

From: no-reply@mbie.govt.nz
To: [Research, Science and Innovation Strategy Secretariat](#)
Subject: Late submission on draft RSI strategy
Date: Friday, 15 November 2019 3:15:21 p.m.

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

Organisation

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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

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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)?

Around 320

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.

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Research, Science and Innovation Strategy

Summary of Scion feedback on the draft Research, Science and Innovation Strategy

November 2019

Korihi te manu, tākiri mai i te ata, ka ao, ka ao, ka awatea! Tihei mauri ora!

The birds sing in the trees, the morning has dawned, the day has broken, behold there is life!

Scion welcomes the opportunity to comment on the draft Research, Science and Innovation Strategy.

We strongly support the aspiration to lift investment in RS&T both from the private sector and from Government and the formation of a coordinated and dynamic network of research across the horizons of research and innovation; we offer some thoughts on how this could be achieved. It is encouraging to see a focus on retention of skilled people within the system and an increasing acknowledgement of the importance of diversity and inclusion. We also support the intention to achieve enduring and sustainable increases to existing funds including SSIF.

This strategy represents a strong change in focus and thinking for the government's investment in research, science and innovation which is proposed to support innovation "at the frontier" and not application of that knowledge – in five, yet-to-be-defined focus areas. We are concerned that by taking this approach the research needs in many areas of importance to New Zealand will not be addressed by this strategy and that knowledge will not be translated into impact. This is because creating impact generally happens behind the frontier and only with a large amount of effort, further research and innovation to make it fit-for-purpose.

We believe that **only** a co-innovation approach with Māori will create value for Māori and define what is meant by economic and environmental sustainability, health and well-being for Māori. We are also concerned that Māori are not seamlessly integrated into the RSI system – addressing Vision Mātauranga still appears to be superficial. **Vision Putaio** (mātauranga=knowledge, putaio=science) would be a more appropriate focus for Māori science-focused policy.

The key points of our submission are summarised below.

Priorities

- Selection of the areas of focus will be crucial to the success of this strategy. The Government has identified 12 priority areas, with a strong focus on wellbeing, but there is little in the document directed towards those priorities. There is risk in narrowing our focus too much, particularly in the context of our crucially important primary sector. Does this redirection of focus suggest that our current National Science Challenges (and CRI Statements of Core Purpose?) are no longer addressing the right areas?

- New Zealand has a unique opportunity to be a world leader in a circular bioeconomy: we are well placed to harness the opportunities of climate change (e.g., better growing conditions); we have strong bio-based skills in R&D and in small-scale manufacturing; we have an opportunity to lead in integrated value chains, packaging (due to reliance on exports) and renewable energy; ease for collisions between different science and industrial activity areas; some NZ-unique aspects such as a wide ocean area of responsibility; some unique species; Māori; and other diverse perspectives that can easily be translated to actions. We are a small enough society to transition rapidly and relatively easily due to our small population.
- Government should prioritise where New Zealand has advantages (not just uniqueness) and leverage off the direction most of world is taking – a bioeconomy based on new carbon and climate change drivers. New Zealand has a distinct advantage in its historical biological expertise. There is little specific activity where New Zealand is truly unique and can gain any kind of advantage – the advantage arises from synergies. Research, Science and Innovation is a building-block process; often the big impacts come from combining science and technologies to create new ways of doing things.
- The strategy suggests four areas that are most likely to extend what New Zealand is capable of doing (solving problems nobody else in the world has solved; capitalising on new opportunities where nobody else is yet successful; making the most of our unique opportunities, such as geology, biodiversity, and our heritage of mātauranga Māori; and investigating areas where New Zealand is the only country likely to do so). While some support across all four areas is appropriate, the greatest impact for New Zealand is likely if the last two points are prioritised.
- However, the document is silent on the advantages for New Zealand in small-scale, just-in-time manufacturing which is close to the biomass resource or consumer (e.g., distributed manufacturing or 3D printing and mass customisation). The world is changing fast – this direction not only fits New Zealand, but we have distinct advantages.
- Given the strong social and cultural aspects to the stated priorities, social and mātauranga Māori research will be essential; these are too often overlooked in the RSI system—often treated as add-ons to help deliver otherwise biophysical research outcomes rather than core, integrated components of the research.

Where Support Should Focus

- The RSI Strategy should balance innovation at the frontier and adapting and adopting valuable science behind the frontier. By its very definition, knowledge at the frontier cannot remain there – it falls behind the frontier very quickly into the realm of adapt and adopt. Adaption/adoption cannot solely be supported through industry-led initiatives – mission-led research plays a key role. The strategy needs to connect the whole RSI ecosystem through to adoption, e.g., Industry Transformation Plans and extension services – not only science but also knowledge transfer.
- If the bulk of government funding is for innovation at the frontier and industry is expected to fund the bulk of implementation behind the frontier, this leaves a huge void for research that is well ahead of industry but is not at the frontier. It is this middle ground that has the potential to provide the biggest impact for New Zealand.

- Compared to the NSSI (2015), this strategy proposes a significant shift away from mission-led research, with both SSIF and the Endeavour Fund moving towards investigator-led research. Mission-led research is the vehicle to deliver impact.
- Assuming that the shift towards investigator-led research is to support the proposed shift to innovation at the frontier, how will mission-led research be supported?
- We agree with the “Start up Scale Up” aspiration as described. However, we question the consistency of the two areas of focus, which emphasise New Zealand’s unique competitive advantage and need, versus the suggested “useful start” for investment, which includes “aerospace” and “health technologies”. We see little connection between these suggestions and the two areas of focus. We advocate that innovation missions creating new economic potential, developed from our traditional national strength of primary production, would be significantly more impactful (e.g., robotics and automation, sensing technologies and additive manufacturing).

Issues About the System

- We agree that impact should be placed at the heart of the RSI strategy, however, impact delivery arguably lies behind the frontier – so is it really addressed by this strategy? Creating impact generally happens behind the frontier and only with a large amount of effort and further research and innovation to make it fit-for-purpose.
- Measuring impact is the only way to know what has been realised from the investment in a particular area of work. However, we are not well equipped to do this within the New Zealand system. Impact evaluation needs to be embedded across the whole RSI system. This will mean a significant culture change for some organisations.
- The RSI system is too complex – it needs to be simplified. Despite its complexity, continuity of funding for an idea initiated within an investigator-led programme is difficult; there is no clear pipeline. How does research generated in the Marsden Fund, for example, then transition through the system to generate impact?
- We challenge the strategy’s assertion that existing funding mechanisms are “fit-for-purpose”: we challenge – whose purpose? Certainly not the CRIs’. We question how this shift towards investigator-led research will lead to tangible benefits for New Zealand in the short-medium term. It will be very difficult to develop larger, applied programmes of work that will deliver significant impacts and demonstrate innovation (such as biosecurity) via mechanisms such as the R&D tax incentives.
- New Zealand needs aligned, long-term programmes of work (e.g., transition to a circular bioeconomy) which the very large reliance on a contestable funding system is unlikely to deliver. The mission-led CRIs are competing for these funds against entities where most of their revenue is from secure sources. System issues are dictating how entities operate today. This becomes very important in the current climate of disruption and change: climate change; new industries; the bioeconomy; circularity; trade shifts; rise Māori in investment; increasing diversity of New Zealanders; IT and enablement of credible data on products; new manufacturing that is smaller, agile and localised; automation; New Zealand’s distance from the world; Gen-Z activism; circular cities and new urban designs; and lagging policy and regulations in both government and local government areas.
- We do not agree that improving connections within the RSI system is the biggest challenge. There are many examples (and many cited within the document) to show

that we collaborate extensively both nationally and internationally. We do agree that policy settings discourage connections between organisations and contend that **connectivity is a symptom, rather than the cause**, of structural issues surrounding funding, IP and poor coordination. Roles and expectations of actors within the RSI system should be clear and collaboration encouraged, not duplication.

- The challenge within the RSI system, therefore, is not connections but one of leveraging those connections for impact. The problem is that collaboration and partnership for impact are not as strong as they need to be.
- The RSI system is structured to encourage competition among researchers which is intended to create “dynamism and the opportunity for new ideas”. However, it also disincentivises collaboration among researchers as they try to retain as much funding as possible for their own areas.
- We don’t believe that the NSCs are encouraging collaboration broadly enough in the RSI system. Many organisations feel excluded, often because of the widely different approaches taken by each NSC or the direction being too narrow.
- The Partnerships mechanism was a highly successful mechanism to build connections between industry and researchers. It supported industry-led, Horizon 2 research (particularly in the primary sector) which is now a major gap in the RSI system. Reinstating a scheme similar to Partnerships.
- We strongly support a definition of excellence that is not based narrowly on academic degrees, publication statistics, reputation or ability to attract funding. However, how excellence plays out in the RSI system does not appear to be consistent with the definition provided. The overall understanding of excellence in the RSI system, and its application as an assessment criterion, needs to be improved.
- New Zealand is very poor at infrastructure investment compared to others – the government needs to invest much more in scale-up facilities without an expectation of direct return. Their advantage is helping shift industry and business to more profitable activities and to support risk taking.

People and Talent

- Retaining, building and attracting talent needs to be a key pillar of this strategy. We need to be globally competitive with infrastructure that is fit for purpose (we look forward to the outcomes of the infrastructure review to identify issues and opportunities). However, instead of focussing solely on attracting global talent, there should be a greater focus on retaining talent that is already in New Zealand.
- There are also many issues outside of the RSI system that influence whether a researcher will come to/stay in New Zealand, both positive and negative. Many people love the New Zealand lifestyle, and will accept lesser conditions to enjoy the country, its relaxed culture and multiple opportunities. However, it is not always easy for whole families to adjust. Immigration policies around minimum salary thresholds are also limiting our ability to attract young scientists.
- To retain talent within New Zealand, we need to take a long-term approach to science funding (10-15 years) and give young people a chance to develop and establish a career within a stable funding context. We need to give emerging researchers at the beginning of their careers the opportunity to win funding specific to their needs – including mentorship and to exchange and interact globally from New Zealand.

- However, new and early career researchers should not be defined narrowly by age, university enrolment or recent completion of a post-graduate degree. We need to support people who change to research after practical science careers or those who conduct research based on skills and knowledge learned outside formal institutions, including mātauranga Māori practitioners.
- The strategy's focus is on attracting the brightest and the best researchers – but we also need to focus on attracting highly-skilled technicians and technical officers into the RSI system. There is currently no real career pathway for this important group of people. They are specialists, but at a level that is not acknowledged at all in the RSI strategy.

Vision Mātauranga

- We believe the RSI strategy should go beyond the Vision Mātauranga policy, and into a co-innovation framework. It is important this is done via a co-design approach to all activities in this area. Mātauranga Māori is New Zealand's only distinctive knowledge system. How do we elevate Māori science knowledge to a place of equal status to sit alongside the rest of the science that we do? The VMCF is so small that it doesn't even appear on the RSI investment diagram – sending very strong messages to Māori that despite the VM policy, they aren't important in science.
- Strong impact for Māori can only take place if Māori have been involved in the design of a research programme, and if the design has made way for a Māori space to exist and flourish inside the programme. Otherwise western epistemology will dominate and impact will be reduced. For this reason, western approaches have been challenged as culturally unsafe and inappropriate for Māori. This creates space for a conversation around how can the RSI system build more culturally appropriate space (physical, cultural, and scientific) to unlock Māori potential?

Nāku te rourou, nāu te rourou, ka ora ai te iwi.

With your basket and my basket the people will live.

Submission form 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 priorities included 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: Where can the RSI system make the greatest contribution towards the transition to a clean, green, carbon-neutral New Zealand?

The RSI system can best enable the transition to a clean, green carbon-neutral New Zealand through the support of long-term, mission-led programmes aligned to delivering a positive transition. These programmes need to be clear on the required contribution to the mission and the RSI system needs to appropriately fund the science and the infrastructure needed to deliver. Clarity of purpose and a level of certainty around funding is essential if impact and opportunity are to be realised.

The system will best enable the transition by supporting the adoption and adaptation of technology from overseas as well as invention. The system should also support invention in areas that others won't, e.g., country specific risks and responses, our flora and fauna. There are many areas of research and innovation that will be needed to deliver a positive transition for all New Zealanders. We would suggest that those should be captured and an analysis undertaken of who and how they might be delivered through to impact. The RSI system needs to address mission-led as well as investigator-led research and how it should support activities across all three horizons.

More specifically within that mission, we need to adopt a circular bioeconomy approach appropriate for a country with high biomass resources such as ours. To give New Zealand a trade advantage and ensure we meet our climate commitments we need to:

- Mitigate climate change and the effects of climate change, with a strong focus on planting more trees both for products and carbon sequestration, adding value to our fibre resource, and utilising biomass as a feedstock to replace current petroleum inputs.
- Focus on sustainable land and resource use and environmental improvement, including valorisation of waste.
- Protect our asset base from pest and disease incursions.
- Cause digital and high-tech disruption in our traditional industries and developing new industries from that.
- Co-innovate with Māori.
- Drive economic development, especially in the regions using new decentralised models.
- Keep pace and exceed consumer expectations around sustainability and traceability, especially for exports.
- Evolve to sustainable communities and cities with a focus on low-carbon and human wellbeing.

This transition will occur most effectively if it is based on our unique strengths as a country: our primary sector, our abundance of biomass, our unique exotic and indigenous forests, and our wider manufacturing and emerging high-tech industries.

We believe that there is opportunity for this transition to be very positive for New Zealand; however, while we may develop technology solutions, we will need willingness and alignment/connections for this to actually happen. Policy development and governance developments through evidence-based science will be required on this issue.

However, transitioning to a clean, green, carbon-neutral New Zealand will also require significant changes in human and organisational decision-making and behaviour.

In order to measure outcomes from the RSI system in terms of human wellbeing, better indicators and measures of success based on well-being, including measures of intangible social and cultural values will need to be developed and integrated.

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

The RSI system will make a contribution to any priority area where there is investment. The RSI should outline how it will deliver on priorities such as the identified industries that have opportunity for transformation, optimal and mixed land use, thriving and sustainable regions, linking research to supply-chain pull and global market trends.

If the strategy's intention is to narrow focus to areas where New Zealand has a specific need or challenge, then inevitably some areas will not advance. Strengthening international connections can only be a part solution to 'filling the gap' as there is currently no investment to support the initiation and development of the required collaborations.

Selection of the areas of focus will be crucial to the success of this strategy. Given the National Science Challenges were set up to "tackle the biggest science-based issues and opportunities facing New Zealand", is there an implication that these are now no longer the most relevant issues? [See later commentary on Scion's view of the effectiveness of the NSCs and the need for them to evolve.]

New Zealand has a unique opportunity to be a world leader in a circular bioeconomy: we are well placed to harness the opportunities of climate change (e.g., better growing conditions); we have strong bio-based skills in R&D and in small-scale manufacturing; we have an opportunity to lead in integrated value chains, packaging (due to reliance on exports) and renewable energy; ease for collisions between different science and industrial activity areas; some NZ-unique aspects such as a wide ocean area of responsibility; some unique species; Māori; and other diverse perspectives that can easily be translated to actions. We are a small enough society to transition rapidly and relatively easily due to our small population.

Government should prioritise where New Zealand has advantages (not just uniqueness) and leverage off the direction most of world is taking – a bioeconomy based on new carbon and climate change drivers. New Zealand has a distinct advantage in its historical biological expertise. There is little specific activity where New Zealand is truly unique and can gain any kind of advantage – the advantage arises from synergies. Research, Science and Innovation is a building-block process; often the big impacts come from combining science and technologies to create new ways of doing things.

However, the document is silent on the advantages for New Zealand in small-scale, just-in-time manufacturing which is close to the biomass resource or consumer (e.g., distributed manufacturing or 3D printing and mass customisation). The world is changing fast – this direction not only fits New Zealand, but we have distinct advantages.

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

1. Structure

Provide long-term funded programmes that align to the Government's objectives.

Also, the language being used should not reference old sectors or refer to the sectors separately. The language should be cross-sectoral, referring to new sectors coordinated with the identified opportunities in the Industry Transformation Plans, e.g., additive manufacturing and distributed smaller-scale manufacturing are new sectors that could play a significant role in transforming existing sectors.

2. Reduce complexity

To deliver on government priorities, there is a need for the system to be more effective in placing investment where it needs to be directed. With a country of New Zealand's size, and the ever increasing cost of research, science and innovation, it is important that the RSI system avoids duplication and supports the assembly of the best teams.

The RSI system is too complex – it needs to be simplified and transaction costs reduced by targeting investment to appropriate research organisations, thereby reducing competition and duplication and increasing productivity. It was a stated intention of the NSSI to reduce complexity in the RSI system, however the opposite has occurred since it was introduced in 2015.

Despite its complexity, continuity of funding for an idea initiated within an investigator-led programme is difficult; there is no clear pipeline. How does research generated in the Marsden Fund, for example, then transition through the system to generate impact? How is a connection developed within the Vision Mātauranga Capability Fund then supported into a research programme of relevance to Māori if that research doesn't meet the excellence criteria of the Endeavour Fund? How do you transition research from a Smart Idea into a Research Programme if the 'stretch' occurred within the Smart Idea? The system is disconnected and lacking direction. We support the intention of the strategy to underpin the government's priority areas – but be clearer how the investment mechanisms can seamlessly transition relevant science from the frontier and behind the frontier (see later discussion) through to impact.

3. Support mission-led research

Compared to the NSSI, we have seen a significant shift away from mission-led research, with both SSIF and the Endeavour Fund moving towards investigator-led research.

According to the NSSI, "mission-led science is undertaken towards a particular policy aim or goal... The value of this type of research can be clear but may be far in the future and is typically geared toward broad public benefit. Benefits could accrue through policy and practice, and in social and environmental spheres, as well as through commercially viable outputs. In New Zealand, the scale of the science required will often necessitate coordination of resources at a national level.

Government's role here is as a principal investor where there is a significant public benefit element (e.g., research into characterising the environment, understanding global processes and their impact on New Zealand, or health issues) that would otherwise face a lack of investment. Mechanisms may need to encourage collaboration, and account for

non-commercial returns, or seek to encourage private sector co-funding where appropriate. Where there is a long-term mission, a mechanism providing for long-term funding stability is required.

Beyond discussion of establishing “innovation missions to address public good opportunities” in the public sector, the strategy is silent on the need for mission-led research more broadly. Mission-led research is how CRIs deliver impact; this is across all three horizons and should be an explicit component of the RSI Strategy.

With the apparent shift in SSIF and Endeavour investment, this leaves the primary vehicle for mission-led research as the National Science Challenges. The NSCs are difficult to access unless you are ‘in the club’. The quantum of funding across 11 discrete areas is insufficient to support the significant gap in the mission-led space. Instead of supporting long-term aligned programmes, the amounts are small and spread amongst a large number of organisations and activities within each programme.

The draft strategy states that the existing funding mechanisms are “fit-for-purpose”: we challenge – whose purpose? Certainly not the CRIs’. Since the Endeavour Fund has been opened up, and moved away from addressing specific critical issues for the country, we have seen a significant increase in the proportion of this fund being accessed by the universities. We question how this shift towards investigator-led research will lead to tangible benefits for New Zealand in the short-medium term.

It will be very difficult to develop larger, applied programmes of work that will deliver significant impacts and demonstrate innovation (such as biosecurity) via mechanisms such as the R&D tax incentives as industries are fragmented. The R&D incentive, although contributing significantly to the overall funding landscape, will focus research on smaller, more targeted areas.

New Zealand needs aligned, long-term programmes of work (e.g., transition to a circular bioeconomy) which the very large reliance on a contestable funding system is unlikely to deliver. The mission-led CRIs are competing for these funds against entities where most of their revenue is from secure sources. System issues are dictating how entities operate today. This becomes very important in the current climate of disruption and change: climate change; new industries; the bioeconomy; circularity; trade shifts; rise Māori in investment; increasing diversity of New Zealanders; IT and enablement of credible data on products; new manufacturing that is smaller, agile and localised; automation; New Zealand’s distance from the world; Gen-Z activism; circular cities and new urban designs; and lagging policy and regulations in both government and local government areas.

CRIs were set up to hold the capability critical to New Zealand’s success. Simon Upton, as their political architect, envisaged significant ‘line’ or ‘core’ funding. As contestability has developed, with increasingly high transaction costs the system has resulted in the unstable career structures that this strategy is now attempting to address.

Yes, CRIs receive devolved funding, but it has been static for 10-15 years, and is not nearly sufficient to establish, retain and grow the capability New Zealand needs. We address the CRI operating model later in the submission.

4. Increase funding

Richard Walley, in his consultation in Rotorua, stated that the funding systems are “not optimal”, the “instruments are not big enough” and that this strategy was not considering “major new funds”. We agree that there is insufficient funding to support New Zealand’s

areas of critical need. It is encouraging to see that the Government intends to increase investment by \$1.6B by 2027. While we would like to see a reduction in complexity in the funding mechanisms, there is a clear gap in the mission-led space. We would like to see SSIF increased substantially and predominantly funding mission-led research. We would like to see more transparency into the areas receiving SSIF investment to ensure areas of critical need are supported.

5. Social and mātauranga Māori research

We have an opportunity to be leaders in ethical and equitable governance by innovating governance systems and processes that are more transparent and built on partnerships with Māori. Given the strong social and cultural aspects to the Government's twelve stated priorities, it is essential that social and mātauranga Māori research sit alongside and are embedded throughout biophysical research programmes.

Social research and mātauranga Māori science are too often overlooked in the RSI system—often treated as add-ons to help deliver otherwise biophysical research outcomes rather than core components of the research that are integrated throughout. The government has made some progress towards the inclusion of Māori science and Māori interests in science through the Vision Mātauranga statements in MBIE funding applications and similar efforts in other avenues of government funding. This should be expanded. As well, similar questions asking applicants to consider and explain the potential social and cultural (beyond Māori) implications and needs of their research would help encourage better integration.

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.

We feel that the goal of being at the “global frontier” of research by 2027 needs to be much clearer, to focus on those areas where there is a New Zealand opportunity or need. We lead in a number of areas but lag behind in many, particularly in the application of science and technology, that could make a significant difference for New Zealanders.

In many ways, the goal of 2% of GDP is not ambitious enough. If we are not going to commit to investing 3% of GDP (like Israel) then we risk spreading ourselves too thinly as innovation at the frontier is much more expensive and risky than innovation behind the frontier. We could create much greater impact by having 50% of our research aimed at fast following that adapts promising technologies to the New Zealand situation (and ensuring they are implemented) and investing a smaller amount, say 50%, at the frontier.

How will innovation behind the frontier be supported under this strategy?

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)?

No, we do not agree that the RSI Strategy should only be focussed on innovation at the frontier – it should be a balance between science at the frontier and adapting and adopting valuable science behind the frontier. We believe there should be one strategy only, with different components highlighted as necessary. We do not believe that the Industry Transformation Plans discussed in the strategy “From the Knowledge Wave to the Digital Age” should be separate from the overall RSI Strategy. Indeed, discussion of start-ups in the RSI Strategy tends to contradict the assertion that they are separate. The RSI Strategy acknowledges that there needs to be “flexibility and cross-contribution across both

strategies". We contend that they should be combined to form one strategy addressing the entire research and innovation value chain.

If the two strategies are kept separate, it is very unclear how it is intended that knowledge at the frontier is then translated to impact. By its very definition, knowledge at the frontier cannot remain there – it falls behind the frontier very quickly into the realm of adapt and adopt. Adaption/adoption cannot solely be supported through industry-led initiatives – mission-led research has a key role to play here (see earlier discussion).

To get the maximum benefit from all the relevant new research being generated globally, we must ensure lessons from overseas are applied here—even if they are no longer considered the frontier on an international scale. Applying existing ideas from overseas in ways that are novel in New Zealand and adapted for New Zealand contexts can still represent science 'stretch' and contribute greatly to our RSI system progress and impact.

Lastly, but very importantly, most of the government's stated research priorities are not primarily about industry – they are about **public benefit, sustainability and wellbeing**. This leaves a significant gap where behind-the-frontier research supporting social wellbeing, environment and conservation is omitted from either strategy.

Behind the frontier

Our primary-industry research also requires long-term trials and collection of baseline and monitoring data which require support well beyond the current short-term funding cycles (5 years) but form the foundation data used in our research. For example, New Zealand is only now reaping the rewards of long-term site productivity trials in the forestry sector which were planted 30 years ago.

This type of work may not represent the frontier itself at any scale, but it is essential to enable novel work at the frontier and can often result in serendipitous transformations. Yet this area of applied practical (and excellent) science has been under-funded and piecemeal, meaning that many datasets remain fragmented and incomplete. In the case of LiDAR, for example, even the recent funding made available from central government still relies on councils to lead and provide co-funding for LiDAR mapping to be carried out on a region-by-region basis. As a result, coverage will still be incomplete. The 'user pays' philosophy to funding applied research means there is no strategic approach to investment, no benefit from economies of scale, and no benefit from the synergies that comprehensive datasets can provide. The strategy should identify the actors within the overall RSI system and how to leverage them through collaboration not duplication.

Another example of national importance/public good research is pest and disease management such as Myrtle Rust. This work is of vital importance to our country, but is not supported through any funding mechanism since interdepartmental science funding was cut from the budget. It is encouraging to see this identified again as an important part of the RSI system provided sufficient funding is made available.

There is a risk that focusing on the frontier will mean we fail to maintain the underlying resources and capability necessary both to remain competitive internationally and to have impact domestically. Thus, the RSI system must carefully balance the needs of research both at and behind the frontier, prioritising work that will provide the greatest benefit for New Zealand.

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?

New Zealand has the opportunity to solve problems in areas where we already lead, usually due to a long-term investment in capability in supporting existing sectors of our economy or where we have unique attributes. Examples include fire research where we lead because we have a regulatory environment that supports outdoor controlled burns, biosecurity because of our national approach to this, forestry and all that we can make from trees due to a very long-term investment in science in this area, etc.

We feel the question should be “what do we need to solve for ourselves?”, what are our priorities? We proposed the following:

- Protect our primary asset based – New Zealand is built on this.
- Agricultural emissions issues.
- Social and wellbeing issues, including health.
- Co-governance models.
- Distributed manufacturing.
- Issues related to our unique environment, flora and fauna.
- Volume to value in the NZ context.
- Issues and lessons due to our remote geographical location to other nations. Our proximity to Southern Ocean for Southern Ocean research.

Question 6: In which areas does New Zealand have a unique opportunity to become a world leader? Why?

- Where we can leverage our strengths – ours are strongly in the land based sector. We need to protect and grow our asset base – this will always be fundamental to New Zealand’s prosperity.
- The circular bioeconomy because we have always been primarily a bioeconomy and we do not have large legacy issues around existing fossil fuel/petrochemical industries.
- Biosecurity research - nearly 10% of the world’s publications in Scopus are from New Zealand. Because the problem is so complex there are many spin off areas of research that can be applied to other domains, hence driving innovation throughout the economy.
- Bioinspired products, e.g., medicines. In addition to our introduced species we have a very ancient fauna and flora in New Zealand and there are probably many bioactive compounds that would have benefits in medicine, high-value foods, enzymes etc.
- Niche areas such as packaging, required for our context as an expert economy at a distance from market.

Question 7: What do you consider to be the unique opportunities or advantages available to the RSI system in New Zealand?

We have easy access across our people (2 degrees of freedom) and also to influential persons, so ideas and feedback should in theory flow quickly. For example, we as researchers can get an audience with our Ministers, Prime Minister etc. much more easily than other large nations (some of our international colleagues are very jealous of this), yet our researchers also gain entry to global stages and their connections attend important OECD events that smaller nations might not have as much influence at. In New Zealand it is

relatively easy to cross discipline boundaries. We also operate in a more cross-the-value-chain approach than other countries that tend to have systems that are more focussed on specialist areas.

Question 8: What RSI challenges are unique to New Zealand, that New Zealand is the only country likely to address?

- Our unique environment, flora and fauna
- Issues and lessons due to our remote geographical location to other nations
- Wai262 and Treaty issues

Question 9: What are the challenges of innovating in the public sector? How do they differ from those in the private sector?

In the public system all our science is carried out under contract with deliverables. This means that any innovation needs to happen prior to setting the contract terms. The appetite for risk is also not well aligned with innovation (a similar challenge that large corporates have with being innovative).

For Scion we need funding to allow us to pursue our mission as outlined in our Statement of Core Purpose. Our SCP states that we are here to drive innovation and growth yet most of our government funding is aligned to investigator-led or fundamental research rather than also supporting how the research will be adopted through to impact. The RSI strategy needs to highlight the expectations of different parts of the system and what they are expected to contribute. CRIs are well connected but funding is not well aligned to our mission to deliver impact for New Zealand. In the private sector there is a much greater focus on expected outcomes and funding decisions are fully aligned to those.

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.

We do not agree that improving connections within the RSI system is the biggest challenge. There are many examples (and many cited within the document) to show that we collaborate extensively both nationally and internationally. We do agree that policy settings discourage connections between organisations and contend that the lack of connectivity is a symptom, rather than the cause, of structural issues surrounding funding, over-competitiveness and poor coordination.

The challenge within the RSI system, therefore, is not connections but one of leveraging those connections for impact. The problem is that collaboration and partnership for impact are not as strong as they need to be.

Some policies have created 'sectoral silos' in the primary sector and duplication of effort at multiple points in each sector, including RSI. This structure also stifles innovation, as niche initiatives that do not sit within an existing sectoral regime struggle to find support, or are left to languish on their own. Even within sectors, dominant players or ideas make it difficult for funding or resources to be provided to support 'non-traditional' sectoral issues or research fields (e.g. organic dairy, sheep dairy, land-based aquaculture, indigenous species research). The New Zealand Government's policy and economic arms need to be faster to adopt, or cause, disruption.

We feel that the biggest issues facing the system are the lack of integration between the funding mechanisms, the highly contestable environment, the overall lack of funding and the lack of long-term programmes aligned with New Zealand's future objectives (ie mission-led research with stable funding).

The system is structured to encourage competition among researchers. As the discussion document notes, competition is intended to create "dynamism and the opportunity for new ideas". However, it also creates disincentives for collaboration among researchers from different organisations, which have strong motivation to capture as much funding as possible for themselves and not to share with external researchers. For the same reasons, there are also challenges collaborating within organisations. Individual researchers must compete with each other for funding, recognition and a better chance at the next funding opportunity.

These issues are not due to a lack of desire to connect by researchers, but barriers that have been put in place by the system.

As an example, Scion frequently collaborates with other CRIs and universities, and has an extensive range of international collaborations. Our connections with the forestry and wood processing industry sector are strong and positive, as they are with the waste management, plastics, packaging, manufacturing and energy sectors. We also have strong connections to various Government departments (MPI, MfE, MoT, MBIE), Government agencies (EECA, NZTE etc.), industry associations such as NZFOA, FFA, WPMA, BANZ etc. We frequently undertake commercial contract work for industry and government. We also work with local government (RDC/RLC/HBRC/BOPRC).

One area we feel is not helping with connections as much as was expected is the National Science Challenges. We would suggest that the Challenges adopt common approaches to engaging with researchers and enhancing the connections that they can. The Challenges are not transparent compared to the Endeavour or Marsden Fund.

The tyranny of distance and funding international connections is a key barrier and a potential reason for perceived poor performance in this area. Expectations of these, and the funding used, should be made more transparent so that perceptions can be overcome as well as continuing to develop the expected relationships.

PROACTIVELY RELEASED

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: Do you agree with the definition of excellence presented here as the best thing possible in its context? Why or why not?

We strongly support a definition of excellence that is not based narrowly on academic degrees, publication statistics, reputation or ability to attract funding. These are often poor indicators of excellence and do not apply equally across the RSI system. Importantly, they prejudice judgements against certain fields, particularly mātauranga Māori-based research and expertise, which are not accurately measured by these metrics. They also emphasise quantity of production over quality of tangible impact.

However, how excellence plays out in the RSI system does not appear to be consistent with the definition provided here. Excellence (beyond excellence of methodology and approach) is currently synonymous with risk and 'stretch'. It is clearly stated that applied research can and should be excellent – however it is challenging for some of this work to pass the excellence gate in the Endeavour Fund – as it is seen as incremental. The overall understanding of excellence in the RSI system, and its application as an assessment criterion, needs to be improved.

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?

We don't believe diversity is an issue in the CRI system. Our workforce is highly diverse. Scion employs staff from a wide range of ethnicities, countries of origin, genders and orientations, religions, cultures, backgrounds, experiences and interests – but we appoint the best person for the role. We don't believe in diversity for diversity's sake. The criteria to securing a position are knowledge, experience, qualifications and team fit. The main barrier preventing people thriving in the RSI system is retention of such a diverse workforce (covered later in the submission). Factors governing a person's departure from the RSI system are often outside its boundaries.

If there is perceived to be an issue with diversity in the context of Māori and Pacifica then there needs to be fundamental, system-wide, long-term change that encourages those groups to pursue a science career.

If the intent is to increase those who whakapapa to Māori, then we need to accept that mātauranga Māori is a valid part of science in New Zealand, strengthen what we do in the education system, and have consistency right through 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?

Excellence must be seen at multiple scales, including but not limited to, a global context. The appropriate scale or scales of judgement must be appropriate for the specific issues being addressed, the research programme and the outcomes desired. A research project which addresses globally-universal challenges, such as development of a new biomaterial or pharmaceutical, should be judged in the context of the global challenge and global research competition. However, a research programme that is unique to New Zealand contexts, such as those dealing with mātauranga Māori, native species or specific cultural and political challenges, must be judged accordingly. It is important that we carry out excellent research that meets New Zealand's needs.

Question 14: Do you agree that excellence is strengthened by stronger connections?

Yes – connections are one aspect of excellence - but there are many others.

Guiding Policy – Impact

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

Please type your submission below.

We agree that impact should be placed at the heart of the RSI strategy, however, impact delivery arguably lies behind the frontier – so is it really addressed by this strategy? To us, this is a philosophical question – as we contend that this strategy should encompass innovation at and behind the frontier.

Measuring impact is the only way to know what has been realised from the investment in a particular area of work. However, we are not well equipped to do this within the New Zealand system. This is for the following reasons:

- We do not consistently plan for impact – nor monitor our progress towards impact. Impact evaluation is primarily a compliance activity.
- We are not required to dedicate resources to impact planning and evaluation through our current funding mechanisms.
- The RSI system has not encouraged development of impact planning and evaluation skills.
- The RSI system incentivises academic excellence over impact delivery.
- We struggle to quantify impact beyond economic to social, environmental and cultural impacts.

Impact evaluation needs to be embedded across the whole RSI system. This will mean a significant culture change for some organisations, whereas others are already moving towards an evaluative culture. However, impact evaluation is a term that gets ‘bandied about’ a great deal without a good understanding of what it really means or involves. Because impact delivery is central to the CRIs’ purpose, a project has been initiated via the Impact Planning and Evaluation Network (iPEN) to develop a collaborative approach to delivering more impact. This project involves five workstreams:

1. Creating an Aotearoa-New Zealand evaluation framework
2. Sharing resources and tools
3. Sharing training
4. Influencing culture
5. Communicating the importance of impact

A way to help embed an evaluative culture into the science and innovation system is for government funding agencies to shift from compliance reporting to evaluative reporting, ensuring that part of the grant investment should be on designing and testing that it has made a difference somewhere. However, a key issue is that when the funding ends – who pays for ongoing evaluation?

At the grants stage:

- There needs to be clearer guidance for people writing proposals about the pathway to impact – what exactly does this mean and what information is really needed here? We need better guidance on how to evaluate work within an impact framework, which is often subjective, especially when impacts cannot be monetised easily.
- Adopt an impact pathway model (eg the Beyond Results programme logic diagram) and ask for this to be included in proposals. If research organisations are asked to

monitor the pathway to impact, then this will start to become more routinely thought about.

We feel there needs to be a better balance between ex-ante and ex-post evaluation. Currently (at least with MBIE-funded programmes) there is no evaluation of what a research programme actually achieved beyond information contained within the last annual report. There is certainly no attempt to come back a few years down the track to assess how the results were taken up. Ex-post evaluations maybe of more value at a system-wide level, perhaps on a regular 10-year cycle?

We believe NZRIS has to be linked to the measurement of impact to achieve consistency, minimise duplication of effort in the system and support decision making on where Government needs to invest, acknowledging that attribution is a key issue.

Regarding the Endeavour Fund, we are concerned that the focus on excellence is cutting out programmes with high impact.

PROACTIVELY RELEASED

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.

Question 16: Where do you think weak connections currently exist, and what are the barriers to connections at present?

See comments under Question 10.

Regarding NSCs, below are some quotes from our staff:

[From document, Page 29: *“We have structures within our research and innovation system that already encourage deliberate, coordinated collaboration, such as the National Science Challenges, and we think they are working well..”*]

- Totally disagree with this statement – the NSCs have major issues, not with a few but with most of them. They certainly do not enable collaborative efforts – we have several examples across multiple NSCs where we have struggled to engage and collaborate in the science, due to lack of willingness by NSC chairs to engage, or by the NSC direction being too narrow and rewarding past efforts at the expense of including new thinking. They do not work well at all.
- NSCs were established from public input to meet Gluckmann’s call for 10 big questions the nation felt were needed. Therein very little public engagement in the science system and the NSC direction has resulted. It makes engagement in science direction seem meaningless to the public - what do they get out of it?
- NSCs are being run as exclusive clubs, rather than the truly engaged and new thinking endeavours they sought to establish. Much of this is due to the hosts and chairs.

Barriers to connections:

A general lack of funding in the system. If we allocate resources to other organisations, then our own staff may miss out. There are no specific funding allocations to building and maintaining connections. Our staff are focussed on delivery on contracts and winning new work to keep their jobs. The system has no real signals to encourage connections.

Question 17: What actions will stimulate more connectivity between parts of the RSI system?

- The Partnerships mechanism was a really important mechanism to drive connections between industry and researchers. It supported industry-led, Horizon 2 research (particularly in the primary sector) which is now a major gap in the RSI system. Reinstating a scheme similar to Partnerships.
- Invest in areas of importance to New Zealand and extend SSIF as a mechanism to do this. Reduce competition in these vital areas and encourage single contributions in particular areas to get the best team and reduce duplication/waste of effort.
- Limit the hosting of NSCs to a five-year cycle and extend each tranche to five years - this would enable more collaboration and connectivity. If hosts know they only have five years and then need to pass the baton, it would not lead to entrenched positions and protectionist actions in research fields. It would require collaborative behaviours to ensure ongoing participation in the NSC once the hosting role moves on.
- Have the system encourage collaboration not duplication across the CRIs. The competitive funding model reduces collaboration where uncertainty over funding causes staff to be very protective of funding won or funding being bid for as they see that their employment is at risk.

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?

- Simplify the system to truly encourage connections. Make sure the research crucial to New Zealand is not subjected to competition.
- Provide mechanisms that encourage connections between users of innovation – take the bureaucracy out of it.
- Provide dedicated salary funding to accompany the catalyst travel grants to ensure we can develop truly unique collaborations that deliver new frontier knowledge/impact.
- Open up information accessibility (open access) so more people can connect with RSI results and provide devolved funding to the CRIs to reduce competition and costs associated with bidding. This would stop the protectionist and non-sharing aspects of the RSI system that limit productivity and innovative thinking around the issues.
- Funding to government departments is important and should be based on best teams not a contestable environment, e.g., DoC is a crucial going forward as they manage 30% of New Zealand's land estate and there are a huge number of pressures on this land, e.g., tourism, mining, biosecurity (weeds etc). New Zealand's reputation and much of our wellbeing as a nation are linked to the health of these places and our ability to enjoy them. DoC is a significant owner of land that could be, in part, used for carbon farming.
- The partnership approach between industry and MPI via the GIA should be expanded. A simple way to do this would be for MPI to apportion 20% of the SFFF budget for biosecurity research. That would allow the investment in the B3 partnership to double – there are extensive governance and accountability measures in place to support that quickly.

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.

We see this as one of the key challenges (the other being supporting mission-led research that includes that needed to develop implementation pathways). We are in a global war for talent and our people are highly mobile.

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?

Attracting New Zealand students into science is difficult. The expectation is that they will face low pay, slow career progression and unstable funding. We need to address the system-wide issues that underpin those perceptions. This will not be 'fixed' by isolated initiatives.

We need to take a long-term approach to science funding (10-15 years) and give young people a chance to develop and establish a career within a stable funding context. That is not possible within the standard five- to seven-year timeframe of current funding mechanisms. A lack of funding stability means researchers are placed on short-term contracts, generally on a lower pay bracket.

A significant barrier to new and emerging researchers is the challenge of getting their first funding and research opportunities. The way that competitive funding is allocated steers funding towards those who are already well established in their careers, have strong personal connections and have long track records. Unless well-established researchers are willing and able to share funding, new researchers may spend years struggling to get their first real opportunities.

We need to give emerging researchers at the beginning of their careers the opportunity to win funding specific to their needs - including mentorship. Currently much of the funding that is available for recent graduates, new researchers and early career researchers is in the form of scholarships to support the next level of university training.

Targeted funding is also needed for Masters-level graduates and other early career researchers who wish to do practical, impact-focused research outside of academia as alternatives to longer, academic-focused PhD and post-Doctoral programmes. This could be accomplished through additional specific tax incentives or grants for research which is conducted by new or early career researchers at approved R&D providers. This forms part of an overall pressing need to develop better career paths for researchers active in impact delivery.

Too often, talented people stay in universities to do the research that interests them (i.e., investigator-led) but aren't interested in teaching. They then use grant money to buy that out so our next generation of students is taught by 'paid teachers' that do not have a research role and are not academics. These Rutherford Discovery Scholarships took all of the money that had supported a diverse range of talented people, giving it to a few elite that, in most cases, already had established careers, i.e., early career academics. There was a huge outcry over these when they replaced the FRST post-doc fellowship scheme. This scheme was excellent and something similar should be reinstated.

Importantly, in all cases above, new and early career researchers should not be defined narrowly by age, university enrolment or recent completion of a post-graduate degree. Doing so would exclude support for people who change to research after practical science careers or those who conduct research based on skills and knowledge learned outside formal institutions, including mātauranga Māori practitioners. It would also push people towards pursuing academic degrees rather than prioritising science impact.

Question 20: How could we attract people with unique skills and experience from overseas to New Zealand?

An issue that has recently come into effect are changes to the Immigration laws. Based on these new laws and higher thresholds for minimum salary, 24 out of the 39 internationals recruited to Scion in the last year would not currently be eligible. The international opportunities for Post-doctoral fellows has essentially ceased, we are unable to bring in that new talent. The post-doctoral experience has always been seen as a driver of developing new scientists, often outside their comfort zone. As they go on to work in other countries, they take their New Zealand collaborations and connections with them. Even if the Post-Doctoral Fellow programme is not for long term duration, the ability to recruit these talented international young scientists is critical for New Zealand's growth and international impact.

However, we should focus on making our RSI system as attractive as possible to grow and attract the best talent, **regardless of where they come from**, and then work very hard to retain them; security of long-term funding, remove protective and non-collaborative behaviours and pay them as much as possible.

That said, given its size, relatively high number of researchers and relatively low level of RSI funding, New Zealand will struggle to be competitive with international salaries; therefore, it must compete by providing better opportunities than equivalent overseas organisations. It must be a place where people have a greater chance to have their ideas heard, to test their ideas, and to see their ideas make a meaningful impact.

One approach would be to allow individual researchers a proportion of their time ('free' time) to research topics of their own choosing. Perhaps the best-known case is 3M allowing researchers 15% of their time for topics of their own choosing. Although it appears to give away a lot, it has the benefits of increased motivation and engagement of

researchers, enhanced personal development, and of course what emerges from such work.

Instead of focussing solely on attracting global talent, there should be a greater focus on retaining talent that is already in New Zealand. A high turnover of people can be detrimental as the biggest problems often take 5 to 10 years (sometimes even longer) to solve.

There are also many issues outside of the RSI system that influence whether a researcher will come to New Zealand, both positive and negative. Many people love the New Zealand lifestyle, and will accept lesser conditions to enjoy the country, its relaxed culture and multiple opportunities. However, it is not always easy for partners to find meaningful employment (especially in the regions) and it is hard for young families to move away from the support of extended family. Often, the cost of living is higher than people may have anticipated. New Zealand research organisations also do not offer the health insurance/income protection insurance benefits that many international organisations do. We must find ways to ensure the wellbeing of the whole family such as support mechanisms for partner and children, and better induction processes

Our offering should continue to offer researchers the opportunity to be involved in research that is wider than often founded in specialised research institutes overseas.

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?

Some suggestions from staff:

- More long-term funding and less competitive bidding, together with more auditing of the quality and quantity of the research outputs and regular review of the research direction.
- Rather than the competitive Endeavour Fund rounds, provide \$4M pa to each of the 7 CRIs (\$28m) and provide the rest in a contestable round (noting that Universities have PBRF and CORE funding and should not need to access so much of the contestable funding available to all). This would minimise transaction costs and provide more stability, but smaller research institutes (such as Motu, Cawthron) may miss out. You could also insist on some of the \$4M bulk funding be spent collaboratively on 3rd parties.

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?

We agree with the general intent, however, there is insufficient detail on what the initiatives might entail to provide any real comment.

Regarding the Unlocking Curious Minds initiatives, we agree that this needs to be extended to lock in the progress made with young people. Currently there is no mechanism to continue the excellent work initiated in these programmes. Inevitably, interest will wane over time unless it is followed up with an ongoing programme.

We believe that the New Zealand Certificate in Science (or equivalent) be reintroduced. This was an excellent scheme which provided in-depth technical training over a range of disciplines and skills. This scheme produced highly skilled technicians who undertook the majority of the analytical work for the RSI system. They were specialists, but at a level that is not acknowledged at all in the RSI strategy. The focus is on attracting the brightest and the best researchers – but we also need to focus on attracting technical workers into the RSI system. There is currently no real career pathway for this important group of people.

The quality of experimental data underpinning the RSI system lies largely with technicians/technical officers. During this decade, we are likely to see the last of these formally trained technicians retire from the workforce. We need to ensure that we incentivise young people into these roles as well.

PROACTIVELY RELEASED

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 23: What elements will initiatives to strengthen connections between participants in the RSI system need to be successful?

Initiatives need to be aligned with the objective of strengthening connections, e.g., how will the initiative reward effort or reward outcomes in relation to strengthened connections?

Question 24: What elements will initiatives to strengthen connections between participants in the RSI system and users of innovation need to be successful?

This will need recognition of how to carry out user-led research where the users may not exist (i.e., we as a country need to create them) or where the users do not have the funds to pay. A limiting factor is the ability of many users of innovation (start-ups, small businesses and iwi) to interact with researchers.

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?

New Zealand needs a more strategic approach for choice of international partner countries. If our strategy is to connect more globally to fill the gaps of a narrowed RSI focus, then this will need to be supported through a clear policy and funding.

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 27: How can we better support the growth of start-ups?

We need to better connect the components of the ecosystem with more clarity of the roles of each component, e.g., universities, CRIs, Callaghan Innovation, tech-focussed incubators, accelerators, innovation clusters, pilot facilities... Callaghan's start up/scale up is a good initiative but does not connect all the actors in our ecosystem.

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?

We agree with the "Start up Scale Up" aspiration as described. However, we question the consistency of the two areas of focus, which emphasise New Zealand's unique competitive advantage and need, versus the suggested "useful start" for investment, which includes "aerospace" and "health technologies". We see little connection between these suggestions and the two areas of focus. We advocate that innovation missions creating new economic potential, developed from our traditional national strength of primary production, would be significantly more impactful (e.g., robotics and automation, sensing technologies and additive manufacturing).

Question 29: What additional barriers, including regulatory barriers, exist that prevent start-ups and other businesses from conducting research and innovation?

Scion's proposal around biopilot facilities emphasises the need for any company, including startups, to be able to validate their concepts with testing of products and cost of production. The leap from lab scale to commercial production is too much, particularly for new areas of activity that are not well established here in New Zealand.

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.

Question 30: How can we better support innovation for the public good?

Use the Living Standards Framework as a basis for investment.

Question 31: What public-good opportunities should our initiatives in this area be focused on?

Land use integration. Outreach with knowledge and tools to allow better land use decisions to be made.

Converting the risk of climate change to the opportunity that could come from the mitigation and adaption activities in relation to climate change.

We would suggest further exploration of key public good objectives for New Zealand would be useful as these are often span multiple sectors and government departments.

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.

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

Long-term funding into programmes which are well connected to end users.

Best teams, limit competition, focus on impact.

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?

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.

What is the risk to New Zealand in choosing only a limited number of areas to focus? How will the non-prioritised areas receive sufficient support to continue? Does this strategy expect the gaps to be filled with international collaborations when there is very limited funding to support those collaborations?

We need to stick to our strengths in natural resources – focus on the biological economy. We have a unique value proposition on the global stage and we should be transforming our existing bioeconomy to be leading and delivering on that value proposition. We can easily see an eight fold contribution from forestry through all the benefits that can be obtained and products we can make from trees with the application of programmes of research, science and innovation.

We have been a leader in renewable energy for a long time, but hydro in particular is not that transferable to all nations. Energy storage is a big issue for an electrified future. One of the most promising alternative options to current lithium technology is aluminium batteries. If the key technical issues can be solved, this is a possible future area of growth for New Zealand.

We don't support health tech as many other nations are getting into this as a bioeconomy strategy route – we should build off what is happening internationally.

We need to understand where our key points of difference lie and make sure that these areas are developed through long term aligned programmes. The funds that are committed to new areas, eg space, should exist but be at the fringe of the funding available. Our opportunity lies in our clean and green image, our points of natural difference (flora, fauna, environmental advantages and our culture) and how to transform our existing industries as well as build new distributed manufacturing industries in New Zealand, particularly around new biomaterials.

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.

The submission below sets out Scion's views, drawing from its still maturing partnerships with Māori, on why an extended Vision Mātauranga would strengthen the work of Scion in its role as a publicly funded Crown owned enterprise to effect change to the material success of Māori in an environment that requires science to help manage the uncertainties and risks of climate change and community transformation in a global economy. It answers, in a broad sense, most of the questions asked in MBIE's discussion document.

Questions 34-36

MBIE's existing policy statement on Māori and RSI Vision Mātauranga, sets out a framework to "unlock the innovation potential of Māori knowledge, resources, and people to assist New Zealanders to create a better future".

The four themes of Vision Mātauranga – Indigenous Innovation, Taiao, Hauora/Oranga, and Mātauranga, continue to provide a powerful framework for considering the outcomes we expect from RSI as they relate to Te Ao Māori.

We consider for the purposes of this strategy that this framework can be built on and extended to recognise the growing role and importance of Māori in New Zealand's RSI activity. The Māori economy is flourishing and has become an important contributor to New Zealand's future. Vision Mātauranga has enabled new opportunities and innovative approaches at the interfaces between Mātauranga and RSI. There is also increasing awareness of the importance of the distinct research approaches preferred by Māori, as necessary where that research is intended to benefit Māori.

We believe the RSI strategy should go beyond the Vision Mātauranga policy, and into a co-innovation framework. It is important this is done via a co-design approach to all activities in this area. As a partner with the Crown, Māori should be able to participate in RSI activities, at least on an equal basis to others but preferably wherever possible and when

appropriate, in an enabling participatory science platform. By extension, this means several possible roles for Māori in RSI activities:

- as researchers, working in any field of research on an equivalent basis to their Pakeha peers
- as advisors, receptacles, innovators, guides, story tellers and practitioners of mātauranga Māori knowledge
- as entrepreneurs and innovators, working with new knowledge, new ideas, and coproduced knowledge in both the public and the private sector
- as leaders and participants in research processes, including as direction-setters, designers, and cocreators
- as beneficiaries of research, whether from specifically Māori-focused research or more generally
- as funders, sponsors, and purchasers of research, and as investors in innovative enterprises.

Historically, Scion has not engaged meaningfully with Māori, not surprisingly the evidence suggests we perform poorly on many of the counts listed above. Consequently, we have far fewer Māori researchers than we would expect, and few Māori entities invest in or fund innovative enterprises. We have struggled with understanding how to be different.

Mātauranga Māori – distinctive knowledge and resources held within Māori communities – has developed for at least 800 years in New Zealand, and is a focus of the Vision Mātauranga policy. It is New Zealand’s only distinctive knowledge system. For this reason, as scientists we have asked ourselves, how do we elevate Māori science knowledge to a place of equal status to sit alongside the rest of the science that we do?

For the industry that we serve we recognise the central importance of the local indigenous way of understanding the wider world, both to Māori, and to all New Zealanders. As we have come to a knowledge of this we have committed to changing our view of and management of VM. Key roles have been appointed to help us with this and we are now working with Māori stakeholders to address the barriers and opportunities that our business and way of working presents for Māori. Through this experience we note the way we do science is changing – as we continue with our core business we are simply doing more, and conducting our business and planning differently.

Working with other CRIs to enhance Māori partnership, co-innovation and impact

The way that impact is defined by the results chain logic model outlined in the draft strategy, does not account for an indigenous worldview or approach to research. Vision Mātauranga version 2 offers an opportunity to broaden the definition and allow space for a Māori coinnovation process which is different to the Western Science process but equally as valuable.

We are finding that impact policy is driving more interest by scientists in the Māori worldview. However, in our experience, bringing together the two worldviews inside a mainstream system is problematic. Whilst the starting point is the same – observation and the formulation of questions/hypothesis – there is a definite separation of worldviews influencing the strength of impact for Māori, in the design/planning phase. Planning sets the framework for the research activity phase, and post research implementation and commercialisation impacts.

This reiterates that strong impact for Māori can only take place if Māori have been involved in the design of a research programme, and if the design has made way for a Māori space to exist and flourish inside the programme. Otherwise Western epistemology will dominate and impact will be reduced. For this reason, in CRI spaces Western approaches have been challenged as culturally unsafe and inappropriate for Māori. This creates space for a conversation around how CRIs build more culturally appropriate space (physical, cultural, and scientific) to unlock Māori potential through VM?

Two approaches we are using to develop more culturally available spaces include 1). Joint Māori strategy and capability building led by Māori working in the CRIs (Te Ara Putaiao), and 2). iPEN.

Te Ara Putaiao have been sharing approaches, methods, and ideas to improve impact for Māori through the CRIs and we support this work. We understand a submission will be made by Te Ara Putaiao so we won't highlight this any further.

As mentioned in the Impact section, Scion in partnership with the other CRIs has launched the iPEN (Impact Planning, Evaluation, and Learning Network) initiative as a collaborative approach to designing and delivering impact.

From hereon we discuss the strength of the impact that can come from planning, evaluating, and continually improving Māori-centric CRI research, with Māori, to meet the intent of the Vision Mātauranga policy – which is a desired outcome of the iPEN project.

Under iPEN Workstream 1: Creating an Aotearoa-New Zealand evaluation framework, workshops and forums have been held with Māori to ask what impact is and how it might be delivered through the CRIs. Early findings indicate that impact for Māori is the same as for any other New Zealander, but the distinctive frontiers of new knowledge that only Māori and their research partners (Māori and non-Māori) can develop, the third space, will deliver transformational impact for Māori – iwi, hapu, communities, businesses.

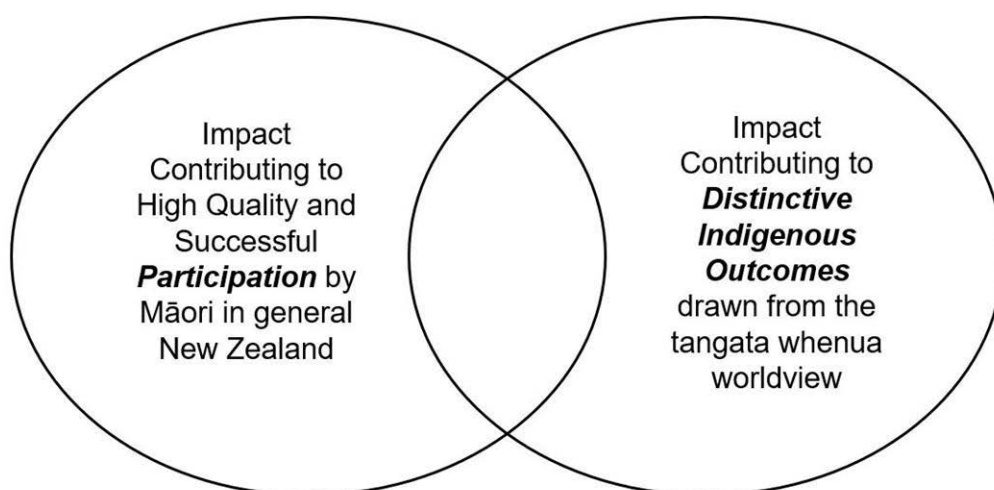


Diagram 1: Impact for Māori – Dr Charles Royal, iPEN and Te Ara Putaiao 2019

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Both impacts are of equal importance to New Zealand's future. However, understanding and enabling, not hindering, this third space is a goal of the iPEN initiative and should be the focus of the RSI Vision Mātauranga expansion activity - where greater specialised capacity is required. iPEN's impact framework will expand the results chain logic with a cross cultural approach to delivering impact.

We know there is more the science system can do to understand and unlock Māori knowledge, resources, and people to help New Zealand and we are pleased to see this intention in the Draft RSI. These are topics for the conversations that you wish to have with us and we use Scion as an example of how this could be done:

1. Redefine VM: mātauranga is knowledge, putaiao is science. Vision Putaiao would be a more appropriate focus for a Māori science focused policy.
2. More appropriate governance of future VM: we recommend co-governance by a joint steering group – Māori, Government, and Science. This would enable a more efficient way to design and distribute VM funds and help manage the problems outlined in 3, 4 and 5 below.
3. Protection of Māori interests in mātauranga Māori knowledge systems and resources: we can help the Crown to better articulate the role of research in supporting or protecting this system of knowledge for the world.

In coming years, Scion's plan is to develop initiatives which support and protect mātauranga Māori while acting appropriately within the framework of the Treaty of Waitangi. Last year we completed an analysis of our systems and policies in this regard and the results prove there is work to be done, so we are moving this forward. WAI 262 and the Waitangi Tribunal's report on the claim Ko Aotearoa Tēnei for instance has raised matters of relevant importance for Scion and the Crown as far as our approach to working with mātauranga Māori in science, research, and technology development. We hope to implement a Māori Co-innovation Steering Group that will develop a co-innovation framework and are part of a whole-of-Crown response to WAI 262.

There is more that we want to do around the sovereignty of data, cultural competency - our work in the future will form part of the ongoing response.

4. Recruitment and advancement of Māori in science: 5.4% (3/180) of our science staff are Māori which is low. We are starting to develop policy and approaches to increase the number of and target jobs for Māori recruits as well as retain the Māori science staff that we hire.

Historically SSIF has had great bearing on our ability to grow Māori science capability - staff were hired for SSIF co-funded projects and none of our SSIF programmes is directly VM relevant. This means we can either recruit Māori into projects without VM (where they generally play a junior role), or contest for funding of which we have recently had no VM relevant success. VM science success is directly related to the retention of Māori science capability, which is directly relevant to what is funded. For this reason, it is fundamentally flawed to put VM in the contestable funding environment, and a key driver for why additional SSIF funding is required. We also need to review the way we design our programmes and invest SSIF going forward.

Under a VM extension, this systemic barrier to Māori recruitment into science, can be reviewed.

5. Review VM in contestable funding: as the owners of New Zealand's largest forest lands and 50% of our national forest estate, Māori success is at the heart of success of the future forestry sector, and New Zealand's 3rd largest industry. At best we only have 30 years to align the Māori forestry sector with the opportunities being presented by a low carbon economy. If we can't do this New Zealand will suffer. We need the VM funding to be accessible and workable.

There are several ways that the RSI strategy could extend VM in the contestable funding environment. Some areas for improvement are:

- VM currently has zero weighting in Endeavour Fund assessments. This gives VM nil value in a contestable funding environment. The way VM is ranked makes VM-relevant proposals unattractive and escalates the likelihood of VM being a 'necessary evil' which generates a certain counterproductive behaviour that could lead to last-minute, often reluctant or forced engagement and bad experiences with, or for, Māori partners. This damages relationships between Māori and the science system and contributes to the general idea that Māori cannot trust researchers. This combines to make VM less effective and is a big risk for scientists building careers, or institutions that cannot get the funding to carry out their work. We should weight/rank VM or give VM its own funds.
- H-Index international publications do not recognise indigenous knowledge. This makes VM proposals unattractive. We can work with other countries to change this; it is a change we can champion globally.
- VM-relevant proposals developed in partnership with a research science institution (that is not Ngā Pae o te Maramatanga) are likely to be of a lesser quality because it is generally accepted that VM is not widely understood by the science panels choosing successful proposals (because the majority aren't Māori). In our opinion, training in VM is insufficient because they are still not going to be looking through a Māori lens and will not understand the mātauranga. This results in a practice known as 'dumbing down the VM' which also fails the stretch and impact requirements. Most CRIs do not attempt Smart Ideas, or Research Programme VM-relevant bids. Many CRIs are also disillusioned with VMCF for the same reason. We should set aside a certain number of VM relevant proposals in the Endeavour Fund, and have Māori selecting for VM relevant success.
- Although Māori are 16% of the population, VMCF (the only truly VM contestable fund) is less than 1% (if that) of total annual science spend – so small that it doesn't even appear on the RSI investment diagram (refer Draft RSI pg 15). The maximum funds available under VMCF are \$180K with an annual spend of \$4M across the science system. This categorises VM science out of the ecosystem and likely at the bottom of the science food chain – sending very strong messages to Māori that despite the VM policy, they aren't important in science. Furthermore, there are no published data on the success or otherwise of VMCF. Our experience is that most VMCF projects are barely scratching the surface of what science is needed with Māori communities. We suggest a complete review and redesign of VMCF with Māori – the goal being to give Māori more access and support for RS&T.
- Science teams in general do not like to 'bid' on (i.e. allocate staff resources to) VM-relevant proposals because they are known to fail, meaning senior science staff do not get involved in the VM-relevant proposals. This reduces the chance of success as the team excellence rating is lower. One way that the CRIs are working through this is to collaborate on VMCF pan-CRI proposals, but this stretches the funding further. Due to the design of the application/RFP process, every VM-relevant bid sets up the

expectations of Māori communities and appears disingenuous. Furthermore, it takes a significant amount of time, effort, and talent to engage meaningfully, co-develop VM ideas for a Māori worldview, only to be translated into a mainstream worldview in a proposal. Add to this the development of a science hypothesis and methodology – VM research can be very costly to get into the funding pipeline, let alone launch. The constant back and forth between the two realities is not accounted for in the funding. Then with the possibility that the funds may not come through, there is the damage control that comes after results are announced. For example, we have worked with one group four years in a row at an average of 200 hours per annum, but the proposal has been consistently turned down even though the science is good. It has been seen as timely as an investment, but when put up against ‘stretchy science’ it has lost out. The process of not managing VM well is extremely unsafe for the Crown, it makes VM ineffective and costly for Māori to engage with. VM must be taken out of the Endeavour Fund if we aren’t going to fund VM-relevant science through these mechanisms. We recommend that a new mission-led, large-scale VM fund be set up, perhaps with two tiers: Tier One VPF (Vision Putaiao Fund large scale Endeavour type) and a Tier Two VMCF (Vision Mātauranga Capability Fund). This would be consistent with the RSI goal to make the most of our unique opportunities, such as our unique geology, biodiversity, and our heritage of Mātauranga Māori (Draft RSI, pg 18).

Summary

Considering Māori are at the bottom of nearly every deprivation index in New Zealand, are asset rich and cash poor – and the VM policy states that science research and technology can make a tangible economic difference to New Zealand – very little of that effect is taking place in Māori communities by way of our science. That is not for lack of trying on our part. Scion science is directly relevant to the contribution that can be made through Māori economic assets - we know we can make a great difference to these communities. Great improvement around adequate access and engagement is required soon. Without a doubt there isn’t enough money being put into VM, we need it to be available to our Māori sector partners. Long term transformative impact can take place with the commitment of a larger pool of strategic funds, and support resources for this purpose.

Conclusion

Scion considers the signals in the draft RSI Strategy to be a start, rather than a set of final decisions. We are wanting to unlock the potential of the Māori science sector and see this as an opportunity to collaborate further with Māori stakeholders to co-design our responses and initiatives.

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.

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?

As outlined earlier in our submission, we feel the system is not set up to encourage collaboration; it is set up to encourage competition.

Be clear about the purpose of our various research organisations and fund them accordingly.

Question 39: Is the CRI operating model appropriately designed to support dynamic, connected institutions and leading edge research? What changes might be made?

The CRIs operate to deliver leading-edge research as defined by the mechanisms that fund CRIs. At Scion over the last two years we have made a very dynamic shift from a five-year SCI to a strategy document that looks at 2050 goals for New Zealand that we could contribute to, and 2030 impact milestones that our work could enable. This is Scion taking a lead role as per its SCP to try and influence the system to drive more impact and benefit for New Zealand. It is not the operating model that causes any issues around delivering leading edge research (which we do) or being dynamic, it is the science system as outlined in this strategy and the way the funding mechanisms work. There is generally a low-risk appetite that also reinforces more conservative behaviour. Despite this, CRIs do their best to deliver impact within the current science system. If the science system were to take a view to align the components and the signals to the outcomes desired then the CRIs would be able to do so much more.

Why just focus on the CRI model? Is the university model really delivering what is required? The RSI system has encouraged universities to compete for research funding when their primary goal is education. There is a fundamental disconnect that has occurred with a large amount of science funding coming into the universities from vote education

whilst allowing them to compete or lead areas of MBIE funding. What is the fundamental role of universities in our RSI system, is it capability development, i.e., education, or is it research? The likelihood is that it is a mix of both but having two purposes creates both issues and opportunities for universities and for CRIs. The issues could be avoided by providing the same level of inflation-adjusted funding to CRIs that universities receive to maintain their capabilities, i.e., a better approach to SSIF to maintain capability and provide opportunities for university graduates to apply skills learnt in New Zealand.

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?

It is definitely true that we lack some key facilities in New Zealand to be able to complete cutting-edge research and we lack pilot facilities to allow the scale up of lab scale science.

New Zealand is very poor at infrastructure investment compared to others – the government needs to invest much more in scale-up facilities without an expectation of direct return. Their advantage is helping shift industry and business to more profitable activities and to support risk taking.

We also tend to operate service-level facilities in New Zealand in isolation within each institution. An example is molecular sequencing and trace element isotopic analysis. There are several facilities of medium-scale machinery where a centralised processing facility for all samples could have purchased a large-scale robotically automated equipment that would significantly reduce the cost of running samples.

However, it is not possible to know what additional infrastructure is required when we do not have a good picture of what is already available in New Zealand. This question will be better answered after the infrastructure review is completed (although this also needs to include universities and Independent Research Organisations).

But we need to be careful – we don't want to build inefficiencies into the system by rationalising equipment and infrastructure where staff are then forced to travel several hours to carry out their research. This simply shifts the cost distribution. We need to make sure that infrastructure decisions are fit-for-purpose to deliver on initiatives, rather than taking a formulaic 'one size fits all' approach.

Question 41: What elements will initiatives in this area need to be successful?

Transparency, simplicity, well-supported through funding. Encourage sharing of infrastructure efficiently.

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.

Create a cross-organisational, cross-departmental think tank. Include the Chief Science Advisors from the various agencies, the Prime Minister's Chief Science Advisor and a range of actors in the RSI system – ensuring there is diversity of age, gender, ethnicity, background and viewpoint. Run a competitive process to find these people similar to the Sandpit process of a few years ago. Facilitate this group well to ensure no bias in the decision making. Empower them to make recommendations.

General

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

Please type your submission below.

Half the beyond the frontier research fails – is the government expecting everything to be successful? You still get advances from the failures – but they will be less direct and possibly take longer.

It is unrealistic to expect that we will be global leaders in everything we do.

The strategy needs to connect more of how RSI is going to actually deliver benefit – whether that be economic, social or environmental. The strategy seems light on how outputs will be adopted and what might be the gaps or hurdles to adoption. We believe that there should be clarity around not only access to research services but also access to knowledge. Where do things like extension services sit? New Zealand is made up of lots of small enterprises or small land owners, how do we leverage our RSI capability across that landscape? Example of work we are involved in with Iwi illustrates the large need for this. Our work with Hawkes Bay Regional Council highlights their significant need and their wish to equip their staff with the knowledge and tools to be able to go out and inform land owners about their options.