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To: [Research, Science and Innovation Strategy Secretariat](#)
Subject: Late submission on draft RSI strategy
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Are you making your submission as an individual, or on behalf of an organisation?

Organisation

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670

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Submission on the Draft Research, Science and Innovation Strategy

National Institute of Water and Atmospheric Research (NIWA)

November 15, 2019

Introduction

NIWA welcomes the opportunity to comment on the Draft Research Science and Innovation (RSI) Strategy. The timing is right for a rethink and NIWA is most willing to engage further as the RSI strategy is shaped and finalised.

NIWA is one of seven institutes owned by Government with the purpose of conducting research for the benefit of New Zealand. As NIWA's owner, the Government has expectations of us that are articulated in our Statement of Core Purpose and annual Letter of Expectations.

For NIWA (and the other CRIs) to deliver on these shareholder expectations it is vital that the Government's RSI investment strategy is aligned. In this regard, we welcome the recently initiated "*Te Pae Kahurangi - Review of Crown Research Institutes' positioning to meet New Zealand's current and future needs*" and that its scope includes considering any implications for the system that supports CRIs.

It is within this context that we provide the following feedback and recommendations on the Draft RSI Strategy.

Contribution of Research, Science and Innovation

The Strategy states that "*supporting a transition to a clean, green, carbon neutral New Zealand is a central part of our RSI efforts*" (pg9) but much of what follows undermines this aim.

New Zealand's natural capital – our stocks of environmental assets and the services they provide – underpins the nation's wellbeing, our quality of life, and what our children will inherit. Our land, climate, freshwater, and oceans provide the resources for our productive and tourism economies, the environments where New Zealanders recreate, and the taonga and places of cultural significance, pride and connectedness.

Much of the RSI effort needed to support transition to a clean, green carbon-neutral New Zealand is of a public good nature. Public good environmental research is diverse in its benefits and beneficiaries and therefore requires Government investment. It is also mission-led, has long-term horizons and requires support from key national databases, collections and infrastructure. But the draft RSI strategy is silent, or nearly so, on such matters.

The critical questions in public good environmental research are both enduring and evolving. They need certainty in longer-term funding so that a strategic mission-led approach can be taken that is able to attract and retain the required talent. There also appears to be a misconception in the Strategy that long-term funding and dynamism are mutually exclusive. They are not.

The RSI system has become overly complex, fragmented and inefficient. It need not be so. The RSI Strategy asserts that "*our investment systems are fit for purpose and work well together to support the full range of RSI activity*". That is not our view. For example, the time taken to establish the

National Science Challenges and the additional transaction costs they created is an inefficient mechanism for conducting mission-led research.

Fragmentation of investment mechanisms has the effect of putting ‘blockages’ in the pipeline from ideation through to application, with researchers having to jump between investment mechanisms in the hope of being funded. Stranded research is the result. This is surely not the outcome one would

Recommendations:

- **That the RSI Strategy explicitly recognises that protecting and enhancing New Zealand’s natural capital is central to meeting the Government’s 12 priorities.**
- **That the RSI Strategy explicitly recognises the need to support and invest in key national science infrastructure, databases and collections.**
- **That the RSI Strategy recognises the need to simplify the investment framework, bring about efficiencies, re-balance its research portfolio towards more long-term investments, and reduce competition to support connection.**

aim for in a well-functioning RSI system.

Researching and innovating towards the frontier

The strong emphasis on pushing out the global frontier is conditionally supported, as is the recognition that research organisations will, and should continue doing important work behind the frontier. However, it is unclear how this new “frontier/non frontier” terminology is different from existing requirements for global novelty, how it will be applied, and whether there will be negative consequences from its adoption. The Strategy needs to present a rationale that links the issues within the current RSI system that it seeks to address to the interventions that will address them. No such intervention logic is apparent.

It is essential that frontier science doesn’t become understood as being only at the generating new ideas end of the research horizon spectrum. The Strategy describes frontier science as creating new knowledge. New knowledge can be created across all research horizons. Science questions relating to how we might make a new idea useful (applying science) can, and often does, create globally new knowledge. Adapting overseas research for NZ benefit can, and often does, create globally new

Recommendations:

- **Before any new emphasis on frontier research is introduced across the sector, it should be clearly identified where New Zealand’s RSI system is failing, and which interventions are appropriate to apply.**
- **That the definition of frontier research is very carefully described, including how it differs from the existing emphasis on global novelty, that it occurs across all research horizons, and that it can occur from adapting overseas research for NZ benefit.**

knowledge.

Our key challenge – Connectivity

There is little evidence provided to show that weak connectivity is a problem across the whole of NZ's science sector. For example, the sentence *“Most researchers and the potential innovators that could exploit their research operate in disconnected spheres, are driven by different motivations and have access to different sets of knowledge”* is not accurate for most public good research. To the contrary, there are very strong connections between CRIs and those that use CRI research to innovate. These connections are a major priority for NIWA and other CRIs whose purpose is ‘to conduct research for the benefit of New Zealand’ (CRI Act) and remain a key criterion in investment decision-making within the RSI system. Complex public good problems have multiple roots, spanning government, industry and communities – this should be the focus of connectivity.

The comment that *“many NZ researchers, institutions and innovators are focusing on New Zealand as their frame of reference”* and as a result *“fail to make connections with global experts”* is highly problematic and also untrue when applied to CRIs. It is entirely appropriate that CRIs use New Zealand as their frame of reference – they exist and are owned by the Crown to conduct research for the benefit of New Zealand. But that does not mean that CRIs fail to make connections with global experts, quite the opposite. A New Zealand focus and global connections are not, and should not, be regarded as mutually exclusive. Rather, they are mutually reinforcing.

We recognise that good policy that protects and enhances our natural capital needs New Zealand focused research that is connected to international research efforts. We cannot rely on research done elsewhere to address the issues we face but we can learn from, and contribute to, the global research pool. In many cases we are the global leaders.

In many cases New Zealand researchers leverage global connections to the significant benefit of New Zealand. For example, NIWA's contributions to the global atmospheric modelling community has provided us access to the global Unified Model which we are now enhancing to provide better predictions of climate change impacts on New Zealand's weather and their associated impacts. This model has had many hundreds of millions of dollars in off-shore investment which New Zealand research and New Zealand is now benefiting from.

Measuring the level of global connectivity by the amount of funding coming from overseas is clearly inappropriate for public good environmental research. What overseas funder is going to pay for us to understand how the water quality of our unusually short fast rivers is changing with climate? Similarly, co-authorship by business and researchers is not an appropriate measure of connectivity

Recommendation:

- **That the Strategy reflects that measures of connectivity are context-specific - public good research should not be measured by the same parameters as, e.g., widget development, that sometimes a New Zealand frame of reference is appropriate, that sometimes New Zealand scientists are the global experts and that sometimes the most important connections are domestic, between science, government and communities.**

for public good environmental research. What business will publish papers with us on glacier retreat?

Guiding Policy – Excellence

The Strategy implies that the best technology, people and ideas can only come from international collaboration, and that partnership is only measured via co-authorship of papers. Excellence at the

frontier can be - and in some cases can only be - homegrown, and productive partnerships do not

Recommendation:

- **That the definition of excellence, in the context of public investment in RSI, should be defined as showing rigorous scientific process, conducted by the right team, achieving standards of transparency and integrity, and fit for uptake to achieve impact.**

always result in co-authorship.

Guiding Policy – Impact

NIWA supports the comments in the Strategy on Impact and supports the ongoing work to better define and measure it.

Guiding Policy – Connections

NIWA supports the focus on enabling fluid connections, reducing barriers and costs which prevent connections from happening. We agree that it is appropriate not to require large collaborations or consensus-based decisions, and that a focus on reducing transaction costs will be beneficial.

Actions – Making New Zealand a Magnet for Talent

We agree that nurturing, growing, attracting and retaining RSI talent is a significant challenge for New Zealand. It is difficult for New Zealand to compete in a global talent war. But through an underinvesting in RSI, an RSI system that is seemingly under constant review and change, and an investment approach that is skewed towards the competitive and short-term it makes it even harder. Because the Strategy fails to identify these issues, and how they impact people in the system, the changes proposed are likely to further exacerbate the problem.

In our experience, these systemic issues are far-reaching. Those talented young New Zealanders we see at the Secondary School Science Fairs we sponsor rarely see science as their career option, those science graduates we support through their post-graduate studies increasingly seek careers off-shore, those Kiwi scientists now based offshore that we interact with do not have a desire to return to the RSI system they left, and top talent from off-shore is difficult to attract when they understand the insecure nature of the funding that would support them.

While NIWA supports the initiatives suggested in the Strategy (although these are short on the 'how'), these are minor and limited in effect compared to that which would be achieved by addressing the system issues outlined above.

Recommendation:

- **That a career within New Zealand's RSI system is made more attractive by increasing funding stability and reducing competition.**

Actions – Connecting Research and Innovation

The draft Strategy states that *“New Zealand has been less successful in converting [...] research into products or public services or using research to inform the products and services that are created.”*

The evidence provided for this are relatively low numbers of patents filed, tech start-ups, and innovative firms.

These are not appropriate measures of the success of much public good research. For example, much of NIWA’s research effort, while providing a service critical to all parts of the New Zealand economy and society, will never be patented, nor result in a start-up or a commercial enterprise, while being essential to the viability of these commercial activities and community well-being.

We are concerned about the feasibility and wisdom of a system-wide approach to IP. The nature of IP generated, and the most appropriate way for NZ benefit to be derived from it, varies greatly and any policy-setting needs to be able to cope with that variability. There is also a need to recognise the IP rights of Maori in the commercialisation system – this is absent.

Increasing investment in international connections will be valuable, although the Strategy is vague about whether that is the intent. Sitting alongside specific targeted international connection funds there needs to be recognition that the research itself needs to be funded. There are examples where enduring institutional connections have ‘fallen over’ because the NZ researchers’ funding has ended.

We observe that about a decade ago a fund was created, called ITER, then LSIP, to provide funding to allow New Zealand scientists to contribute to the Intergovernmental Panel on Climate Change and United Nations Framework Convention on Climate Change. This was then expanded to include support for other international policy efforts relating to the environment (e.g. Intergovernmental Panel on Biodiversity and Ecosystem Services). This fund supported New Zealand scientists to both contribute to international policy impacting New Zealand but also to lead science at the global frontier, raising the profile of New Zealand science. Unfortunately, this fund was abolished with the creation of the Endeavour Fund.

Recommendations:

- **That the Strategy reflect a more sophisticated approach to IP that recognises the case-specifics and, more generally, the rights of Maori.**
- **That a fund be re-established to enable New Zealand scientists to lead frontier research and contribute to international policy via engagement with international bodies (like IPCC, IPBES etc.).**

Actions – Innovating for the public good

We agree that better support for innovating for the public good is required, but we do not support the initiatives being proposed. Public sector organisations have already articulated their R&D needs in various strategic planning documents (e.g. Conservation and Environment Science Road Map).

Why divert research effort across new focus areas, like those indicated in the draft strategy, especially when it is unclear how they were identified?

Recommendation:

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- **That any new focus areas for public good research are selected by a rigorous and transparent process involving the relevant public sector organisations.**

Actions – Scale up

The best way to build scale in focused areas in public good science is to use existing institutions, existing governance and accountability structures, and existing funding mechanisms. The transaction costs of setting up new structures, which for the most part just use existing capability in new formations, is enormous. It took each National Science Challenge several years to be up and running, with multiple false starts. The two newest SSIF platforms (Antarctic Platform and the Data Science) have both suffered from extended setting up processes, wasting considerable time and money. Our current research institutions already address, or with the right incentives could easily address, all science needs for New Zealand. In particular, the CRIs are very well placed to deliver large mission-led impact programmes to address government needs and do so. Indeed, that is their primary purpose.

Using existing organisations and funding mechanisms will reduce administration costs and increase efficiency: they already have the strategic, legal, financial, management, and quality systems in place

Recommendation:

- **That existing science organisations/funding mechanisms (e.g. CRI SSIF Platforms) are used to build scale in focused areas. They have the capability to deliver and would do it faster and cheaper than creating new structures.**

to ensure excellence and delivery.

Actions – Scale up – Choosing our areas of focus

While we support the narrative on the categories/criteria for areas of focus on p.35, we urge further and widespread consultation on choosing the actual topics of focus. While intuitively the concept of choosing topics of focus has appeal, we are concerned about how it might be implemented and the unintended consequences that might arise. As stated elsewhere in this submission, implementation should not lead to further fragmentation of the investment system, should not involve high transaction costs, and should not undermine the need to increase support in those areas that critical to their success (e.g., databases, collections, infrastructure).

The topics of focus should have a direct line-of-sight to the government's 12 priorities and support the central part of the RSI efforts which is to support transition to a clean, green, carbon neutral New Zealand (articulated on p.9 of the Strategy). Of the 'starters' proposed on p.36, it is difficult to see why 'aerospace' would make the list. Renewable energy and health technologies might, as surely would environmental technologies to remedy and improve the health of our environment and research (across the range of sciences) allowing us to most effectively adapt to a changing climate.

Recommendations:

- **That choosing the topics of focus is undertaken through wider consultation.**
- **That existing funding mechanisms be used to give effect to the results of that consultation.**
- **That topics of focus are clearly aligned with the Government's priorities and fill a known RSI gap.**

Actions – Towards an Extended Vision Mātauranga

Although this section is disappointing in its level of analysis, we support the intent of the initiatives proposed. There is a need for the Strategy to recognise that perhaps a co-design process does not go far enough – an extended Vision Mātauranga needs to be developed by Māori for Māori. We offer some further thoughts below.

In the current RSI system, there is insufficient investment in targeted Māori-led research. Within existing investment mechanisms, there are significant barriers to funding for kaupapa Māori research, including that it is typically assessed against western science frameworks and metrics. For example, papers in international journals as a key metric does not consider the local, regional and/or national responsibilities of the research/researcher to their collaborative partnership(s) first and foremost. Reliable Māori-driven funding mechanisms are rare, and co-funding requirements can be a barrier to accessing the best Māori thinkers and researchers.

One of the critical issues is the lack of Māori research capacity and capability across the New Zealand science system, not just within science and research institutions, but also within whānau, hapū and iwi to lead their own research priorities and aspirations.

There is a need to improve the awareness of Māori businesses and enterprises about how to access the capabilities of CRI's, central government, and funding pathways across the whole of government including NZTE, MPI, TPK and Callaghan Innovation.

Recommendations:

- **That a fund is created to invest in Kaupapa Māori research.**
- **That the lack of Māori research capacity and capability is addressed via targeted funding.**
- **That the criteria for assessing science excellence is changed to also be appropriate for Māori research.**
- **That a Vision Mātauranga “Connect” scheme specifically targeted for Māori businesses and enterprises to engage with and access the best advice, expertise, information and/or data across the science system be established (analogous to the current Envirolink scheme for Regional Councils).**

Actions – Building Firm Foundations

The acknowledged lack of appropriate funding for “applied research required by the wider public service” is a major challenge of the current system. This creates significant difficulties for CRIs in particular, who can struggle to both provide for the needs of central government agencies (which

typically is not for high risk/"stretchy" science) while also addressing the increasing focus of SSIF and Endeavour on horizon 3 research (generating new ideas).

In Annex One, the strategy states "Investment and decisions here (at the leverage proven ideas for better public service delivery) are best made by the public entity charged with delivering the service." If MBIE will not invest in support of other government agencies, like MfE and MPI etc, then these government agencies must be funded appropriately to make their own investments, rather than rely on the unreliable (.e.g MBIE contestable funding), as they often do currently. This is a curious position for MBIE to take, given the existence of the highly successful MBIE Envirolink fund which supports the leverage of proven ideas for better public service delivery in the regional government sector. Could not a similar fund, held by MBIE but driven by central government agencies, be an efficient solution?

There is a difference between policy relevant research and the application of that research - the former is a national public good research activity with a range of beneficiaries, while the latter is what individual stakeholders should pay for. CRIs were set up to conduct research for the benefit of NZ, via the primary mechanism of the mission-led SSIF Platforms. But, the mix of reducing buying power of CRI SSIF funding and increasing delivery expectations is unsustainable. While ensuring connectivity is always a high priority, maintaining dynamism and the range of frontier research needed is challenging under these restricted funding conditions.

We support the plan to review e-research capability and place existing initiatives on a sustainable footing. NIWA considers e-research a key opportunity for New Zealand and essential to address the Government's priorities. The current arrangements for New Zealand e-infrastructure are sub-optimal.

We also support the plan to conclude the review of data bases and collections to ensure future sustainability. In recognition of the essential role our data bases and collections have in enabling us to deliver the best science for New Zealand, we have been spending an increasing proportion of our SSIF funding on maintaining key databases and collections. This is unsustainable.

As noted earlier, we support the review of the CRIs and, in particular, how the government expectations of CRIs (current or revised) can be best supported by an aligned RSI Strategy.

Recommendations:

- **That public entities should receive appropriately tagged funding to enable them to invest in applied research to meet their needs, if MBIE will not.**
- **That investment in the CRI SSIF Platforms is increased to enable CRIs to be dynamic and maintain focus on leading edge research for the benefit of New Zealand.**
- **That MBIE reviews and ensures sustainability of New Zealand's e-research capability key databases and collections, and critical infrastructure (e.g. vessels).**
- **That MBIE aligns its RSI Strategy with its expectations of CRIs that emerge from the current CRI review.**

General

This strategy has some important initiatives in it. However, it fails to respond to the diversity within our RSI system. In particular, the weaknesses identified in the current RSI system, which this strategy seeks to address, do not apply to public good research in critical ways. This raises concerns of potentially significant negative impacts on parts of the science system. Potential negative impacts of the new strategy do not seem to have been considered at all.

Recommendations:

- **That appropriate intervention logic is applied, and that the potential negative impacts of the proposed strategy on the provision of public good science is explicitly considered.**
- **That an independent analysis of the potential impacts of a change in RSI focus on Māori research needs, and Māori research capacity should occur to ensure that any changes in RSI direction and language do not lead to further increases in inequality.**