From:	no-reply@mbie.govt.nz
To:	Research, Science and Innovation Strategy Secretariat
Subject:	Draft Research, Science and Innovation Strategy submission
Date:	Friday, 8 November 2019 4:12:28 p.m.
Attachments:	Online-submission-form-uploadsdraft-research-science-and-innovation-strategy-submissionsSubmission-research-science-and-innovation-strategy_UOO_Biochemistry.docx

Submission on Draft Research, Science and Innovation Strategy recevied:

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

Name
Iain Lamont

Name of organisation or institutional affiliation
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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)
Research

If you selected other, please specify here:

How large is your organisation (in number of full-time-equivalent employees)?
Approx 100 research staff; approx 100 postgraduate (PhD and MSc) students

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.

Please upload your submission document here
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MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Research, Science and Innovation Strategy

Submission form

The Government is developing a Research, Science and Innovation (RSI) Strategy to set out our vision for RSI in New Zealand and its role in delivering a productive, sustainable, and inclusive future.

We are keen to hear the views of New Zealanders on the draft Strategy so that we can get a better understanding of what our country needs from RSI. We also are looking for feedback on how we can take action to ensure New Zealand's RSI system is optimised for success. These views will inform the direction of Government investment in RSI and the research and innovation areas for us to focus on as a country, as well as help us understand the challenges we need to overcome.

We encourage anyone with an interest to make a written submission.

How to have a say

We have included a number of questions in the draft RSI Strategy document to highlight issues on which we would like further input. We encourage you to use these questions as a guide when submitting your feedback.

This document provides a template for you to provide your answers. Please upload the completed document using our online submission page.

You do not have to fill out every section – we welcome submissions on some or all of the questions.

The closing date for submissions is 10 November 2019.

After the consultation period finishes, we will analyse the submissions received and incorporate the feedback in the final version of the strategy.

Confidentiality

Please note: All information you provide to MBIE in your submission could be subject to release under the Official Information Act. This includes personal details such as your name or email address, as well as your responses to the questions. MBIE generally releases the information it holds from consultation when requested, and will sometimes publish it by making it available on the MBIE website.

If you do not want some or all the information you provide as part of this consultation to be made public, please let us know when you upload your submission. This does not guarantee that we will not release this information as we may be required to by law. It does mean that we will contact you if we are considering releasing information that you have asked that we keep in confidence, and we will take your reasons for seeking confidentiality into account when making a decision on whether to release it.

If you do not specify that you would prefer that information you provide is kept in confidence, your submission will be made public. While we will do our best to let you know that we plan to publish your submission before we do so, we cannot guarantee that we will be able to do this.

Contribution of Research, Science and Innovation

This strategy is about New Zealand's Research, Science and Innovation (RSI) at a high-level. Its aim is to identify challenges and opportunities that will have the broadest impact on our research and innovation activities. For this reason, it mentions few specific areas or sectors of research and innovation. For this draft version of the Strategy, we are keen to hear from researchers, innovators, businesses, and providers of public services on what the RSI system could be doing to accelerate progress on Government's priorities.

Question 1: Where can the RSI system make the greatest contribution towards the transition to a clean, green, carbon-neutral New Zealand?

Question 2: Where else do you see it making a major contribution?

Question 3: What else could else the RSI system be doing to accelerate the progress towards the Government's priorities*?

* see list of the Government's twelve prioritiesincluded in Part 1 of the draft Strategy.

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Q1. The greatest contribution can be made through adopting and embracing technologies that will provide innovative solutions that address the most pressing needs (reduce farm-based gas emissions and a transition to a sustainable primary industry sector), with solutions "at the frontier", using the best tools available. A key tool, in widespread use internationally, is the use of gene editing technology. Current regulations form a major barrier to use of this technology in New Zealand and pose a very high barrier to the innovation needed for New Zealand researchers to provide the primary industries with solutions specific to the unique New Zealand landscape. If the Government is serious about New Zealand being a global innovation hub and supporting a transmission to a sustainable economy, it urgently needs to review the relevant regulations.

Q2: Through diversifying our economy, reducing reliance on the primary sector for GDP

Q3:

- Well defined career pathways for graduates, more incentives to employ Eearly Career Researchers, lower overheads on full cost recovery grants, secure pay for graduate work
- Incentivise diversity and support more training against unconscious bias
- Promote wide engagement and leadership by a diverse group of people
- Factor in the time/administration costs for funding schemes and minimise these
- Increase outreach, for example through television, social media and other outlets that highlight diversity (subjects, ethnicity & gender), and the impact of R&D. Broadcast e.g. professorial lectures on late night TV.

Researching and innovating towards the frontier

Question 4:	Do you agree that the RSI Strategy should be focused on innovation at the "frontier" (creating new knowledge) rather than behind the frontier (using existing knowledge to improve the ways we do things)?
Question 5:	In which research and innovation areas does New Zealand have an ability to solve problems that nobody else in the world has solved? Why?
Question 6:	In which areas does New Zealand have a unique opportunity to become a world leader? Why?
Question 7:	What do you consider to be the unique opportunities or advantages available to the RSI system in New Zealand?
Question 8:	What RSI challenges are unique to New Zealand, that New Zealand is the only country likely to address?
Question 9:	What are the challenges of innovating in the public sector? How do they differ from those in the private sector?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Q4: Innovation at the "frontier" and existing knowledge are connected. It is not necessary to separate the two. Much could be done converting current international knowledge to a NZ context.
In the comments on the NSSI 2014-2024 it was pointed out that not only does NZ invest less than the rest of the OECD in R&D (as %GDP), but also invests just 8% of that R&D expenditure to untargeted funds; other SAE's invest more than twice that (Figure 1). (https://royalsociety.org.nz/assets/documents/RSNZ-Comments-on-Draft-NSSI.pdf).
For example, with historic funding success rates for the Marsden Funding at just 7-10%, a lot of very high quality projects are unfunded. This causes lost opportunities to expand the frontiers of knowledge, some of which will have direct impacts for the aims of the NSSI. Sustainable increases in the Marsden fund in particular, but also the Endeavour Fund and the Health Research Council as indicated in the draft document, will therefore be of very high importance not only because of generation of new knowledge but also if New Zealand is to be a magnet for talent.

Q5-8: New Zealand has a distinct geographical location, biodiversity and ecosystem, which provide unique opportunities for research. Opportunities clearly arise through high-value products (primary industries and others), building on New Zealand's already strong reputation.

Our key challenge – Connectivity

Question 10: Do you agree that a key challenge for the RSI system is enabling stronger connections? Why or why not?

Please type your submission below.

Figure 3 clearly shows that while research organisations are well connected (as shown by publications and authorships) businesses are well below international averages. Increasing connectivity of businesses to research providers to facilitate innovation is a key challenge. This is related to the low rate of investment (by international standards) of businesses in R&D – it has long been recognised that a challenge for New Zealand is to increase business R&D. For research organisations, CoREs and NSCs (as well as MBIE/HRC Programme and Targeted Funds) already enable strong research connectivity. This has greatly benefited the high productivity of the NZ research sector.

Figure 3 shows that building business connectivity within NZ and also internationally is a key challenge.

Guiding Policy – Excellence

Question 11:	Do you agree with the definition of excellence presented here as the best thing possible in its context? Why or why not?
Question 12:	How can we achieve diversity within our research workforce? What are the current barriers preventing a diverse range of talent from thriving in the RSI system?
Question 13:	Do you agree that excellence must be seen in a global context, and draw from the best technology, people, and ideas internationally? Why or why not?
Question 14:	Do you agree that excellence is strengthened by stronger connections?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Question 11: Excellence is defined as "the ongoing pursuit of the best thing possible" but the document also states that excellence "resists a single definition …" which is slightly confusing. Clarification would be helpful.

Question 12: Contributing to the lack of diversity is the lack of a clear career pathway – other career pathways look more attractive. Because of the pace of advances and the need for technical skills, people who take time out of the work force for example to raise a family are disadvantaged and that will contribute to lack of diversity.

The increasing focus on consortia, while important for translation and impact, often runs counter to bringing diversity to a problem as the 'leaders' tend to engage with people they know/previous collaborators who are often people that resemble the leader. Furthermore, involvement and leadership of consortia often requires quite a bit of 'smoozing' – this is often time consuming and ill-defined, therefore if people are not part of the 'club' it can be difficult to break in.

Question 13: In general we agree that excellence should be seen in a global context. We agree that excellence cannot apply broadly to all activity or researchers but it should always be aspired to.

Question 14: Yes.

Guiding Policy – Impact

Question 15: How can we improve the way we measure the impact of research?

Please type your submission below.

The definition of impact used in the draft document is too narrow. It should be expanded to acknowledge that fundamental advances in knowledge can also represent an important impact. This is often the main impact of research funded through mechanisms such as the Marsden fund or PBRF, at least in the short term. The statement that "In the research sector, all of our publicly funded research should have a strong line of sight to impact" should therefore be modified or removed.

Furthermore, a greater emphasis should be placed on 'system impact', not impact of an individual or a given grant.

Guiding Policy – Connections

Question 16:	Where do you think weak connections currently exist, and what are the barriers to connections at present?
Question 17:	What actions will stimulate more connectivity between parts of the RSI system?
Question 18:	How could we improve connections between people within the RSI system and people outside it, including users of innovation, and international experts, business communities, and markets?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Q 18. Connectivity brings a cost, of at least time and usually money, associated with interactions between different people. This cost can be high. Improving connections therefore requires incentives for different people to engage with each other. For businesses incentives will primarily be financial, through perceived long term benefits that merit an initial investment of time/money and/or through funding of some description to cover the costs of initial interactions. A key challenge is building connectivity in a time efficient manner that increases the possibility of building connectivity for a greater number of scientists.

Funding schemes that required interactions between businesses and research providers, for example for pilot schemes for exploring innovative ideas, could be one approach. A second approach would be fellowships designed to incorporate both academic and business aspects, that could lead to longer term connectivity. Such a scheme could be overseen by an organisation such as the Callaghan fund. This is already in place for PhD students, it could also be extended to postdoctoral researchers.

For connectivity to promote productive research outcomes, it requires a medium-long term timeline. A key factor contributing to poor connectivity is the absence of a clear career structure for graduates. The current environment of short term contracts and deep career instability leads to a high attrition rate of graduates from the system and the failure of knowledge to be retained or efficiently passed to the 'next set of hands'. We applaud the recognition of the need to develop, support and retain researchers but recommend a stronger link is made between this need and the ambition for a more connected science system.

Actions – Making New Zealand a Magnet for Talent

Question 19:	How can we better nurture and grow emerging researchers within New Zealand and offer stable career pathways to retain young talent in New Zealand?
Question 20:	How could we attract people with unique skills and experience from overseas to New Zealand?
Question 21:	What changes could be made to support career stability for researchers in New Zealand? What would be the advantages and disadvantages of these approaches?
Question 22:	Do you agree with the initiatives proposed in the Strategy to support and attract talented researchers and innovators? Are any changes needed for these initiatives to be successful? Are there any other initiatives needed to achieve these objectives?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Question 19. This is a key question for the Strategy. Our students (both undergraduate and postgraduate) bemoan the lack of a clear career pathway in science, which is a powerful disincentive to a career in science. A second problem is the large amounts of student debt. New Zealand graduates are world class and consequently many of our best and brightest work overseas for the above reasons – in addition, salaries can be higher, allowing debt to be paid off more quickly, and larger markets have more job opportunities.

New Zealand therefore needs to work harder at being a magnet for our own talent. This means not just providing pathways but ensuring students have the skills that match the needs of the research/innovation sections of our economy.

An obvious approach is to provide a fellowship scheme akin to the Rutherford Fund, as indicated in the document, but extended to non-academic settings. The main disadvantage of such an approach would be that it would cost money though if it was partly co-funded by businesses that would benefit then that would reduce costs.

Therefore our best opportunity to attract and retain top quality talent from NZ and internationally is to have more fellowships schemes that are both vertically (career stage) and horizontally (fundamental-translational) integrated. We should not back one aspect of the pipeline at the expense of others. These could be leveraged towards achieving other asects of the the RSI policy, and could include:

-a properly supported national postdoctoral fellowship scheme for NZ trained scientists

-internationally targeted postdoctoral fellowships

-targeted industry partnership fellowships at the postdoctoral level

-career break fellowships supporting individuals returning from paternity leave

-Further fellowship opportunities at the early, mid and late career stage

It should also be noted that current full cost recovery funding models within Marsden, HRC

and the MBIE Endeavour Fund make it challenging in Universities to provide full-time salary at the postdoctoral level or above because of other research costs and overhead charges. An increased focus on connectivity, potentially leading to a larger teams (more AIs) and costs associated with interactions, will further increase pressure within the budgets providing a further disincentive for top young researchers to work in New Zealand. A process to ensure that the funding mechanisms provide sufficient support, and that increased focus on connectivity does not further decrease opportunites for early- and mid-career researchers, will be required.

A second major challenge is to develop a clear national "pro-innovation" culture that is open to adopting cutting edge frontier technologies. A clear example is gene editing that is being rapidly adopted in many countries and has great potential to transform many fields, such as ameliorating climate change. A blanket "no" to new technologies, with no risk/benefit analysis, is a direct barrier to innovation but also gives the impression of an "anti-innovation" culture that is an "anti-magnet" to the innovative people the Strategy is looking to attract.

Actions – Connecting Research and Innovation

Question 23:	What elements will initiatives to strengthen connections between participants in the RSI system need to be successful?
Question 24:	What elements will initiatives to strengthen connections between participants in the RSI system and users of innovation need to be successful?
Question 25:	What elements will initiatives to strengthen connections between participants in the RSI system and international experts, business communities, and markets need to be successful?
Question 26:	Are there any themes, in addition to those proposed in the Strategy (research commercialisation and international connections), that we need to take into consideration?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Question 25. Currently international research connections commonly arise from New Zealanders spending time overseas (often for postdoctoral training). It would be good if a system where opportunities for international researchers to spend time in New Zealand were developed, for example through better funding for postdoctoral researchers. (See response to question 19.)

Actions – Start-up

Question 27:	How can we better support the growth of start-ups?
Question 28:	Do the initiatives proposed in the draft Strategy to support growth of start-ups need to be changed? Are there any other initiatives needed to support start-ups?
Question 29:	What additional barriers, including regulatory barriers, exist that prevent start-ups and other businesses from conducting research and innovation?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Question 29: The HSNO Act is a major barrier to the use of frontier gene-editing technologies. While research with gene editing can be carried out in contained laboratories, it is not realistic at present to consider release of gene edited organisms despite the potential benefits that they could bring. Use of gene editing has high potential to reduce greenhouse gas emissions from agriculture.

The relative inaccessibility of the DHBs to research, and the current lack of a national system to review and implement new health technologies is a barrier to start up companies in the health sector who struggle to get research materials and clinical data from DHBs and face severe obstructions when trying to implement new technologies. This has the effect of deterring new health start ups and forcing more activity off shore.

Actions – Innovating for the public good

Question 30:	How can we better support innovation for the public good?
Question 31:	What public-good opportunities should our initiatives in this area be focused on?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Actions – Scale up

Question 32: What is the best way to build scale in focused areas?

Question 33: Do the initiatives proposed in the Strategy to build scale in focused areas need to be changed? Are there any other initiatives needed to build scale?

Note: see following page to comment on possible areas of focus

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Scale up – Choosing our areas of focus

For this draft iteration of the strategy, **we seek input on the selection of possible areas of focus**. We will consider establishing around five focus areas, but, depending on the eventual selection, are likely to introduce them over time, rather than immediately. In addition to the criteria set out in the Strategy document, we invite stakeholders to consider the following factors in their suggestions –

- The ambition of this strategy to focus efforts in the RSI portfolio at the global frontier of knowledge and innovation.
- Ways in which the RSI system can accelerate progress on the government's goals.
- The focus areas already determined by *From the Knowledge Wave to the Digital Age*.
- Work already underway where we are already seeking to build depth and scale in the RSI system.

The following areas could be a useful start, and are highlighted in *From the Knowledge Wave to the Digital Age:*

- **Aerospace**, including both autonomous vehicles and our growing space industry.
- **Renewable energy**, building on recent investments in the Advanced Energy Technology Platform.
- **Health technologies** to improve delivery of health services and explore opportunities in digital data-driven social and health research.

We invite comment on these suggestions and welcome input on other possible focus areas.

Please type your submission below.

Actions – Towards an Extended Vision Mātauranga

This section of the draft Strategy signals our intention to consult and collaborate further with Māori stakeholders to co-design our responses and initiatives. From that perspective, we consider the signals in the draft Strategy to be a start, rather than a set of final decisions. Nonetheless, we are keen on initial feedback in the following areas.

Question 34: Does our suggested approach to extending Vision Mātauranga focus in the right five areas? If not, where should it focus?

Question 35: How can we ensure the RSI system is open to the best Māori thinkers and researchers?

Question 36: How can we ensure that Māori knowledge, culture, and worldviews are integrated throughout our RSI system?

Question 37: How can we strengthen connections between the RSI system and Māori businesses and enterprises?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

This section could be expanded to more explicitly emphasise partnership and information sharing between Maori and research organisations and businesses.

Codesign is not always practicable for some types of research and yet obligations for developing Maori talent and being responsive to Maori remains critical. This should be more strongly emphasised.

The different roles of the research institutions and individual researchers in promoting Vision Matauranga needs to be discussed. Both groups must contribute, but their roles and expectations may differ depending on the research discipline (eg. public health vs quantum physics).

Actions – Building Firm Foundations

Question 38:	Do the current structures, funding, and policies encourage public research organisations to form a coordinated, dynamic network of research across the horizons of research and innovation? What changes might be made?
Question 39:	Is the CRI operating model appropriately designed to support dynamic, connected institutions and leading edge research? What changes might be made?
Question 40:	What additional research and innovation infrastructure is necessary to achieve the goals of this Strategy? What opportunities are there to share infrastructure across institutions or with international partners?
Question 41:	What elements will initiatives in this area need to be successful?

Please type your submission below. If applicable, please indicate the question(s) to which you are responding.

Actions – General

Question 42: How should the Government prioritise the areas of action, and the initiatives proposed under each area?

Please type your submission below.

General

Question 43:	Do you have any other comments on the Strategy which have not yet been addressed?

Please type your submission below.