



10-Nov-2019

Comments on MBIE's draft for consultation:

NEW ZEALAND'S RESEARCH, SCIENCE & INNOVATION STRATEGY

This submission is from the New Zealand Association of Scientists (NZAS) and reflects the views of the Association. We are an independent association of scientists who work and lobby to promote science in New Zealand, increase public awareness of science and expose pseudo-science, debate and influence government science policy, improve working conditions for scientists, including gender and ethnic equality, promote free exchange of knowledge and international cooperation, and encourage excellence in science. The Association membership includes physical, natural, mathematical and social scientists and welcomes members with an interest in science education, policy, communication and the social impact of science and technology.

Summary

We commend MBIE for exploring and clarifying how the NZ Research, Science and Innovation (RSI) system can work strategically through open and accessible dialogue containing laudable aspirational goals and concepts.

We note that this is the first major review of RSI strategy since the National Statement of Science Investment (NSSI). Given the time elapsed, there is a surprising lack of evidence and data supporting the proposed strategy.

Potentially laudable aspiration goal(s) are proposed, yet we question whether evidence is presented that these are achievable via demonstrable steps or pathways. We also question whether the aspirational goal(s) represent the breadth of the nation's RSI well, and will avoid doing causing more harm than good.

We strongly support the aspirations sought for technological innovation, but suggest differentiation is needed for environmental and primary sector research that represents a large proportion of the nation's publicly funded research.

We strongly recommend stronger and wider support for Early Career Researchers (ECRs), and ongoing development of well-funded, stable institutions and programmes supporting high quality RSI activity can deliver wide benefits to New Zealand. The latter deserves ongoing practical discussion that extends this strategic discourse on concepts such as excellence, impact, and connectivity to meaningful management by institutions and teams.

Overarching Comments

This strategy appears excessively focused on Innovation. The consultation talk implied that the Research and Science were to continue as the focus, but this document provides little evidence of this. The draft strategy contains laudable aspirational goals, but lacks evidence-based assessment to suggest that goals are well considered, and also lacks clear steps along an achievable path toward the aspiration goals. If applied across the nations diverse science needs, institutions and workforce, it is not difficult to imagine the draft strategy, despite its laudable components, causing more harm than good. **We suggest it is time to move RS&I out of MBIE – “Business” dominates strategic thinking to the detriment of science’s ability to serve the nation.**

The document builds the case that the nation’s science be assessed based on “excellence”, “impact” and degree of “connectivity”. In reality there is no evidence that MBIE can evaluate either “excellence” or “impact” and the focus for connectivity is incorrect.

The document gets hung up on “the frontier” as if there is some magic line in the sand out there that all our science should adhere to.

The document also has a strange disconnect between the nice flow chart diagrams and the text. Specifically, the lack of future climate impacts as a research driver in the bulk of the report is alarming.

The level of aspiration relative to the level of funding is out of balance and is an unhealthy attitude to have at the sector level. Telling people they have to be globally-leading then funding them well below average levels is essentially bullying.

MBIE also appear to be creating a paradox whereby they want to see “globally-leading” research but be locally relevant. The reality is that locally-relevant research will often struggle to have leading impact globally and any truly globally-leading research will move offshore at some point.

Here we respond to the specific questions posed in the Draft and then provide additional comments at the end.

The Contribution of Research, Science, and Innovation

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

Climate Change now generates discussion as an emergency, implying that it is severely under-represented in the draft RSI strategy. One may reasonably question why there is a lack of analysis of past strategy, nor a more appropriate suggestion of future scientific response. There’s a one-page diagram trying to neatly summarise ANZ Climate Change work but it is as if it was produced independently of the rest of the document. Other than the table the word “climate” appears four times in the document and two of those are a negative as in “not just climate change”. Is MBIE suggesting climate is not a priority? By including the one-page diagram, it seems that climate change is intended as a case study of a priority, yet we appear to

learn that the strategy is unable to usefully include such a case study. It should be straightforward to allow for growth in the excellence, impacts and connectivity of the core steps in climate change research and action frameworks: understanding drivers, forecasting, mitigating, and adapting. None of these are in this document.

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

The Government says "By 2027, New Zealand will be a global innovation hub, a world-class generator of new ideas for a productive, sustainable, and inclusive future." So it's going to have to do a lot of things.

- *Innovation hub* - what does this really mean? Is it realistic? One can wonder if this is a vision of hot-desking Nordic architecturally-designed offices producing apps? Please define what this means and why it is an appropriate goal for the entire RSI system.
- *New ideas* - OK so there will need to be more support for discovery science (Marsden) and then more willingness to take risks when converting science into outcomes.
- *Productive* - Of course. Arguably the National Science Challenges were a way to connect science with outcomes and their success is questionable - certainly in a per dollar view. A sign of a healthy science system would be if we really were answering some national science challenges. The document suggests MBIE thinks the National Science Challenges "are working well". What evidence is this based on? Given the size, cost and diversity of Challenges, can we not identify that some are working poorly or well? Do they justify the costs and consequences of overlapping governance, accountability, and compliance frameworks? MBIE needs to explain, with metrics, how well this is doing because for 5 years they dominated the discussion and now they are almost invisible.
- *Sustainable* - there is little to no emphasis on environment in this document so how will we know we are sustainable? Or did you mean sustainable in a purely business sense? In which case we return to our opening argument that RS&I needs to be pulled out of MBIE.
- *Inclusive* - This is vital. Making it the platform for excellence will need to be examined closely to see if it can actually achieve what it says it will.

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)?

The premise of this question is deeply problematic. We don't have to pick one or the other, and, in fact, we shouldn't. A healthy research ecosystem will have components operating at all points on the "frontier" compass. It is also not linear. There are many instances where a backwards look provides innovation. This monolithic view of advancement of knowledge is not helpful. We propose it would be better to define where "frontier focus" is helpful, and also define a "frontier fallacy" recognising that requiring all research, science and innovation to exist at the frontier is counterproductive.

The Parliamentary Commissioner for the Environment's (PCE) investigation of Environmental Reporting¹ has just provided a very clear demonstration of the unhelpful (negative) impact that a focus on funding only what has been perceived as frontiers of knowledge can have. Environmental monitoring and associated long-term ecosystem research value consistency and duration much more than the cutting edge. In New Zealand, there has been no specific funding for environmental monitoring outside greenhouse gases inventory and the databases/collections identified in the 1990s. As a result, the PCE clearly shows we are flying blind in critical areas of environmental and biodiversity policy. Not only is monitoring inadequate as a direct result of RSI strategy, but we can now see that this has undermined research that relies on foundations of environmental understanding. We support the PCE's findings, and expect that a major rethink of this section and others will be required to reverse the poor historic investment in foundational environmental monitoring and long-term research.

We further note that the use of the term 'frontier' research may require a more careful definition, and was originally used in Europe to allow for replacing and avoiding the terms 'basic' and 'applied' research². Doing so avoids the perception that basic research is preferred over, or cannot overlap with, applied research at the cutting edge of knowledge³. The draft consultation document and Impact of Research Position Paper preserve the counterproductive distinction of 'basic' and 'applied' research. The European Research Council's compression of elements of basic and applied research into "frontier" research was intended to enable a process of "investing rapidly in research targeted at new and emerging issues confronting society."

A logical suggestion is to re-use the concept of "line of sight," creating a goal of *connecting* all funded RSI activity, including monitoring and infrastructure, via *line of sight to the frontier*.

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?

We appreciate the aspirational nature of this question but coupled with the low level of funding this is largely an unrealistic expectation except in niche areas.

- Problems of regional significance – we will certainly continue to excel on topics of local significance.
- Problems where collaboration is key – the scale of our science system means we can do some highly collaborative work relatively effectively.

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?

Here's a reality – we often work and collaborate in internationally connected/high profile projects where we have "unique opportunity to become a world leader". We do our best in international

¹ <https://www.pce.parliament.nz/publications/focusing-aotearoa-new-zealand-s-environmental-reporting-system>

² <http://erc.europa.eu/about-erc/mission> (accessed 9 Nov 2019)

³ Stokes DE 1997. Pasteur's quadrant : basic science and technological innovation. Washington, D.C., Brookings Institution Press. xiv, 180 p. p.

activity for a small country. The reality is our overseas colleagues go back to their team of five people working on the same task and the NZ scientist returns to their 4 other radically separate tasks.

On the other hand our scale means we are inherently well-connected internally. This is true both in terms of interdisciplinary work and crossing “the frontier”. This is a really important point. It is true in terms of disciplines, getting science to policy, and getting ideas from Discovery to Proof of Concept.

In terms of unique problems to solve - South Pacific climate response and socio-political implications might be a good focus for the next century.

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

Lets face it, the Aotearoa NZ public science sector is, for much of the time, indistinguishable from the private sector. Different stakeholders then think of the science sector as being public or private whichever way it suits them at the time. The scientists themselves do an amazing job continually walking this tightrope.

Our Key Challenge – Strengthening Connections

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

No, the Key Challenge is lack of funding. Certainly collaboration is important but MBIE seems to think the science community is not trying hard enough to collaborate internationally. There is plenty of evidence that ANZ scientists connect well internationally. The limit is we don't have the funds to properly contribute to international projects or support ECR to participate.

Our limited funding is exacerbated by lack of stability, which is a key ingredient in collaborations. Stable institutional funding, that allows and incentivises institutions to set and transparently defend investment can coherently include enhancing connectivity. This can be a focus for continuing to grow investments in PBRF and the institutional components of SSIF. We note the PBRF is currently under review, and draw attention to Tertiary Education Union's suggestions⁴. While not necessarily fully supporting TEU recommendations, it is worth highlighting an approach that would be consistent with RSI strategy and reforming PBRF. Specifically, this could include simplifying individual assessment to focus on a limited number of excellent outputs⁵, while requiring institutions to provide bibliometric and statistical assessment including evidence of connectivity and consideration of line of sight to impact. These interact usefully with the draft RSI strategy proposal under consultation.

Overall, if connections across the system are considered problematic, it would be sensible to review whether past efforts to enhance connectivity have succeeded. National Science

⁴ <https://teu.ac.nz/news/teu-submissions-made-over-october>

⁵ <https://theconversation.com/there-is-a-problem-australias-top-scientist-alan-finkel-pushes-to-eradicate-bad-science-123374>

Challenges are widely considered to have emerged from Recommendation 9 in the 2010 CRI Task Force report⁶. This recommended “that Government include, as part of its open access investment programme, funding to support inter-institutional, collaborative research.” The five-year reviews of Challenges were not publicly released, and there is a wide perception that some Challenges have become so large as to become walled fortresses where open junctions should have been streamlined. Improved open review, and learning lessons across the diversity of Challenges is needed, along with other assessment of barriers to connections imposed by current structures and incentives.

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?

There is nothing in the document that explains how excellence will be quantified/assessed. It’s hard to agree as the document doesn’t actually say how you identify excellence in any definitive way.

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?

Until we have a working NZRIS - and have it working for a number of years - do we even know what we have in terms of diversity? **A major barrier to diversity is inequality in wealth** - this leads to inequity in health, housing, opportunity, education and outlook.

The evidence we have available is damning for the system-wide lack of encouragement of Māori⁷ and Pacifica⁸ academics. MBIE will be hard-pressed to solve this by making a few more positions for ECR from under-represented groups. Certainly, please **do** make these positions available, but it is not a fix to a much wider problem: the lack of role models. Lack of funding. Take the Vision Mātauranga Capability Fund as an example: it can neither fund meaningful PhDs nor ECR roles, nor research at scale. How do we build diversity in research areas unique to ANZ but that have little presence in the University sector? This will make us slow to respond to new challenges.

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?

This will be true up to a point. But at the same time we want to build diversity and locally relevant ideas- and our present ways of determining excellence don’t support this.

Ultimately who decides? What really matters is the reviewers, assessors, and panellists evaluating funding applications, and therefore efficient and high-quality assessment, and clear criteria that drive assessment for funding.

⁶ <https://www.mbie.govt.nz/assets/7502750043/how-to-enhance-the-value-report-of-the-cri-taskforce.pdf>

⁷ <http://doi.org/10.20507/MAIJournal.2019.8.2.10>

⁸ <http://doi.org/10.20507/MAIJournal.2019.8.2.9>

Question 14: Do you agree that excellence is strengthened by stronger connections? Why or why not?

The draft document has an unsophisticated view of excellence. Some aspects are strengthened. Certainly, excellence will rarely be harmed by stronger connections. There is much literature available on poor use of publication metrics. The Document says “Scientific papers that are co-authored tend to be cited more often than papers which are written by a single author”. What does this even mean? Is it proposed to apply equally across all fields of research? Co-authored papers will typically be “bigger”. Even simple self-citation will give this outcome. The literature is not a monolithic score card. It is where we archive ideas, data and discovery. The draft document says “Papers co-authored by teams from across academia and industry tend to be cited more frequently than those that are written solely by academics.” Please cite the evidence so this can be properly assessed, and if valid applied appropriately but not beyond its validity.

Guiding Policy – Impact

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

By reading the new Impact Position Paper released by MBIE?

<https://www.mbie.govt.nz/dmsdocument/6983-the-impact-of-research-position-paper-october-2019-pdf>

This correctly identifies the following difficulties in “quantifying impact”.

- Long lags between research activities and impacts
- Convolved impact pathways which may be distributed across several research organisations
- Missing or ambiguous data
- Contributions from multiple streams of research and factors beyond researchers’ control
- Difficulties quantifying the magnitude and value of impacts.

However, nothing in the Position Paper provides clarity on how these hurdles will be overcome.

It’s not clear MBIE has an adequate definition of Impact. The impact of basic research is fundamentally mis-understood, and the blurry distinction between basic and applied research (e.g. Frascati classification) misused. The scale and cross-fertilisation of projects in NZ is not accounted for - the Position Paper and draft strategy port ideas across from science ecosystems that fund very large initiatives, which cannot be correctly co-opted assess every scale of project. Please revise.

We do not see how you evaluate impact for small or even medium scale projects unless they are effectively “engineering” with very narrow scope.

Furthermore, expecting to identify the impact of science as a way of evaluating its worth is fraught. You can lead a horse to water. Given that globally carbon emissions are not reducing would you suggest that climate science has failed?

How does MBIE expect any of this to work without at least a decade of the NZRIS operating?

Who will review narratives around Impact? Limited ability to judge veracity of impact statements means the system will slide further towards over-promising with little fear of come-back.

Ultimately, no science system has achieved wide assessment of the relationship between research and impact. The examples given within the appendix of the position paper appear highly inappropriate to claim that measures of impact will or can be available across the breadth of New Zealand's science policy needs within the timeframe of the draft RSI strategy.

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, international experts, business communities and markets?

Funding is a major barrier to consolidating connections. Supply of quality students is limited as they find other systems more attractive. In addition, science is a small world and so people outside the system are aware that there are redundancies and struggles with the connection between vision and reality. Lack of pathway for students. Here we have a poor postdoctoral phase and limited industry opportunities. We note though that internationally short-term contracts are more common than in NZ.

Clarity around roles... Universities lead large research programmes, CRIs do consultancy work, Consultants apply for research funding. Having a meaningful review system for Endeavour Proposals would improve the ability of the system to gauge the likelihood of success of the proposed work. As it stands there is very little reason to not wildly over-promise.

We must build home-grown leading scientists. Talk to a leading scientist from an international setting and ask them how they do all the things that they do and they say... postdocs. They have several fully functioning scientists who essentially run their lab while they do the big-picture work. These scientists have some turnover and fundamentally share their achievements. Again we recognise that internationally short-term contracts are more common than in NZ and so there is the possibility to take advantage of ECR.

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?

Vote Tertiary Education currently subsidizes activities in Vote Research, Science, and Innovation by covering a substantial portion of the full cost tuition fees for PhD students. Grants

from MBIE, HRC, and the Marsden Fund will typically pay a portion of the tuition fee, but do not attract the full costs of PhD tuition. This subsidy is distortionary as post-doctoral fellowships and investigator buyout attract full cost recovery overheads, which favours the use of PhD students to carry out research programmes rather than more experienced staff. One of the effects of this distortion is a low number of post-doctoral fellowships relative to the number of PhD students. Removing this subsidy so that Vote RSI was exposed to the costs of PhD tuition where students are funded by grants would be cost-neutral, but would likely result in a reduction in the number of positions for PhD students with flow-on consequences for our universities. The NZAS therefore recommends that the government create and maintain a national post-doctoral fellowship scheme, such as the scheme that was scrapped earlier this decade.

NZAS also recommends that the Rutherford Discovery Fellowships should be used to enhance the diversity of the research system, by targeting support to presently unsupported people and targeting them for new areas of work rather than existing.

Stop allowing entities to advertise scholarships/fellowships where they don't provide overhead as this makes the recipient less appealing from a business perspective. Build into the Tax Credit process the uptake and nurturing of industry ECR.

Make Aotearoa NZ the best place in the world to be a scientist. We do attract quality scientists, but more funding and stability would retain them. We need to embrace a broader perspective in how we think about the "high-flying researcher". Do these people ever fulfil the expectations? We will probably never attract the most expensive of big name rockstar researchers - the markets are simply too small. There would be plenty to suggest that someone focused on such large markets probably isn't appropriate for our scale anyway. We could also make sure our Universities and Research Institutes don't develop a reputation for making researchers redundant.

In addition, recognise that "science technicians" are increasingly unique and valuable and part of the international research job market. Our markets and talent pools are so small we need to think about tech skills as international also.

Compared to overseas in a lot of ways we have more stability - *for those with a job*. We also struggle with the small scale meaning dual career families make sacrifices to get even one career up and going.

Also consider carefully that direct involvement in or connections with environmental science and primary sector science is what will have the strongest draw for bringing talent to New Zealand. It is also largely publicly funded, yet different from technological innovation that can be done anywhere in the world. Understanding of our unique biology, soils, geology, oceans, environmental legislation, and agricultural systems requires unique expertise that takes years to acquire. Mātauranga deserves additional focus. These requirements must to be carefully considered at the intersection of attracting talent, creating stable career pathways (that do not disadvantage diversity), and the rest of the strategy.

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?

We recommend greater clarity and financial support for open data, where there is strong or plausible case for public good. Currently and historically, IP frequently limits both connectivity and reuse to benefit innovation and wider knowledge. Benefits will be achieved by clearer lines around IP and roles within the research ecosystem. Trust and the sense that the work is underpinned by adequate funding. These connect with previous ideas around clarity of purpose for various research providers.

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

There is a large literature on this, which brings the limited referencing of the draft strategy into question. How does MBIE view Startups in our local context of a geographically isolated capital-poor economy? Does MBIE have a model for retaining StartUps once they grow?

Actions – Innovating for the public good

Question 30: What elements will initiatives to support innovation for the public good need to be successful? **Question 31:** What public good opportunities should our initiatives in this area be focused on?

There will need to be an element whereby MBIE more clearly values public good research. It is probably time that we consider moving the RS&I out of MBIE as the “business is king” environment is clearly having a detrimental effect. Other than a few mentions in the preamble figures Discovery science seems to be ignored. It is not clear that MBIE understands how the science ecosystem actually works or that one of the major advantages of the NZ system is the interconnectivity between discovery and applied science.

There would seem a good case to focus on some Public Good issues along with “innovation”. Things like Environment, Climate, Health, Housing, Pacific, Inequity. Interestingly many of these align with NSCs but these were largely captured by particular areas so significantly that the overarching challenges still remain.

Actions – 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, we are likely to introduce them over time rather than immediately. In addition to the criteria set out above, 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 towards the government’s goals - the focus areas already determined by the industry strategy *From the Knowledge Wave to the Digital Age*. **We invite comment on these suggestions and welcome input on other possible focus areas.**

Given the graphic implying that climate change can be a case study, where is the innovation process that will help New Zealand survive climate impacts, through developing and enhancing responses. More widely, the environment sector and its strong connections to primary sector research continues to be ignored, despite this being a large focus of public funding directly controlled by this strategy.

When MBIE say “renewable energy”, building on recent investments in the Advanced Energy Technology Platform – does MBIE mean more of what you’ve funded or support for areas that MBIE didn’t fund in the initial tranche? A prudent focus area would be to develop some of the many points in the Climate Change figure not supported by on-going funding and to bridge historic disconnects in the science ecosystem around climate. Is MBIE reflecting on their lack of investment in renewable energy over the last decade and where that has left us in a global marketplace?

Actions – Scale up

Question 32: What elements will initiatives to build scale in focused areas need to be Successful? **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?

Nowhere does the strategy take the time to analyse what our RS&I ecosystem *should* reasonably look like. We are probably the most physically isolated nation on earth and the last to be populated. Is there any reason we should be aiming for some SAE/OECD average setting? Funding is a major barrier to consolidating connections.

Actions – Towards an Extended ‘Vision Mātauranga’

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 world views are integrated throughout our RSI system? **Question 37:** How can we strengthen connections between the RSI system and Māori businesses and enterprises?

These foci are appropriate end-goals but they do nothing to foster a system that will get us there. We need to lift socio-economic equity indicators and we need to invest in science in early stage education across the board.

Where are Pasifika in all this? Vision Mātauranga continues to drive inequity.

There is not enough emphasis on fostering and supporting early engagement with potential Māori thinkers and researchers. As recognised by many, the lack of role models in any meaningful proportion means the supply and opportunities are not sufficiently developed.

The VM approach coupled with low success rates for funding is effective but can only develop slowly with inadequate support through Māori-focused education. A critical mass of Māori researchers are required so that their work can extend beyond traditional research areas otherwise the global aspect will not be achievable.

Please state the degree to which the “Extended Vision Mātauranga” proposal has already included a diverse group of Māori researchers and iwi organisations.

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 globally leading 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?

Against a backdrop of the 90s reforms, and the modest efforts to repair any negative impacts, these are big questions. Clearly the business focus of CRIs affects what science gets done. Does a “board-driven” model adequately support science? Is it time for a hybrid leadership model that better balances business and discovery/knowledge/application?

MBIE sends fundamentally conflicted messages. What, in the present Impact criterion, suggests CRIs **should** be doing globally leading research? Almost all of the CRI activity is based on applied science to support the nation, ministerial motivations etc. To expect this to be globally anything is only relevant in terms of supporting the scientist’s CVs.

Most of the CRIs operate intensive capital programs – often at a scale beyond a University- so they have to fund this through their cost-recovery model. Funding capital equipment through surplus funding/profit biases support for certain areas.

You don’t ask the same questions of the University sector. Are hybrid teaching/research/foreign student focused institutes appropriately designed to support dynamic, connected institutions and globally leading research? What changes might be made? Similarly the consultancy/SOE sector?

Actions – General

Question 42: How should the government prioritise the areas of action, and the initiatives proposed under each area? **Question 43:** Do you have any other comments on the Strategy which have not yet been addressed?

With funding success rates generally in the 10-15% range there is no room to fund work that only supports one dimension - excellence - impact - connections. Imagining a Venn diagram of impact, excellence and connections – what does something that sits in the intersection of all three? Is that what we want?

The Association appreciates the opportunity to comment. We appreciate many of the goals and look forward to further discussion wherever possible.

A handwritten signature in black ink, appearing to read 'Troy Baisden'. The signature is written in a cursive, flowing style.

Professor Troy Baisden

President NZ Association of Scientists