**From:** no-reply@mbie.govt.nz
**Sent:** Sunday, 10 November 2019 2:58 p.m.
**To:** Research, Science and Innovation Strategy Secretariat
**Subject:** Draft Research, Science and Innovation Strategy submission
**Attachments:** Online-submission-form-uploadsdraft-research-science-and-innovation-strategy-submissionsSimon-Granville-submission-form-research-science-and-innovation-strategy.docx

Submission on Draft Research, Science and Innovation Strategy recevied:

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

Individual

**Name**

Simon Granville

**Name of organisation or institutional affiliation**

Victoria University of Wellington

**Role within organisation**

Senior Scientist

**Email address (in case we would like to follow up with you further about your submission)**

simon.granville@vuw.ac.nz

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

Researcher

**If you selected other, please specify here:**

**Gender**

Male

**Ethnicity**

NZ European

**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)**

**If you selected other, please specify here:**

**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.**

**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.**

## Researching and innovating towards the frontier

| | |
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| **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.**

(Addressing Questions 4-8): I agree that the RSI Strategy should be focused on innovation at the frontier, but the strategy document worryingly describes this aspect of the strategy in terms of NZ going it alone – "...solving problems that nobody...is likely to investigate...", "...making the most of opportunities unique to us..." and "...investigating areas where NZ is the only country lkely to do so..." This makes it look disconnected from one of the other major parts of the proposed RSI Strategy, "..building stronger connections within this system and beyond..."

It does of course make sense for NZ funding to have a focus on NZ problems and areas where NZ has competitive advantages, but we cannot afford to lose projects, platforms and researchers that link us in to international networks - even if we are not the world leaders in these areas, or where NZ does not have a special ability to solve problems that no-one else can solve, or where there are no immediately obvious unique opportunities or advantages for NZ. It is increasingly vital that we can train people in sectors of GLOBAL importance, and not just focus on what NZ does now, and what we think we need at this moment in time. We have no idea what future skills, networks or industries might be important to NZ's interests in 5 or 10 years time - who would have thought, 5 years ago, that aerospace would be in the government's 2019 RSI strategy document as a proposed priority area for NZ? Or before that, that NZ's technology sector would be so successful that it is now on track to out-earn dairy in 5 years?

The RSI strategy needs to ensure we are able to take advantage of these unexpected and often unpredicted (by most) opportunities, and the way to do that is to foster excellence and capability within NZ in areas of global importance. Then we will have the connections to participate in these areas as they develop on the international level, we will be well placed to identify opportunities for NZ at an early stage, and as long as we have researchers with

skills and knowledge in these areas, we will have the maximum chance to capitalise on these opportunities – giving NZ a great flexibility to adopt new technologies, build new industries, and implement the changes that will improve our lives and protect our environment.

## 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.**

YES, very much so. As said on p 14, "…competitive funding (can) create dynamism and the opportunity for new ideas." But NZ's research environment is so intensely competitive (success rates as low as 10% for funding of excellent research, as for instance in the Marsden Fund) that it acts to disincentivise making connections, except within excellent mechanisms that explicitly prioritise connections, like the CoREs and NSCs. We are too small to make progress effectively alone, and stronger connections will lead to much more effective decisions about the research we will undertake, with much better outcomes for NZ. Making better connections within NZ as well as internationally will also mean we can deliver much greater impacts by better leveraging what we can put in.

## Guiding Policy – Excellence

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| **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.**

(Addressing Question 12): With a national postdoc scheme there is an opportunity to use it to work towards diversity targets. Postdocs will become the future research leaders and innovation role models in NZ, and a national scheme with targets for diversity would circumvent a lot of the factors within the university and CRI system that have meant a consistent underrepresentation of women, Māori, Pasifika and many other groups in research hires. Embedding diversity at this level will ensure these talented people will become a permanent part of the NZ research workforce rather than drop out or leave at the end of their studies, when they see there is no way for them to stay doing what they know.

# Guiding Policy – Impact

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

**Please type your submission below.**

As acknowledged in MBIE's Impact of Science discussion paper, impacts often lag the science that leads to them by many years, and discoveries or new technologies are eventually found to be extremely impactful in ways that were totally unpredictable at the time the research was done. As such it's a huge mistake to conclude that "all of our publicly funded research should have a strong line of sight to impact.." (RSI Strategy page 28). Today's technological world is built on advances that had no such line of sight at the time they were developed – the internet, lasers, wifi... There needs to be a lot of room for such science and technology to be developed, and then room for it to be explored for applications. If we decide the application before we've even done any research, we're only ever going to deliver today's technologies, incrementally better.

## Guiding Policy – Connections

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| **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.**

(Addressing questions 16-18): There is an intense level of competition for very low success rates of funding within NZ, so this always acts in opposition to better collaborations and connectivity. In the funding mechanisms in NZ, the small amounts of funding per project also mean that there is a cost to those who do seek to buid those connections to collaborate on a project – bigger things that involve more people cannot be done with the same amount of funding that a smaller group would get. The CoREs and NSCs have been excellent for getting people to work together rather than just compete over scarce resources, and the recent addition of mechanisms such as the Marsden Fund Council award mean that a small number of research projects in NZ can afford to build the networks to address bigger problems than previously were possible to address. These models need to be continued and extended to improve connections. These could certainly be expanded to include international experts and business communities within NZ as co-partners.

One area where connections are weak or difficult is sharing resources across research institutions, such as specialised equipment. Facilities are hard fought for by individual research groups, and there is no incentive to share access, or to make them available to NZ businesses. There is no system to allow for joint purchasing of or access to equipment that could be truly transformative for various sectors, so each research institution can only acquire what it can afford alone. There is a major need for national facilities or a national research infrastructure fund with the explicit condition that the equipment will be available for others. Along with these national facilities there needs to be stable funding for experts to run them, otherwise they will fall into disrepair or it will fall to PhD students to run them. When they are finished, the student will leave and the capability will be largely lost. In the physical sciences an example to look at very closely is the Australian National Fabrication Facility (ANFF). A strong first step would be to fund a small cluster of capability in NZ that could become an associate 'node' of a larger trans-Tasman or international network such as ANFF.

There could be value in setting up fellowships for NZ-based researchers to live and work overseas for some time before returning home. Personal connections are always important, and in parts of the world that NZ is wanting to build better connections to, the in-person connection is particularly highly valued. Getting NZ researchers to exchange more with China, south-east Asia, and other major trading/research partners will mean that NZ will be at the top of the list for new opportunities when they arise. Lastly, incentivising researchers to build better connections is not enough - there are too many competing demands on

researcher time already. Making connections also needs to be made EASY, or it will fall into the too-hard-to-be-worth-it part of researchers' to-do lists.

# 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.**

(Addressing Questions 19-21): Emerging researchers are few and far between in NZ simply because of the lack of funding to support them (e.g. no postdoc positions). NZ may be a place talent wants to live, but there is practically no room for such talent until an existing researcher retires and is succeeded - not a frequent enough occurrence to be viable. Talented PhD students who may have broken new ground in a field, or started an exciting new idea, cannot seize upon that when their studies are done. Without stable funding to allow these early-career researchers to mature, they will never be retained in NZ, nor will we attract talent from elsewhere. Rutherford Discovery Fellows are tomorrow's stars – but most will end up as academics or CRI researchers rather than entrepreneurs. The RDF scheme is an excellent one for attracting top talent, but it should be on top of a much wider platform of funding to support a healthy field of early career researchers who will go on to boost the RSI system in NZ across universities, CRIs and firms. The lack of this platform means there simply are not the number of skilled researchers retained in NZ that we need. There needs to be the reinstatement of a national postdoc scheme that supports more than just 10 excellent researchers each year – this is far too small a number for making an impact in all the places NZ should have it.

# Actions – Connecting Research and Innovation

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|---|---|
| **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.**

(Addressing Questions 23-26): Connections cannot simply be another criterion to fill in on funding applications - there are already enough of those that have appeared in recent years without the support or guidance of HOW to go about these things. It can be frustrating to be asked to add something new to your proposed project when you don't know how to do it, and is simply another in an increasing set of demands on researchers' time that take them away from doing research. Perhaps some proportion of allocated funding should be specifically intended for connection building activities.

## 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.**

(Addressing Question 27): If we want to encourage start-ups then the obvious thing is to establish a postdoctoral/early career researcher fellowship scheme at a national level. Students are rarely at the stage they can develop an idea or technology from their MSc or PhD work into a product or company, and university or CRI researchers who spend their time and effort commercialising research are at a disadvantage compared to their non-commercialising colleagues because of what these sectors incentivise (publications, not companies). Postdocs have the knowledge to really develop something new to where it can be spun out and commercialised, and they are not yet fixed in their careers so they are the natural pool of talent to do this. The lack of these early career positions in NZ means there is no-one to take research out of the lab. If we retained our students as postdocs, able to build their ideas to the point of starting a business, there would be a lot more start-ups coming out of research labs. NZ is probably the easiest place in the world to start a business - let's also attract more overseas early career talent to do that – attracting established academics to start companies is not going to work with the incentives they have within universities (e.g. PBRF rewards papers, not spin-outs).

# 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.**

(Addressing Questions 30-31): NZ's regulatory environment is consistently rated top in the world for ease of doing business, and this is not the problem compared with the lack of incentives for researchers to work with businesses on research, and the lack of access start-ups have to the capabilities they need. There need to be national facilities that are well equipped to address business needs and that are staffed by experts who can run these facilities for all-comers. There needs also to be better accessibility and coordination of major research infrastructure between research institutions, to avoid unneeded duplication of these facilities, and so NZ gets the best bang for the buck. We have no collaborative national facilities like ANFF in Australia.

## Actions – Scale up

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|---|---|
| **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.**

(Addressing Question 32): Perhaps the best way to build scale is to make the connections to the international networks in these areas. This will quickly get NZ researchers into the game, and will greatly speed our ability to build up scale in NZ while not needlessly duplicating what we can access internationally.

(Addressing Question 33): The renewable energy focus in the RSI strategy document needs to be broader than just producing energy renewably - this is something that vast resources internationally are put into, so NZ needs to be open to investing in related areas like energy-efficient design and energy-efficient advanced technologies. I support the concept that, while there are focus areas for new funding, at least the current level of support for non-focus areas should continue, lest we be too narrowly focused and miss out on new technology sectors that no-one knows about yet, but which could be extremely important to NZ in the future.

# 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.**

# Actions – Building Firm Foundations

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|---|---|
| **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.**

(Addressing Question 38): The answer is clearly NO. Investment decisions by research institutions are made based on their internal needs, and coordination on such decisions is exceedingly rare and difficult to do because of the lack of incentive to coordinate, and the fact that institutions are all competing against each other. CoREs and NSCs have been successful at cutting through the disincentives to coordinate, and should be supported and boosted. A national infrastructure fund with coordination between and access for multiple institutions as a requirement would help, or equally national facilities that are open to all.

(Addressing Question 40): Joining international networks such as Australia's ANFF would be an easy way to share infrastructure and build better connections while avoiding wasting resources on duplication.

# 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.**

In order of urgency

- a postdoc scheme that has clear targets for building diversity in NZ's early career research (ECR) workforce
- a national infrastructure fund or providing better coordination for research infrastructure investments, and
- fellowships for NZ researchers/entrepreneurs to be embedded within other research groups nationally or internationally, or within NZ businesses

These are the most important initiatives for building a better nationally and internationally connected RSI sector in NZ, for attracting and retain talented researchers in NZ at a time when they have the most flexibility in their career and life choices, to provide the skilled people that NZ businesses need, to make best use of our scarce funding resources, and to embed diversity into the early career researcher cohort who will become NZ's future research leaders and role models.

# General

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

**Please type your submission below.**

An additional indication of success in diversifying the RSI workforce should be the number of ECRs involved in or leading investment proposals and funded research projects. This will be the first sign that talent in RSI is being attracted and retained. If there are diversity targets in a national postdoc/ECR scheme, the number of women and Māori involved in leading proposals/projects would also be a good first indicator that it is starting to work.