



10 November 2019

S19.27

Submission to the Ministry of Business, Innovation & Employment on the Draft Research, Science and Innovation Strategy

Introduction

- 0.1. The National Council of Women of New Zealand (NCWNZ) is an umbrella group representing over 200 organisations affiliated at either national level or to one of our 15 branches. In addition, about 450 people are individual members. Collectively our reach is over 450,000 with many of our membership organisations representing all genders. NCWNZ's vision is a gender equal New Zealand and research shows we will be better off socially, environmentally and economically if we are gender equal. Through research, discussion and action, NCWNZ in partnership with others, seeks to realise its vision of gender equality because it is a basic human right.
- 0.2. This submission has been prepared by the NCWNZ Climate Change and Environment Standing Committee with contributions and support from New Zealand Federation of Business and Professional Women Incorporated (BPWNZ) and Graduate Women New Zealand (GWNZ).

1. Contribution of Research, Science and Innovation

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

- 1.1. By embracing a less anthropocentric approach in nature where status of ecosystems is not in prime consideration in assessing human progression by interlinking ecology, economy and society and providing the core functionality of Sustainable development with a strong focus on the United Nations Sustainable Development Goals. It requires enabling research that can advance our understanding of a circular, sustainable economy rather than prioritising a growth economy and it requires enabling greater partnership with Māori and the means to combine tikanga Māori approaches and mātauranga Māori with western science approaches to the climate crisis.

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

- 1.2. More scientific and innovative understanding, analysis and interpretation on such issues helps in developing appropriate technologies. This includes water security, its wise usage and management as well as treatment and storage for drinking water, along with managing sanitation according to the

principles of Reduce, Re-use and Recycle (3Rs). It requires investment in RSI focussed on transport, energy, agriculture and guardianship of resources. But it also requires significant advances in supporting research and innovation that enables a shift in unsustainable practices based on a consumerist culture. There is a need to finance innovative thinking and new solutions at the community level.

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

1.3. Suggestions include:

- Foster gender balance in research teams, in order to close the gaps in the participation of women.
- Ensure gender balance in decision-making, in order to reach the target of 50% of the under-represented women in panels and groups and of in advisory groups.
- Integrating the gender dimension in research and innovation (R&I) content to help improve the scientific quality and societal relevance of the produced knowledge, technology and/or innovation.
- Remove barriers that generate discrimination against women in scientific careers and decision-making (supporting research organisations to implement gender equality plans), and
- Integrate a gender dimension in research content.
- Identify ways to recognise research achievements in the tertiary sector which take carer commitments and the restrictions on (for example) travel into account. A good example of this is recognising parental leave and parenting commitments in applying for Marsden funding (i.e. 2 extra years' eligibility per child is now awarded to fast start applicants).

2. Researching and innovating towards the frontier

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)?

2.1. Yes.

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

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

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

2.2. New Zealand has the opportunity to demonstrate effective transition to a climate-neutral economy, supported by evidence-based research. This will require commitment to climate-change policy and financing increased opportunities for innovative research. We appreciate the signalling of this commitment through the foregrounding of sustainability, inclusiveness and wellbeing in the strategy

along with the direct referencing of the need to meet the challenge of transitioning to a zero-carbon economy. We have a responsibility to ensure that this commitment is reflected across policies.

- 2.3. Digital Earth provides a wide reaching tool to support connectivity and evidence based research. Digital Earth Australia¹ for example, utilises satellite imagery to detect and monitor physical changes across Australia. It identifies soil and coastal erosion, crop growth, water quality and changes to cities and regions.
- 2.4. It enables evidence based policy and decision making as a critical tool in establishing the impact of climate change.
- 2.5. New Zealand could achieve a zero carbon economy with the use of lead technology that Digital Earth offers. It would inspire a new phase of creativity, innovation and the ability to move forward to achieve evidence based, connected, multi layered and adaptive outcomes.
- 2.6. *Digital Earth: The Next Paradigm*² by R Simpson provides a summary of the scope of this powerful tool that is utilised by China, Russia and many European nations.³

3. Our key challenge – Connectivity

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

- 3.1. Yes. In order to solve the most critical problems facing our society (including those named in the strategy of transitioning to a zero-carbon economy and protecting the environment), collaborative multi and transdisciplinary research is required; however, the current research system still rewards individual endeavour. We must place greater emphasis on the incentive of cross-research opportunities. We must also explore innovative ways to foster connections which don't rely on extensive international travel – this will reduce the carbon footprint of travel at the same time as enabling greater participation of female researchers who are more likely to be restricted in the travel they are able to take due to caring responsibilities.

4. Guiding Policy – Excellence

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?

- 4.1. Over the past 10-15 years, the global community has made a lot of effort in inspiring and engaging women and girls in science and research. Yet there is much more room for women and girls to participate fully. There is a huge opportunity for the industry to attract and retain women scientists. The growing number of female doctoral graduates in NZ is not reflected in the number of women taking up senior science research positions. Suggested initiatives include:

¹ <https://www.ga.gov.au/about/projects/geographic/digital-earth-australia>

² <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3396470/>

³ [Next Generation Digital Earth](#), Goodyear, Simpson et al

- Ensure service, community and cultural obligations are fully recognised and accounted for to facilitate greater research participation for women, Māori and Pacific researchers.
- Recognise equivalent experience and the diversity of career pathways.
- Support more Girls in STEM initiatives - If more girls are to study science, technology, engineering and maths (STEM) subjects at university, then attitudes among parents and society at large must change.
- Grants could be focused on research organisations who have received an award for female-friendly and diversity-friendly policies.
- Seek ways for the tertiary and research sector to be more open and accommodating to diverse ways of learning and researching. Our tertiary sector is based on a colonial model of learning that can function to exclude Māori and Pacific academics and restrict career progression. The percentage of lecturers and professors is not representative of the diversity in NZ society which means that our Māori and Pacific academics are over-stretched and carry disproportionate commitments compared to Pākehā colleagues (e.g. expectations to carry out advisory/committee/board roles).
- New Zealand has changed and is becoming more diverse. Multicultural diversity offers valuable opportunities such as helping RSIs increase their innovative power. With diversity comes creativity and proliferation of exchanges and practices to advance new ideas.
- Revise the PBRF model to account for community and collaborative research.
- Note the research findings in 'Why isn't my Professor Pasifika' DOI: 10.20507/MAIJJournal.2019.8.2.9 which point to global patterns of exclusion, which in New Zealand impacts on women, Pacific and Māori staff. Findings indicate the need for structural change in NZ universities to become indigenised, decolonised places of learning that 'embrace all learners, esteem all knowledges and serve all communities' (p.230)⁴.

5. Guiding Policy – Impact

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

5.1. It is time to update New Zealand's understanding of scientific impact.

- **Impact originates from collaboration.** The increasing number of co-authors in almost every scientific field and rising incidences of hyperauthorship (articles with several hundred authors), suggest that meaningful insights can often only be generated by a complex combination of expertise. This is supported by the fact that interdisciplinary collaborations are associated with higher impact. Research is increasingly becoming a collaborative enterprise.

⁴ http://www.journal.mai.ac.nz/sites/default/files/MAIJrnl_8_2_Naepi_FINAL_0.pdf

- **Common impact measures fail to recognize systemic shifts in scholarly practice.** New digital research infrastructures and the advent of online distribution channels are changing the realities of scientific knowledge creation and dissemination. Yet, the measurement of scientific impact that funders, policy makers, and research organizations perpetuate fails to sufficiently recognize these developments. This situation leaves many researchers stranded as evaluation criteria are often at odds with the reality of knowledge creation and good scientific practice. A debate is urgently needed to redefine what constitutes scientific impact in light of open scholarship. Open scholarship being scholarship that makes best use of digital technology to make research more efficient, reproducible, and accessible.
- **Impact comes in different shapes.** Researchers increasingly produce results that come in forms other than articles or books. They produce scientific software that allows others to do their research, they publish datasets that lay the foundation for entire research projects, or they develop online resources like platforms, methodological resources, or explanatory videos that can play a considerable role in their respective fields. In other words: Research outputs are becoming increasingly diverse.
- **Impact is dynamic.** Research products are basically information goods and therefore likewise prone to constant changes (e.g., tables and graphs that are being updated with live data, blog posts that are revised). Even a conventional article, a seemingly static product, changes in the publication process as reviewers and editors ask for clarifications, additional data, or a different methodological approach.

6. Guiding Policy – Connections

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

- 6.1. As mentioned above the current system rewards individual academic achievement and contribution. It is time for a system's change where connection between people inside and outside institutions are increased and cross-collaboration is rewarded. To solve the world's greatest challenges and achieve the Sustainable Development Goals and other ambitious goals for the people, the planet and the environment. Improvements in the use of technology, expertise exchanges, online conferences, increased webinars, the use new technologies such as blockchain and artificial intelligence are needed.
- 6.2. The use of Digital Earth would provide for a digital commons that would transcend the information silos, provide the connections for cross collaboration of all sectors and enable the application of currency and future predictive modelling based on evidence. Digital Earth is powerful. It offers what is arguably the best opportunity at this time for technology and research to grapple with the challenges of our changing climate. Refer to Q 6 for links. It takes leadership and commitment from government as we step into the implementation of a new phase of commitment to achieve a zero carbon nation.

7. Actions – Making New Zealand a Magnet for Talent

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?

7.1. A powerful and internationally competitive research base, essential to the present and future vitality of New Zealand, depends fundamentally on a strong cohort of highly creative researchers, and therefore on New Zealand's capacity to attract some of the best minds in each generation, not only from Europe, but also from the global pool of talent. It is talent that New Zealand needs and Government commitment to support that talent. Attracting experts in Digital Earth technology for example would require that commitment. Research and the people trained in technology can inspire many of the ideas, aspiration and actions that contribute to the vitality of society and its capacity for bold creativity in responding to whatever the future might hold. An attractive and efficient research career structure requires:

- well-designed posts that are adapted both to research needs and career prospects of researchers; -well-structured career perspectives that clearly indicate avenues for progression including posts outside academia;
- **strong funding** and facilitating processes that permit competitive salaries to be offered;
- **career development support**;
- **advice and support** for diverse career pathways; - shared responsibility for research careers between all key stakeholders, comprising universities, governments and those from public and private sector who fund research.

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

7.2. By ensuring New Zealand is at the forefront of **leading-edge research** to develop new understanding and creative people are retained within New Zealand and welcome new ones. It is crucial that some of the best intellects in each generation, especially women, continue to be attracted to research careers, and are given every opportunity to grow confidence, capacity, ambition and creativity.

7.3. A **research environment** with a wide variety of researchers working on cognate topics, strong links with other disciplines in a cross-disciplinary setting, good international connections, cross-fertilisation of ideas from external researchers, and access to appropriate facilities.

7.4. **Independence and responsibility** at an early stage of a research career.

8. Actions – Innovating for the public good

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

8.1. In recent years, the fall of the innovation dice is increasingly weighted to serve vested economic interests. It is therefore essential that RSI enable and enlarge innovation spaces to expand the possible, and to do so with an agenda that serves social needs. A significant shift is required if activities are to constitute public good and social justice.

9. Conclusion

9.1. In general, NCWNZ, BPWNZ, and GWNZ support this consultation on the draft RSI Strategy, however a number of recommendations are outlined here to ensure a positive outcome for all is achieved.



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