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| **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 3:52:36 p.m. |
| **Attachments:** | Online-submission-form-uploadsdraft-research-science-and-innovation-strategy-submissionssubmission-form-research-science-and-innovation-strategy-v7.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**
Professor Dan Tompkins

**Name of organisation or institutional affiliation**

**Role within organisation**

**Email address (in case we would like to follow up with you further about your submission)**
dant@pf2050.co.nz

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

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

**Gender**
Male

**Ethnicity**
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.**

**Question 1**

The greatest contribution from the RSI system (actually, equally priority with the response to Question 2), would be to drive the much-needed transdisciplinary approaches needed for most effectively addressing the critical priority environmental, social and economic risks and challenges that New Zealand faces:

- For example, in the environmental sector, the majority of resourcing is sequestered by a relatively few disciplines that have been dominant in the past, in which innovation and breakthroughs are now few and far between. Yet there is now compelling evidence that incremental improvements alone are vastly insufficient for overcoming the risks and challenges faced.
- True transdisciplinary research is one powerful way in which innovation is being made globally, and better support for currently under-strategically-funded areas of research for the environment would empower such for New Zealand. Historical areas continuing to sequester the majority of resources while window-dressing with other areas of needed research is not sufficient.
- And it's not just a matter of funding research activity – capability building in under-supported areas is needed for such activity to occur at the required level of quality.

**Question 2**

Another major contribution from the RSI system (actually, equally priority with the response to Question 1), would be to drive greater focus of the limited resources available in the applied research sector on directly addressing the critical priority environmental, social and economic risks and challenges that New Zealand faces:

- Reverse the trend of applied research strategic funding increasingly being used for academic pursuits without direct (or sufficiently supported indirect) pathways to application for New Zealand benefit;

- Reverse the trend of applied research strategic funding increasingly being used to support as wide a range of historical capability as possible, rather then being invested in new capability in a forward-looking manner for NZ benefit;
- Not consider publications as outcomes of applied research strategic funding. While essential for underpinning and quality control, they are not the purpose of applied research strategic funding – rather, outcomes are real-world differences made.

**Question 3**

Additional activities to accelerate the progress towards the Government's priorities include to:

- Enforce that agencies in charge of allocating government strategic research investment employ transparent, objective, unbiased and inclusive processes of doing so.
- Enforce that those processes are based on true intervention logic (and not simply only labelled with that term), whereby the Government prioriites are the starting points and research programmes constructed backwards from those (rather than working forwards from researchers wish-lists).
- Enforce increased investment in the communication of research findings to, and engagement with, both outcome stakeholders and the general public to drive greater real-world impact from the uptake of research outputs and the education benefit that can be achieved from research activities.
- Address the issue of charge-out-rate blow-out in the research system, in part driven by agency middle management accrual such that more resource is spent on internal activities rather than actually getting on with the job of delivering research outputs to stakeholders for impact against *their* priorities.

## 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.**

**Question 4.** Yes

**Question 5.** One research and innovation area in which New Zealand has an ability to solve problems that nobody else in the world has solved is pest management and biosecurity. This is because we are in the unique situation of having an agricultural and natural environment based economy that is facing critical threats from both legacy pests and new incursions, yet we have a world-clase research system. So our need is intense…yet such pressure drives innovation for which we have the system of sufficient quality to provide.

**Question 6.** New Zealand likewise has a unique position to maintain its world leader status in pest management and biosecurity, that is currently at risk from too great a focus on last-century's research approaches. There is a critical need for a Centre for Biosecurity and Pest Management to effectively drive the innovation required, rather than the current splintering of effort across agencies that leads to poor coordination, duplication, business-as-usual and a failure to drive innovation, and essential research falling through gaps.

**Question 7.** Being a small country with a developed research system is a unique advantage, meaning that the effective construction of applied research programmes to deliver impact against stakeholder priorities is eminently do-able.

**Question 8.** None come to mind.

**Question 9.** One key challenge is the tendency for institutions to regress to perceived safer business-as-usual research, rather than accepting (or even embracing!) the greater risk of innovative research. Such behaviour can also be promoted through a lack of focus on national priorities, but rather a focus on individual and institute priorities which can additionally hinder the development of the new capability needed to address national priorities.

# 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, enabling stronger connections is a key challenge. But it is more than this – it is the enabling of the right connections needed to deliver the best outputs that create the biggest impacts against national priorities. And ensuring that the polarities of those connections are such that national priorities are driving research and not vica-versa.

Disagree that the National Science Challenges have helped increase the scale and nature of connection across the domestic sector. The vision was spot-on, but in application they have been dominated top-down by vested interests that are actually inhibiting rather than encouraging innovation in the research system in favour of business as usual. Stakeholder engagement has also been carefully managed to allow dominance of vested interests over driving the development and initiatives needed to best address national priorities.

## 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.**

**Question 11.** Agree with the definition of excellence, but disagree with the statement that "investment in research and innovation, especially that funded by the government, should be concentrated on achieving excellence". With limited resourcing for research and innovation, the primary focus needs to be on Impact, otherwise resources are spread too thinkly across the academic spectrum with no area having the focus to achieve the potential impact that could be made (as acknowledged in the Impact section). And with the ever-increasing issues that New Zealand faces, delivering impact has to be priority. Excellence has an essential secondary place, underpinning and providing quality control for impact. This position does not preclude 'Horizon 3' research, but rather encouraging researchers to think about pathways to applications and impacts for their blue-skies ideas will be highly beneficial.

**Question 12.** As noted in previous responses, a critical barrier is the dominance of vested interests preventing the capability development needed in non-dominant areas.

**Question 13.** Excellence must definitely be seen in a global context. However, Excellence with regards to research activity in New Zealand should focus just as much (if not more) on research applying knowledge that is novel to New Zealand (innovations made off-shore) for the benefit of New Zealand. Only focussing on the innovation that we can accomplish on-shore, and excluding the 99+% of innovation that occurs off-shore, will be greatly harmful to New Zealand's chances of addressing and achieving its priorities.

**Question 14.** Excellence can be strengthened by stronger connections, but the nature of those connections is equally important. Simply generating more and stronger connections without any consideration of their nature, would most likely decrease Excellence.

# Guiding Policy – Impact

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

**Please type your submission below.**

Impact should be based solely on real-world difference made, or predicted real-world difference that can be appropriately supported (with the evidential-basis required to support longer-term impacts being less than that required to support shorter horizon impacts). Publications (or other solely academic activities) per se should not be considered in any way as measures of impact.

## 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.**

**Question 16**

Not necessarily weak, but very highly selective connections currently exist between the stakeholders addressing NZ's national priorities and the research community. This is due to too much influence by the established research community over the strategy for government research investment, biased to enabling those stakeholder connections that support the strategic direction(s) that the researchers want to take (normally in support of business-as-usual), and biased against those who support different directions. In many cases there is increasing divergence between strategy dictated by institutional priorities and national priorities; thus this is a critical 'connection' issue that needs remediating.

**Question 17**

Encouraging the right kinds of connection should take priority over simply stimulating more connectivity.

**Question 18**

Break-down the information silos generated by vested interests. Knowledge-flow should be open and unbiased, based on robust scientific and other research principles, and not dictated by individual or organisational priorities or politics. Ensure that opportunities for engagement and support are open to all on a level-playing-field basis. Steps towards both of these will only occur if MBIE pull-back more control of strategic government investment from research providers, who invariably operate in a way that maximises benefit to their own priorities, politics and business rather than to New Zealand's priorities.

Also, ensure that much greater proportions of budgets for strategic applied research are put to the communication of outputs to, and engagement with, stakeholders and the general public (not including academic engagements and communications). The job of communication and engagement should be led by those actually conducting the research.

# Actions – Making New Zealand a Magnet for Talent

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| **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.** Transfer the resourcing for the Rutherford Discovery Fellowships back to post-docs. While the RDF has done very little to attract talent back from overseas that has made a real difference, and has generally funded individuals who would have obtained funding from other sources anyway, that transfer of funding away from postdocs greatly inhibited the retention of quality graduates in the New Zealand research system.

**Question 20.** Provide leading NZ academics and applied researchers, in the areas where capability development is most needed, with resources to 'head-hunt' and support promising up-and-coming overseas researchers and, to a lesser-extent, mid-career oversees researchers to direct the capability buidling in those areas where current capability is most lacking. It is those individual connections that matter most for the identification of the talent that will best benefit NZ.

**Question 21.** Reducing overheads at institutions will allow more researchers to have more stable funding on the currently available resources. No disadvantages to this approach. An additional advantage may be reductions in management complexity leading to the better alignment of research activities to national priorities rather than to institutional priorities. Resources specifically for mentorship of new researchers would also provide much needed support at the early career stage.

**Question 22.** Agree with the proposed initiatives. As noted above, mentorship structures for early-career researchers are also needed.

## 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.**

**Questions 23, 24, 25 and 26.** Very few individuals can act as successful conduits between researchers, users of innovation and international opportunities. Such research-institute-independent 'Knowledge Brokers' need to be identified, given a high degree of responsibility and empowerment, and supported at an appropriately high level (with their own network to assist each other and obtain additional support where needed) to facilitate the best connections for the most valuable benefits. Independence from both research providers and innovation users would be critical to maximise benefit to New Zealand.

## Actions – Start-up

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| **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 27.** The proposed planned actions are very good.

**Question 28.** Start-ups need to be given a mechanism to influence what sort of capability development occurs at the research-provider end of the applied research system, to ensure that New Zealand builds the capability and conducts the research that they need.

**Question 29.** The level to which research institute charge-out rates have grown, and the frequent requirement of businesses to resource researchers at their charge-out rates for engagement to happen, is a major barrier to the required information and innovation flows needed for business (both start-ups and in general) to maximise benefit from the RSI system.

# Actions – Innovating for the public good

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| **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.**

**Question 30.** Please refer to the responses to Questions 1, 2, 3, 10, 16 and 18.

**Question 31.** The two opportunities identified in the draft strategy, kaitiakitanga of our biological heritage, and health system delivery, are supported as areas where new innovative missions are needed to address public good opportunities. An additional one, identified in the response to Question 6, is pest management and biosecurity where a new Centre for Biosecurity and Pest Management would overcome critical issues with the current situation (see Question 6 response for more details). Such an initiative would greatly benefit both public-good and the private sector.

## 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.**

**Question 32.** The considerations mooted for building scale are all supported. In addition, greater focus on priorities and the underpinning capability needed for the future (rather than continual support for business-as-usual) should be driven throught current SSIF investments. The RSI system would have a very weak case for additional SSIF funding if it can't drive appropriate and best use of current allocations.

**Question 33.** In some instances, building scale may not be sufficient for the desired outcome. Where current efforts are fragmented across the research system, new Centres that collate those efforts together where they can be most efficient and leverage one another may be needed.

# 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.**

The suggestions for renewable energy and health technologies are both supported as areas of focus. The suggestion for aerospace as an area of focus is not supported, as New Zealand is highly unlikely to be able to compete with overseas efforts with much larger resources in this field, while all of NZ's needs could be met far more effectively and efficiently by utilising international services.

Relecting previous responses, "Pest Management and Biosecurity" is mooted as an additional focus area. Current investments in this area are not preventing new damaging incursions to both biodiversity and agriculture, both areas of critical importance to NZ's social, cultural and economic wellbeing, and are not sufficient to meet legacy pest control requirements such as Predator Free 2050 and Wilding Pine control. In this instance, an additional need for a Centre for Biosecurity and Pest Management is identified as necessary to overcome critical issues of the current situation of fragmentation across the research system (see Question 6 response for more details).

## 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.**

**Question 34.** Yes.

**Questions 35, 36 and 37.** See responses to questions 18 and 23. Also, the key issue facing Māori stakeholders and researchers is capacity limitation. Far more investment is needed at the education and training stages, both to get more school leavers into STEM subjects and then give support for research training, and thus increase the number of individuals with the quality, skills and experience needed to progress Vision Mātauranga goals and maximise benefit for Māori.

# 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.**

**Question 38.** No. See previous responses. In summary, current structures, funding and policies are too dominated by vested interest and business-as-usual. Equal opportunity and open and transparent processes are needed. The National Science Challenges are not fulfilling the purpose for which they were envisaged; rather than promoting innovation they are inhibiting it. They should thus be closed down. Innovation to address priorities could perhaps be driven by new outcome-focussed initiatives in which the stakeholders, rather than the researchers, drive the setting of priorities and activity areas.

**Question 39.** CRIs are no longer operating for the purpose for which they were commissioned. Rather than being lean and agile, driving innovation for New Zealand, vested interest leads to the consolidation of business-as-usual and continuance of historical research areas with limited potential for innovation, while inhibiting the new capability development and research needed to best address national priorities. Cooperation between CRIs continues to be very poor. Overhead and management bloat means that more money is spent on internal processes than helping addresss NZ priorities. The move to reduce competition through core and SSIF funding has backfired, giving CRIs the opportunity to persue strategies supporting personal, institutional and business priorities, rather than investing in the best manner to deliver to NZ priorities. To address this, MBIE should (1) pull control of SSIF investment back from the CRIs, and (2) drive reduction in researcher overheads.

## 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.**

Smaller-scale actions will not deliver the required benefits until the larger RSI system structural issues are addressed. This comment applies solely to the applied research system (principally Challenges and CRIs). The fundamental research system is performing well.

# General

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

**Please type your submission below.**

Very encouraged by what is an excellent draft strategy. However while it frequently alludes to the major structural issues of our RSI system, it would be far more impactful if it were to address them head on.