

From: no-reply@mbie.govt.nz
To: [Research, Science and Innovation Strategy Secretariat](#)
Subject: Draft Research, Science and Innovation Strategy submission
Date: Sunday, 10 November 2019 3:50:27 p.m.
Attachments: [Online-submission-form-uploadsdraft-research-science-and-innovation-strategy-submissionsRSI-MacDiarmid.docx](#)

Submission on Draft Research, Science and Innovation Strategy received:

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

Organisation

Name

Nicola Gaston and Justin Hodgkiss

Name of organisation or institutional affiliation

The MacDiarmid Institute for Advanced Materials and Nanotechnology

Role within organisation

Co-Directors

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

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

If you selected other, please specify here:

Gender

Ethnicity

Name of organisation on whose behalf you are submitting, if different to the organisation named above

In which sector does your organisation operate: (Please select all that apply)

Research

If you selected other, please specify here:

How large is your organisation (in number of full-time-equivalent employees)?

40-50 (but this is not entirely well-defined, for a CoRE - this is an estimate of directly funded FTEs, including students)

Please indicate if you would like some or all of the information you provide in your submission kept in confidence, and if so which information.

Please upload your submission document here

RSI-MacDiarmid.docx - [Download File](#)



Research, Science and Innovation Strategy

Submission form

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

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

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

How to have a say

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

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

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

The closing date for submissions is 10 November 2019.

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

Confidentiality

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

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

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

Contribution of Research, Science and Innovation

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

- Question 1:** Where can the RSI system make the greatest contribution towards the transition to a clean, green, carbon-neutral New Zealand?
- Question 2:** Where else do you see it making a major contribution?
- Question 3:** What else could 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 1-3:

In the MacDiarmid Institute for Advanced Materials and Nanotechnology, we have grappled seriously with this first question over the last couple of years. We believe that it is necessary to build scale in selected areas of green materials technologies with a low footprint, high value, and supported by existing capability.

There is an extent to which "we will be good at what we are good at"; the idea of choosing specific areas to support, or at least going too far down that road, is difficult given the non-linearity of scientific development pathways. However our experience has shown that the challenge of building critical mass in certain areas – around particular existing capabilities – works best if framed as a challenge of collaboration and co-development. Public support for the implementation of green technologies depends critically on awareness that such technologies exist, and that they can be implemented and commercialised for export in the New Zealand context; our work in public engagement, communication, and supporting commercialisation has shown that a systems approach is required. Moreover, our engagement with industry and investors in the area of green materials technology leave us in no doubt that leading New Zealand businesses are already positioned to grasp the significant export opportunities presented in this area.

Beyond building public appetite for such technologies, the scientific community needs to engage with the policy environment effectively. The RSI system can make the greatest contribution where the government provides specific targets that can be met. These targets could, for example, be in the form of "If scientists can provide a systems that does X (e.g. reduce CO2 emissions from cement by 50%) the government will impose legislation that does Y (e.g. provide a specific economic incentive that will result in adoption of the CO2 saving technology).

This experience of collaboration to effect culture change – building on the many strands of

work that CoREs engage in, from fundamental research, to education and outreach, to commercialisation and policy engagement – should be considered a model to support progress towards other Government priorities.

PROACTIVELY RELEASED

Researching and innovating towards the frontier

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

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

Q4. There is an extent to which innovation at the frontier takes care of itself, as the line of sight to market and application exists as a clear driver of investment. Thus, while both activities are important, government strategy should be focused on incentivising the creating of new knowledge. Our experience in the MacDiarmid Institute would suggest that this leads to a wealth of activity ‘behind the frontier’ as a natural outcome, while the converse is not so necessarily true.

There is some risk in the distribution of public funds (especially R&D tax credits) for activities which, although ‘innovative’ (as per p.17) do not go further than what should be business-as-usual. The ‘innovation at the frontier’ discussion here (p.18) could be more strongly communicated and implemented by Government; the experience of CoREs such as the MacDiarmid Institute in conducting investigator-led research that is nonetheless mission-inspired, may be useful to point to to communicate the relationships between different parts of the RSI system.

Many of our researchers would answer this question differently, and that is the real advantage of collaborative schemes in the RSI system: as one of our researchers says *“Personally, I prefer to operate behind the frontier but the only reason I can do this is because of the extensive work of those at the frontier”*. It is important in discussing the relative importance of different components of the RSI system that competition not be weaponised against the scientific community – growing a culture of mutual respect is probably the most important responsibility of MBIE in this space.

Q5,6. See Q1-3. For “this is most likely to happen by ...”, the evidence basis for that statement is not clear. E.g. if you want to talk about space, recognize that what was required was to fund and support Peter Beck over a 30+ year career; including things like

giving him a DSIR internship and funding UoC control systems engineers.

Q7. (Also relevant to Q1-3,5,6). NZ is a great potential testing ground for sustainability techs, as it has been for health techs for example. We have a combination of first world infrastructure, diverse population and geography, and flexibility and nimbleness to try things (both in terms of attitude and size). As an early adopter of carbon neutral legislation, New Zealand can be positioned to develop and export low emissions technology to other countries seeking to meet their own obligations in a future where carbon will cost more and more.

Q9. As with the science workforce, it's important to incentivize the public sector – more important than just thinking about connectivity. The model of investment and entrepreneurship which motivates the private sector is probably not transferrable. Working conditions, pay, job security etc. should be aligned with innovation (without fear of failure). There are related issues of organizational structure and conservative (or politically compromised) management.

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.

To build connectivity and engagement has been a real focus of the MacDiarmid Institute in the last two years, as we have sought to develop a new research programme built on fundamental scientific questions but addressing long term challenges targeting the area of Innovation for Sustainability. In doing so, we have acquired some understanding of the work required to build and maintain connectivity in the RSI system.

Connectivity is an important factor in the RSI system. However, the concept of connectivity relies on other aspects of the system – most obviously, the need for institutional knowledge, and the need to support people.

The first stage in developing connectivity is building an awareness of key stakeholders, and investing time in developing relationships that enable us to be responsive when an opportunity arises. Indeed, this goes both ways – some of our established partners in the outreach and industry spaces are more likely to now approach us when they see an opportunity that is suited to particular aspects of our mission, rather than engagement needing to be built around the need to drive a specific project. This kind of organic connectivity has enabled us to be much more efficient in delivering on many aspects of Institute strategy – but it is based on deep institutional knowledge, and associated clarity of purpose. Stability in the RSI system – both within government, and within institutions – is deeply important and underpins effective connectivity.

In addition, there remains the important challenge of supporting and incentivizing people – who are the points supporting and driving connections. This issue is at the centre of basically every challenge or opportunity in the RSI system. Researchers are very good at maintaining international connectivity at a individual level as all the incentives built into the science system internationally incentivise this; unfortunately, the challenge there may be making those connections visible at a higher level.

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.

Q11,13. Incentives are notably missing from the description of excellence on p.25; and excessive focus on 'excellence' can detract from performance. It would be a good idea to consider what is required from an individual (person, idea, tech) to obtain globally excellent system performance – that is, do we want a team of champions, or a champion team? This also applies when trying to attract “the most talented researchers and entrepreneurs in the world” (Q20).

Q12. In the MacDiarmid Institute, we have a 17 year history of grappling with the issues of diversity in science. In part, it is the longevity of the Institute and the culture of mutual trust that has been most important in getting buy-in from all our researchers into our recently established (2017) equity policy, for example. Moreover, by taking a research-community first approach to equity, we have been able to drive institutional changes at some of our partner universities, where policies regarding the support for childcare at conferences, for example, have had to be changed to accommodate our equity policy. Therefore connections, and respect for teamwork, are two very important parts of the solution.

Our initial work on equity, inclusion and diversity was very much based in outreach. Having said that, we have long since recognised that our ability to support equity externally, in education, is limited by the extent to which we represent New Zealand demographics within our Investigator cohort. This recognition has been one of the most important drivers of our PI renewal strategy, and is the basis on which our Investigator cohort is now significantly ahead of baseline statistics relating to gender diversity in the physical sciences. That said, there is still a great deal of work to be done!

Q14. Yes, but there is a risk associated with the suggested use of connectivity as a performance metric (p.43), especially since a great deal of connectivity is at the researcher to researcher level, when looking internationally, and this is probably largely invisible to MBIE. However, as with the assessment of impact, it is really important that incentives for connectivity and the need to report on it remain an institutional responsibility: funding mechanisms such as Marsden, Endeavour, Catalyst schemes should report on collective connectivity, and CoREs, NSCs, and Universities can also usefully be incentivised to report this using current funding mechanisms (e.g. PBRF). Asking individual researchers to report

needs to be carefully done so it does not become a distortionary incentive.

PROACTIVELY RELEASED

Guiding Policy – Impact

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

Please type your submission below.

The measurement of impact, as with connectivity above, needs to be done collectively, and should be primarily seen as the responsibility of the funder (with whom the understanding of the effectiveness of a given funding scheme should lie!) rather than with individual researchers, even if the data needs to be collected from them.

However, there is a real issue with Impact, in that the time between research funding, as an Input, to the delivery of Outputs and Outcomes is both significant and widely variable, and the delivery of Impact is even more sensitive to the vagaries of progress in research.

The MacDiarmid Institute, as an organisation of 17 years existence with ca. 36 Principal Investigators at any one time, and connections kept to our cohort of Emeritus Investigators, has significant statistics gathered over both types of research activities and time, and we are well-placed to report on the impact of the work we have supported. However, the idea of impact being reported by the recipients on Marsden funding, at any time during their contracted funding, would be either risible or distortionary, and indeed risks being both.

The benefits of research generally, and the imperative for public funding, are already clearly demonstrated by existing economics research, in NZ and overseas. The requirement for “all of our publicly funded research should have a strong line of sight to impact” ignores the outstanding success of the Marsden Fund, and the long-term overwhelming support within the RSI community for the format of that fund to be retained and increased. Analysis of the effects of Marsden funding (Jason Gush, Adam Jaffe, Victoria Larsen & Athene Laws (2018) *The effect of public funding on research output: the New Zealand Marsden Fund*, *New Zealand Economic Papers*, 52:2, 227-248) gives as a broad rule of thumb, that the fund could be doubled in size with no loss of research quality. Other government funding schemes in New Zealand have not been assessed with the same rigour.

In summary, the idea that “we expect researchers and institutions to step up” (p.28), is deeply problematic when it comes to individual researchers. Mention of “the resourcing needs” here and in the position paper are not clearly articulated. There is a clear emerging path towards further burdening of individual researchers. The pathway to impact from research is so complex and non-linear that it may render attempts to measure it impossible. The position paper partly recognizes this, but still uses a “result chain to impact” as its basis and suggests using impact measurements (including econometric studies) for assessment and performance evaluation. There are no clear strategies relating to the risks of drawing incorrect conclusions or creating perverse incentives. The complexities of international connectivity are not addressed. International precedent continues to motivate impact measurement, without indication that they have been in any way successful. There are some worthwhile exercises that can be undertaken in this space, relating to improved and standardized data collection, understanding of how impact happens, and developing qualitative methods.

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.

Q17-18. As a CoRE, the MacDiarmid Institute has significant recent experience in developing and maintaining connectivity (see also our response to Q10); the fact that we are a large collaboration ourselves is also relevant.

We note significant recent (3-4 years) improvements in the research commercialization process in (for example) some Tech Transfer Offices, Kiwinet, Callaghan Innovation, and the Science for Technical Innovation National Science Challenge. Skilled people, clear role definition, time and resource, institutional knowledge, a global outlook, and focus on NZ Inc. have been major contributing factors. Good points are made (p.28) about the need for ease of transaction, avoidance of creating new funding pots, data access, IP, and incentives. There could be more emphasis on improving factors such as researcher time and support, avoiding duplication of effort, reducing fragmentation and excessive competition in the RSI system, avoiding churn and loss of institutional knowledge, and reducing the regularity of top-down reforms. Effective support for time-poor researchers is important. Skilled people with capacity and the right incentives, aided by access to systemic data, can make a significant positive difference. For international connectivity of research, researchers "focused on NZ as their frame of reference" is cited as a connectivity issue (p.22). This is a good example of misaligned incentives: the funding which determines job security emphasizes 'Benefits to NZ', and in fact, we would consider that international connectivity is high at the researcher to researcher level, though it may be invisible to funders. Finally, the funding and competitiveness of the Catalyst grants should be considered.

The intense level of competition for very low success rates of funding within NZ will always act in opposition to better collaborations and connectivity. The CoREs and NSCs have been excellent for getting people to work together rather than just compete over scarce resources, so these models need to be continued and extended to improve connections. These could certainly be expanded to include international experts and business communities within NZ as co-partners. One area where connections are weak or difficult is sharing resources such as specialised equipment access across institutions. Facilities are hard fought for by individual researchers and there is no incentive to share access, or to make them available to NZ businesses. There is no system to allow for joint purchasing of equipment that could be truly transformative for various sectors, so each research institution can only acquire what it can afford alone. There is a major need for national facilities or a national research infrastructure fund with the explicit condition that the equipment will be available for others; the original CoRE funding round, which had funding for CAPEX, was a good example of how to do this but there are of course also other ways.

Along with these national facilities there needs to be stable funding for experts to run them, otherwise they will fall into disrepair or it will fall to PhD students to run them. When they are finished with their studies, students leave and the capability is often largely lost. An example to look at very closely is the Australian National Fabrication Facility (ANFF). A strong first step would be to fund a small cluster of capability in NZ that could become an associate 'node' of a larger trans-Tasman or international network such as ANFF.

There could be value in setting up fellowships for NZ-based researchers to live and work overseas for some time before returning home. Personal connections are always important, and in parts of the world that NZ is wanting to build better connections to, the in-person connection is particularly highly valued. Getting NZ researchers to exchange more with China, south-east Asia, and other major trading/research partners will mean that NZ will be at the top of the list for new opportunities when they arise. Lastly, incentivising researchers to build better connections is not enough - there are too many competing demands on researcher time already. Making connections also needs to be made EASY, or it will fall into the too-hard-to-be-worth-it part of researchers' to-do lists – for this reason, again, we believe that reporting on connections needs to be an institutional or collective responsibility.

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.

Q19,20 The MacDiarmid Institute has long operated by Sir Paul Callaghan's vision of New Zealand as "a place where talent wants to live". It is good to see an explicit focus on people (p.30 on), even if 'magnet' is not quite the right word as it implies attraction is more important than growth and support (and one should remember that magnets also repel!). The document is light on concrete strategies addressing working conditions such as pay, job security, and research facilities. The comment "may appear complex" (p.14) is understated. The system is complex, difficult for researchers to navigate, and fragmented.

Emerging researchers require more funding to support them. As a CoRE, we recognise that this is not the message you will receive from the majority of Universities, where there is little incentive to employ postdoctoral fellows because the subsidies paid directly to the institutions for PhD students make them far more attractive (not to mention, these subsidies undermine the entire principle of a fully-costed funding system – if this is justified on other grounds that is fine, but one should then be careful in applying the fiction of a fully-costed funding system to justify the high levels of overheads on postdocs!).

Nonetheless, the system in its current state leaves a large hole in the career pathway for emerging researchers who are committed to New Zealand and who have already acquired significant research expertise. In 2018, we ran a contestable funding round for postdocs – where we evaluated the researcher themselves, and invited them to write their own research project – this was in contrast to previous postdoctoral appointments, where the project was put forward by an established researcher. In essence, we believe that there is not only an immense need for this type of funding, but that it drives the selection of the very best people who have the ideas needed to drive innovative research in New Zealand; two of the 6 people we appointed have since found permanent employment (one in academia, and one in industry research) less than a year later. These schemes are needed, and valuable.

The contestable postdoctoral fellowships administered by FRST, which lasted for 3 years

and enabled postdocs to propose their own ideas for support, were an excellent model. However it is possibly useful to note that when the nationally contestible scheme was put in place, it was introduced alongside the Bright Future Doctoral Scholarships. We mention this as one of the consequences of that funding was to make a PhD in New Zealand competitive with doing it elsewhere in the world; as of 2003, for example, the scholarship rate was \$25k; in 2019 it is \$27k at the University of Auckland and only \$21k at the University of Canterbury. It is really shocking that our PhD students are effectively being paid **less than the minimum wage**, and while the MacDiarmid Institute raised its scholarship rate to \$30k in 2019, and is planning further increases in the near future, we are aware that inflation since 2003 would support a stipend of \$41k.

We mention the above simply to point out that competition between Universities in New Zealand is not an effective way of enforcing fair conditions for students and early-career researchers, and that intervention by the funders of these short-term contracts – both TEC and MBIE – is absolutely **needed** to drive change.

Q21. Changes could include more and longer-term support for researchers, and incentivizing results rather than funding. The right people would be encouraged by that kind of a system. The entrenched paradigm is (p.2,14): “Stable long-term institutional funding is important to build and grow teams and make significant progress on big challenges and problems. Competitive funding creates dynamism and the opportunity for new ideas.” This should be challenged, because the system is overcompetitive. There are important opportunities for new ideas when funding is stable that are NOT available via short term funding. The costs of the competitive system in researcher time and career incentives should be recognized and measured by Government. Job security profiles should be considered, particularly at CRIs. There are related power structures (mostly related to incentivization of Universities and CRIs to compete financially) which lead to (for example) primacy of obtaining funding in job security, and cost cutting reducing support for researchers.

Q22. Regarding the suggestion of more RDF-like schemes (p.31). RDFs are considered highly prestigious, but even they are notable for occasional exploitation by the Universities and associated poor job security. Regarding “migration settings” (p.31). This is a critical and ongoing issue when it comes to recruiting and retaining overseas PhD students. Long and seemingly disorganized processes are leading to NZ losing talent.

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.

These questions pose some interesting challenges with respect to the emerging imperative to minimize airline travel. This needs to be balanced against the various needs of emerging and established researchers.

Q23. The most important answer here is long term stability for funding and researcher careers (see also our answer to Q10).

Q24. Structures such as the Technology Transfer Offices and the revamped Tech Incubator system must be closely watched, given the potential for ticket-clipping rather than prioritizing the success of NZ Inc.

Q25. Addressing the conflict between IP would be a good role for Government agencies, along with connectivity to international investment opportunities. The barriers relating to IP are understated here, particularly trust from the company side, complexity of multi-institutional projects, and international considerations.

Q26. Researchers who are new to NZ, and ECRs, particularly stand to benefit from increased connectivity; and connectivity of public sector research is also important.

Connections cannot simply be another criterion to fill in on funding applications - there are already enough of those that have appeared in recent years without the support or guidance of HOW to go about these things. It can be frustrating to be asked to add something new to your proposed project when you don't know how to do it, and is simply another in an increasing set of demands on researchers' time that take them away from doing research. But as a collective responsibility for institutions (including CoREs) to report on, we would support this.

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.

Speaking from experience of our start-up and commercialization work, early pipeline research is increasingly assisted by some TTO incubators, Momentum, Return on Science, and KiwiNet. However, the skilled capacity of this support could be increased, as organizations like MacDiarmid are called upon to fill gaps due to lack of capacity. The document would also do well to recognise that start-ups are not the only commercialization model. There is a risk of focusing on start-ups when growth of an existing business, or licensing (for example) might be more sensible.

Eligibility conditions for Callaghan grants (which are useful due to scope and timeliness) often rule out startups at the stage where it would be most helpful.

We would also suggest that postdoctoral funding will be a strong driver of the capability development needed to support start-ups.. Students are rarely at the stage they can develop an idea or technology from their MSc or PhD work into a product or company, although we have put significant effort into supporting our student cohort to develop some of these skills in the last years, they usually require postdoctoral support from somewhere. University or CRI researchers who spend their time and effort commercialising research can be at a disadvantage compared to their non-commercialising colleagues because of what these sectors incentivise (publications, not companies). Postdocs have the knowledge to really develop something new to where it can be spun out and commercialised, and they are not yet fixed in their careers so they are the natural pool of talent to do this. The lack of postdoc positions in NZ means there is no-one to take research out of the lab. NZ is probably the easiest place in the world to start a business - let's also attract more overseas postdoc talent to do that - attracting academics to start companies is not the most effective model, in our experience.

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.

Environmental innovation is an area in which rich and diverse connections between researchers, businesses, communities, and not-for-profit organisations can stimulate innovation for the public good.

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.

There is an extend to which focused areas grow organically. The sustainable materials spinouts emerging from Parnell, for example (Avertana, Mint Innovation), arguably reflect the mindset of sustainability-driven investors (eg K1W1), sharing of knowledge and talent amongst each other, and their co-location. It strikes us that public-private investment funds that are values driven and based on a sophisticated understanding of deep technology and the associated risk and opportunity profile, and good links to talent is an essential ingredient.

Central to any growth initiative must be a focus on people and talent. Pathways must be created to ensure the right people can play a leading role in these industries. Something we have learned in the MacDiarmid Institute is that the first steps of tech spinout companies is critically dependent on the timing of funding support for the scientist entrepreneur to step out and lead the company. We have known examples where this support has arrived at just the right time to establish the spinout team, and others where key people have been lost and the window of opportunity closes.

Scale up – Choosing our areas of focus

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

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

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

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

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

Please type your submission below.

The MacDiarmid Institute fully endorses the suggested focus on renewable energy technology. New Zealand has recognised strength and a pipeline of talent and ideas in niche areas that could both support New Zealand’s zero carbon targets and provide export opportunities.

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.

In physical sciences (relevant to the MacDiarmid Institute) we have much still to do particularly in terms of participation (Q35, 36). Yet, materials science is an example of an area that can really make a difference to Maori. Research takes place over long time frames, an innovative outlook is essential, and we create high-tech industries with small footprints that could be located in regions. There is also resonance with a 'material' world in Mātauranga Maori. There is an emerging Maori way of doing tech entrepreneurship that is relevant to MacDiarmid, which emphasizes long time frames, people over profit, and sustainability. The value of these traits starting to be recognized in mainstream investment circles. There are also some exciting Maori-led emerging thematic organizations with an entrepreneurial culture e.g. FOMA, Nuku ki te Puku, Poutama, Wakatu Q37 Building trust and relationships, hard work, and resource input in both directions. It is a time-consuming process and a fragmented landscape on both sides.

Within the Institute, our primary mechanism for creating change is, as always, through supporting people. But this support is much more than financial; it is about creating a culture which recognises the additional work done by Māori researchers, due to a system that requires their capability, but still frames diversity in terms of equity: we need Māori researchers both in mainstream departments across our universities (such as in a physics department, for example) AND in māori studies departments and the like. This duality of the need is not often clearly recognised. Our approach has been to consciously recognise both needs and work to support those researchers that we are in a position to best engage with.

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.

It is great to see the emphasis on firm foundations; perhaps see our comments regarding the importance of institutional knowledge and supporting people in the context of connectivity. These things are a prerequisite for many aspects of a successful system.

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.

“Science is People”, said Alan MacDiarmid: invest in people, stability of careers, and career development. Everything flows from that.

PROACTIVELY RELEASED

General

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

PROACTIVELY RELEASED