From:	no-reply@mbie.govt.nz
To:	Research, Science and Innovation Strategy Secretariat
Subject:	Late submission on draft RSI strategy
Date:	Tuesday, 19 November 2019 12:45:26 p.m.

Are you making your submission as an individual, or on behalf of an organisation?
Organisation

Name
Anthony Scott

Name of organisation or institutional affiliation
Science New Zealand

Role within organisation
Chief Executive

Email address (in case we would like to follow up with you further about your submission)
ce@sciencenewzealand.org

Which of the below areas do you feel represents your perspective as a submitter? (Please select all that apply)

If you selected other, please specify here:

Gender

Ethnicity

Name of organisation on whose behalf you are submitting, if different to the organisation named above

In which sector does your organisation operate: (Please select all that apply)
Non-profit, Other

If you selected other, please specify here:
Peak body for Crown Research Institutes

How large is your organisation (in number of full-time-equivalent employees)?

Please indicate if you would like some or all of the information you provide in your submission kept in confidence, and if so which information.
NA

Please upload your submission document here
SNZ_RSIS_Submission_November-2019.pdf - Download File

Science New Zealand

Science New Zealand Inc.
PO Box 10-345, The Terrace, Wellington 6143, New Zealand
Level 6, 17 Whitmore Street, Wellington
P +64 4 382 6649 W sciencenewzealand.org

Science New Zealand submission on draft Research, Science & Innovation Strategy

November 2019

Science New Zealand Submission on the Draft Research Science and Innovation Strategy

Introduction

This submission is made by Science New Zealand Inc., the organisation representing the seven Crown Research Institutes (CRIs). The CRIs were established by statute in 1992 to perform research of excellence and benefit to New Zealand, and to promote and apply such research. Collectively, the CRIs employ about 4000 staff, around 2500 of them scientists, and have revenues of $750M per annum, around $380M of that from the Ministry of Business Innovation & Employment (via various contracts and contestable processes).

The CRI's hold the bulk of New Zealand's long-term strategic scientific research capability. The CRIs develop five-year Statements of Corporate Intent (SCI) with their staff, colleagues, collaborators and clients, and consistent with the Cabinet-approved Statements of Core Purpose applying to each CRI. The SCI is then agreed with the shareholding Ministers. CRIs are an essential part of the nation's emergency response capability, whether from natural hazards or other causes such as fire, biosecurity, or health, and the Government may direct CRIs in certain situations of need.

The CRIs have numerous and often long-standing links with multiple types of Māori entities. An individual CRI may have links to 100 or more entities: iwi, hapū, Māori businesses, land-owning incorporations, and have been strong contributors to the Māori economy.

The CRIs support New Zealand businesses: 3 out of every 4 dollars New Zealand companies spend on R&D outside the business sector is spent with CRIs.[1] Research excellence and application has been recognised in, for example, Plant & Food Research being awarded the 2017 Prime Minister's Science for the development of Gold Kiwifruit and ESR the 2018 Prime Minister's Science Prize for the development of forensic DNA technology, STRmix. CRIs also have commercial spin-out companies such as Grasslands Innovation Ltd and Toitū Envirocare (formerly Enviro-Mark Solutions Ltd).

CRIs collaborate widely with other research institutions in New Zealand (CRIs are partners in 7 of 10 CoRES and 9 of 11 National Science Challenges) and internationally. CRIs support the development of New Zealand's science workforce, as co-supervisors or mentors of typically 330 PhD students and 130 MSc students annually. CRIs also partner with universities in joint graduate schools in areas of importance to New Zealand.

This submission is a high-level consolidation of views expressed within the Crown Research Institute community. Individual CRIs will provide more detail, examples or emphasis in their own submissions.

Science New Zealand welcomes the opportunity to comment on the Draft Strategy and expresses appreciation for the very helpful consultation workshops and other discussions between MBIE staff and Science New Zealand groups.

[1] https://www.stats.govt.nz/information-releases/research-and-development-survey-2018

Summary

We strongly support the premise that research, science and innovation will (and must) play an increasing and central role in delivering a productive, sustainable and inclusive future for New Zealand.

Policy shift

The draft appears to signal that Vote Research Science and Innovation will, in future, only fund the generation of new knowledge and leave the application of existing knowledge to other portfolios. If so, this is a major shift in New Zealand RSI funding policy.

We are concerned that:

a) this leaves a gap in funding, and
b) that the gap may take some time to fill (as proof of impact requires application of knowledge as well as its generation).

Research that would benefit areas flagged as important in the strategy, particularly for business and Māori, will suffer if the application of knowledge is not adequately funded. There is also need for funding which bridges the gap between fundamental research and the applied research that users are expected to invest in.

Resourcing the strategy

We strongly support a number of the points raised in the draft, including:

- the four descriptors helping select areas to focus New Zealand's efforts (and where research is likely to see results),
- the aspiration to see 2 per cent of GDP invested in R&D,
- 'Connections' as a third guiding principle,
- support for diversity and inclusion in the RSI workforce,
- long term funding to attract and retain talent,
- support for matauranga Māori, and
- an increased focus on international connections.

All the areas come with resourcing issues, and often substantially so. These matters will need to be addressed as the policy develops.

Vision Mātauranga

We strongly support a kaupapa for redesign of the Vision Mātauranga policy that has Māori as co-designers. This is essential to it being effective.

Selecting Areas of Focus

We trust that a rigorous and transparent process will be put in place to identify new areas of focus for research, particularly in strategic areas. The suggested areas in the draft's commentary, while they may be valuable, look to be arrived at *ad hoc*.

IP approach

The proposed approach to IP arising from publicly-funded research appears to be "one-size fits all." Our experience as science enterprises well-connected with private and public sector end and next-users of science research is that there are many different pathways to implementation of the research. A one-size fits all pathway will lead to unintended consequences. We therefore support the current case-by-case evaluation.

CRI Review

The draft refers to an intended review of CRIs. Subsequent to the draft being published a collective review of CRIs has been initiated, overtaking that proposal.

Submission

Policy shift

The draft strategy indicates a major shift in policy which, in our view, needs considerable further clarification and discussion. The draft strategy proposes that Vote Research, Science & Innovation, stewarded by MBIE, will focus on 'frontier' research - *creating new knowledge* - while other Votes or portfolios will be expected to fund the 'behind frontier' - *using existing knowledge to improve the way we do things.*

This reading of the draft strategy was reinforced at the consultation workshops. It represents a significant step towards reversing the science reforms of the 1990's. At that time, the Government aggregated the Crown's R&D expenditure into the Research, Science and Innovation portfolio to allow for a whole-of-government approach.

The 2019 draft strategy separates the purpose and role of MBIE-stewarded research funding from that to be funded by other government agencies. While other agencies have been increasing their own funding for some types of research, such a move will leave a significant gap in funding the research most likely to have impact. MBIE has, outside this draft strategy, acknowledged the gap and that it needs to be bridged. CRIs are concerned that there will likely be a loss of capability even if arising only from uncertainty while the funds are found.

The RSI Strategy addresses funding to some extent, and we have concerns about indicators for future prioritising, as this submission and others from our members indicate. It is possible that further discussion will clarify these matters.

It is important, however, to state that strategic mission-led research that can attract and retain the required talent and invest into the facilities they need, requires longer-term funding than is currently available. Long-term funding and dynamism are not mutually exclusive, especially in closely monitored agencies which manage enduring and evolving public good research.

Clarification of Frontier and Behind Frontier, and implications for resourcing

The split between 'frontier' and 'behind frontier' appears relatively arbitrary and has the potential to undermine two of the three guiding principles of the strategy, *Impact* and *Connections.*

- Solving problems in the economic, social and environmental sectors very often involves application of existing knowledge or a mix of existing and new knowledge. So, not funding 'behind the frontier' research will likely lower potential impact.

- Industry, Māori, and policy end-users of research are typically working to tight timeframes and want solutions that can be applied quickly, particularly in the early stages of a relationship. This usually requires application of existing knowledge. So, such groups will be less likely to work with frontier researchers which appear to be MBIEs priority.

- Innovation at the frontier that will extend the boundaries of what we are capable of doing requires research of all types. It is about generating new knowledge, applying existing knowledge, and adopting and adapting knowledge from offshore to new areas.

- Applied research attracts more private sector investment, creates stronger connections between researchers, end users and Māori, and is more likely to have impact in the short to medium term compared to fundamental research. The difference, if any, between applied research and innovation behind the frontier (using existing knowledge to improve the way we do things) is not clear in the draft.

Page 18 addresses researching and innovating towards the frontier. The first paragraph states that *the focus of this strategy is on innovation at the leading edge of what the world knows and can do – i.e. the 'frontier' of knowledge and its application.* (We underline the conjunction 'and' to endorse and highlight the significance of both these attributes).

The paper then goes onto to indicate four areas in which, for *New Zealand, this is most likely to happen:*

- *solving problems that nobody else in the world has solved, such as how to reduce agricultural emissions,*
- *capitalising on new opportunities where nobody else is yet successful, such as civil use of space*
- *making the most of our unique opportunities, such as our unique geology, biodiversity, and our heritage of Mātauranga Māori,*
- *investigating areas where New Zealand is the only country likely to do so, such as questions arising from our unique population and greenhouse gas profile.*

We agree that these are useful broad descriptors in helping define where New Zealand places its research resources, so that New Zealand will likely see results and that the results will benefit New Zealand.

The final document should emphasise that the four descriptors are not mutually exclusive; and that each will necessarily require a mix of new knowledge and the application of existing knowledge. We would like to see criteria around the second point to ensure that there are clear reasons why the New Zealand research would be likely to be successful where other groups have failed.

It is important to acknowledge in the strategy that about 1 per cent of the world's research is done in New Zealand; so the identification, adaptation or adoption of research from offshore is vital to New Zealand's wealth and well-being on all measures. Such work can be as challenging as 'frontier' activity and by definition is of more direct value to New Zealand.

Prioritising

The relative allocation of funding across the descriptors and across the areas of focus is critical to understanding the Government's strategic prioritisation, and the role of the MBIE-stewarded funding and research funding expected from other Crown agencies.

Given the role and purpose of CRIs as set out in statute, Cabinet-approved Statements of Core Purpose and in Shareholding Ministers-approved SCI, this goes to the heart of the mission of the Crown's research institutes. Further discussion is required.

Areas of Focus

The final document should also better link the descriptors (page 18) with the page 35 section: *Choosing our Areas of Focus.*

The draft asks for areas of focus, possibly up to five, and states:

The areas will fall into one or both of two categories:

i) Where we can genuinely expect that New Zealand has, or will be able to build, a sustainable competitive advantage on the world stage:
   a. Opportunities for shifting from volume to value
   b. Areas complementary to existing strengths or other opportunities
   c. Areas with no obvious global leader where New Zealand has a head start
   d. Where New Zealand has an inherent advantage based on our unique heritage or resources;

ii) Where New Zealand faces a unique challenge or has a specific need.

The wording of the categories for the areas of focus seems to be a restatement of the descriptors. The final document needs to be clear whether the descriptors and the categories are the same or similar and if the latter, what is the difference.

These are extremely important issues to researchers with a New Zealand-benefit focus aligned with current or emerging sectors, and with a commitment to and track record of excellent research.

Clarity is needed, not least to offset unconscious bias in those involved in priority setting or selection processes that might lead to favouring 'world stage' research over 'unique to New Zealand' areas. For the record, excellence and research which extends the frontier is needed in all components. We also strongly endorse the commitment to application as a means to having impact for New Zealand's benefit.

The draft strategy asks for areas of focus to be proposed by respondents. Doubtless there will be multiple proposals. We strongly recommend that the selection process be both rigorous and transparent, ideally involving the RSI sector. This also applies to SSIF investment.

The potential areas highlighted on page 35 are given with no evidence or process presented as to how they might benefit New Zealand more than others. A consultative, criteria driven process to identify areas of greatest strategic value and to identify the gaps in current research to address them is required.

The two percent commitment and implications

We support the aspiration to reach 2 per cent of GDP being invested in R&D. This is a minimum if we are to secure a more productive and sustainable New Zealand.

While the 2 per cent target represents a considerable increase in funding, it still lags the OECD average. The draft strategy should also be clearer on, and separate out, the figures for expenditure on, funding for, and support of, R&D.

The strategy will need to be clearer on the associated challenges of the commitment to the significant increase in R&D spending. The most critical - and the point of constraint - is the number of skilled R&D people. Considerable effort will be needed to develop and attract R&D personnel to meet the country's needs. The implications arising from the draft strategy, applied to the StatisticsNZ 2018 R&D survey, are that the Government Sector will need an additional 1,300 R&D staff, and the Business Sector more than 14,000.

The CRIs have considerable experience in R&D staff development across a broad range of areas. We are most willing to work with government, and others, on developing a strategy to increase New Zealand's talent pool.

The third pillar: Connections

We support the introduction of Connections as the third guiding principle. In fact, connections is part of a spectrum, with each being important: connections, collaborations and partnerships. Together they are vital in supporting excellence and impact with industry, policy, Māori and the wider community to achieve impact. It is a critical part of the CRI way of working, and it is good to see that New Zealand outperforms the OECD on this measure.

CRIs are extremely well-linked to important New Zealand business sectors, as shown in the StatsNZ R&D Surveys surveys, and also regularly top the OECD table for government-owned research institutes being commissioned by business. The question is, how can we continue and how can we improve, and how can we extend both scale and scope of connectedness to grow the benefits?

The draft recognises the importance of international connections for New Zealand's small and relatively geographically isolated research system. We agree that international research investments should be made at scale. The final document should broaden the range of international partners listed. We hope to also see a broader range of initiatives connecting New Zealand with global leaders in their research fields as well as with researchers who happen to be close by.

Connections are primarily about people and arguably is the greatest concern for the nation's future. Connections can be enhanced by institutional commitment and support, for example to allow offshore experience or to develop closer relationships within groups within New Zealand such as Māori. The building, maintenance and refreshing of connections takes time and needs resourcing. This needs to be recognised in the investment mechanisms.

Science New Zealand has long emphasised the need for focus on people (recruitment, retention, development) as their talent and well-being is at the centre of what any research, science & innovation system can aspire to or achieve. They are core concepts in the two joint reports from the combined CRIs, on the future of work and of science and of building enduring relationships and partnership with Māori.

The shortfall in the workforce numbers is only part of the equation of concern which the RSI Strategy should address. Science New Zealand members comment on the need for pathways from universities for post-doctoral people; and all are involved in some way with joint graduate schools, programmes and other forms of building capability in science and its application relevant to New Zealand current and emerging needs.

Impact

The recent *Impact* paper from MBIE is timely and useful. The paper provides insight into how MBIE views that guiding principle of the strategy and will improve the ability of research to realise benefits to New Zealand. The CRIs have been working with MBIE for some time on a framework to plan for, measure and recognise impact through the iPEN project and we look forward to continuing this work.

The RSI Strategy needs to be careful in citing evidence of lack of success measured in areas such as tech start-ups, patents filed or innovative firms. They are of course important;

but they do not adequately reflect the value crated from much public good research which – in New Zealand especially – underpins the economic, environmental, social and cultural wealth and wellbeing of New Zealand.

Workforce issues

The CRIs strongly support the importance of growing diversity and inclusion in the research workforce. CRIs identified several initiatives to improve diversity of the scientific workforce. in their joint report backs to Minister Woods on Māori Engagement and Workforce Planning. We look forward to working with the Ministry on the issue.

Developing, attracting and retaining top talent is an ongoing challenge, globally. So New Zealand must be a highly attractive place for highly mobile talent. A key element is supporting researchers to have the time to focus on and make progress on complex and challenging problems. This requires long term stable funding from which the new ideas that drive dynamism can be developed and the expertise to solve industry's problems in a timely fashion can be built up.

In this regard we welcome:

- the commitment to an investment framework that encompasses a range of funding time frames,
- the commitment to targeted strategic funding.

CRI Review

Question 39 raises the matter of a review of CRIs. This has been overtaken by the collective review of CRIs recently agreed by the Minister of Research, Science & Innovation and the CRI Chairs, with outcomes due in mid-2020.

IP

It is not clear what is meant by a 'regulatory systems' approach to IP policy on publicly funded research. Managing IP to maximise the economic and social value of research to New Zealand is a complex area. A blanket approach is likely to prove restrictive and have unintended consequences. We believe that this is best managed on a case by case basis, such as is the existing policy for MBIE funded research.

Other comments

The draft strategy includes commentary on several matters which we address below and suggest for clarification or review in the final strategy document or in subsequent policies.

- Other than in the introductory sections, the draft strategy is mainly economically focussed. The final strategy should ensure in its discussion better recognition of the role of research-based innovation in solving issues in the environment and social areas. This will complement the discussion around the role of research-based innovation in the development of 'products and services' that are new to the world.

- New Zealand publishes more papers per dollar invested in R&D than the OECD average, and even more so than the small advanced economies. This is often celebrated as an example of 'productivity' of New Zealand's scientists. It is however, a troubling indicator in that it may signal why business in New Zealand is less willing to invest in R&D with institutes of higher education: publication has primacy over industry engagement.