capability from research impacts. Rather, they bring together providers and users of these capabilities from across the RSI system, enabling them to build and share capability. Each centre has a level of base funding to cover any operational costs, but is otherwise funded through capability funding provided to each institution.

Q8: Do you think a base grant funding model will improve stability and resilience for research organisations, and how should we go about designing and implementing such a funding model?

- There is a tension between "top-down" funding and "bottom-up" funding. Top-down funding (at the national or institutional level) is good at reducing overlap and improving coordination, but bad at exploring different alternatives and finding creative solutions. Bottom-up funding allows for the exploration of problems from many different angles, encourages creativity and reduces bureaucratic overhead.
- Excessive competition for funding wastes a lot of time and money. We should move the emphasis towards competing on *results*, not competing for *funding*. This suggests that some significant fraction of funding should be via non-competitive processes, and contingent only on demonstrating minimum abilities/capabilities.
- We believe a mix of both is best - there should be direct funding at each of the levels: national, regional, institutional, groups *and* individuals. For instance, give research-active published academics each a fully discretionary research budget of \$5k per annum, so that the competition is in terms of what they get done with it, rather than whether they get funding.

Q9: How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?

Q10: How can institutions be designed to better support capability, skills and workforce development?

Q11: How should we make decisions on large property and capital investments under a more coordinated approach?

Q13: How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge into operational environments and technologies?

- We should simplify and optimize structures to reduce bureaucracy in the RSI system
- The current CRIs are essentially groupings of related research portfolios, based on historic needs. This structure makes them inflexible to changing national requirements and prone to duplication. If the suggested shift to nationally set research priorities takes place, we suggest that a more appropriate and flexible model is to structure the CRIs (or their replacement) around *capabilities*, similar to how Universities are structured into colleges/faculties, with AI fitting into a capability grouping of Mathematics, Statistics and Computer Science for example. These fundamental capability groupings would receive sufficient base funding to ensure the capability endures changes in national research focus. They would then be drawn upon by research portfolios as required, ensuring their continuing relevance to the research system.
- There is currently too much competition between universities and the CRIs, caused by their drawing from the same funding sources (chiefly MBIE Endeavour/Smart Idea and Marsden grants). We propose to avoid this by establishing (and funding) national priority research portfolios that span universities for basic research, research organisations for application, and industry and other stakeholders for impact. This would result in a far greater level of cooperation and knowledge dissemination between the various groups, and would open up greater opportunities for students to gain valuable research experience while harnessing their enthusiasm and creativity for public good, including through post-doctoral positions funded by the national priorities and supervised jointly by the participating organisations. Such a model assists the tertiary sector to produce graduates and postgraduates with relevant skills and experiences.
- We support the idea of incentivising freer movement between different types of research institutions, such as between universities and the research organisations, allowing university staff opportunities to apply their research in a practical setting, and giving research organisation staff the space to explore cutting-edge advances in their field and to disseminate their practical knowledge to other researchers and students. This could be built into the funding structure of the national research portfolios, for example.

Workforce

Q14: How should we include workforce consideration in the design of national research priorities?

Q15: What impact would a base grant have on the research workforce

A fundamental issue with the current project-based funding model is that it leads to workforce precarity. This is particularly acute for the CRIs, but also impacts a TEO's ability to build capability (for example, Post Doctoral positions).

National research priorities have the potential to exacerbate this issue, by shifting from one discipline to another, and leading to the closure of whole avenues of research, potentially with a corresponding loss of positions held by talented researchers.

In AI, as with other disciplines, it is vital to attract and retain talented people. Base funding of *capabilities* within the research institutes (as described previously) could achieve this by complementing the funding of national-led priorities, removing the current pressure on the research organisations to constantly find funding, and taking the pressure off our emerging scientists so they can grow and thrive.

===== END OF SUBMISSION =====