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Renewing the Aotearoa New Zealand Science System: Summary

The New Zealand Association of Scientists

The effects of Covid-19 reveal some of the cracks in our science system. This points to the need for its review and renewal. Covid-19 now, and climate and biodiversity very soon, will require a different way of valuing and connecting with science. The NZAS proposes an eleven-point wide-ranging and empowered review of the science system.

1. Start by valuing people - make them, their careers, and their communities, the foundation of a good science system. Build a culture of inspirational ideas and knowledge that is grounded in what is possible locally.
2. Sow and nurture the seeds for more Māori and Pasifika scientists and their pathways to contribute and benefit.
3. (Re)Create a Ministry focused on Science and Research in a way that balances ministerial connectivity with all the aspects of Aotearoa New Zealand that stand to benefit from science and research.
4. Develop better pathways for science and policy to connect – and communicate how this works to all stakeholders.
5. Improve alignment across the system so that components work together rather than in competition.
6. Clarify and support what Universities and government funded research institutes are for and support that at the board-level.
7. Science for the nation – would a new version of DSIR (Department of Scientific and Industrial Research) do better than separate institutes?
8. Develop a better approach to key challenges faced by the nation, by improving the ways in which teams and organizations are brought together to tackle them.
9. Build a nuanced understanding of our place in global research and what is preventing better collaborations.
10. Determine pathways to leverage from Aotearoa New Zealand's non-science strengths.
11. Develop processes to generate the data and evidence to assess the system and its impact.

A connected, evidence-based, adequately funded, harmonized research ecosystem is a goal we need to pursue. Now is the time.

Renewing the Aotearoa New Zealand Science System: The Long Read

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What are we talking about?

This is a call for a wide-ranging review - with teeth. Socioeconomic pressures from Covid-19 and the climate emergency suggest globally and nationally we are at a crossroad. We outline the motivations for rethinking and reorganizing the Aotearoa New Zealand science system - its purpose and structure - to give us the information and tools to take the best path possible for the challenges ahead. This is not a complete plan. It is a call for a wide consultation and more data with which to make decisions.

Why do we need to do this?

A number of things going on at the moment are throwing a spotlight on science and society in different ways. The range of national responses to the present pandemic is doing a very effective job of demonstrating the benefits of connecting science with positive outcomes for society. This is against a background of a changing climate and social inequality struggling to have any impact on decision-making over recent decades.

The science and wider research sectors have undergone significant corporatization (by which we mean a primary focus on financial outcomes) over recent decades. While this has enabled apparent expansion, it has also exposed weaknesses and raised questions about the sector being fit for purpose.

Due to their expanded reliance on international students, universities are entering a period of massive financial stress. The Crown Research Institutes (CRIs) have just been reviewed and found to be overly business-oriented at the cost of some of the driving motivations for their existence[17]. At the same time, they are being protected from many of the risks of actual commercial operation because some components are vital for national interests. Other agencies like museums and independent research organizations fill key niches in the research ecosystem and face their own specific challenges.

Meanwhile our climate is changing in ways that will have both direct and indirect effects on our environment and economy. Our land, freshwater and marine ecosystems are being placed under close-to unbearable pressure. What if solving this was part of the answer to living better lives?

Society struggles more than ever with inequity. What if improving this in an evidence-based fashion was part of the answer to having a better society?

It is not certain by any means that our present science and research sector was fit for purpose prior to the new reality of a global pandemic, and it clearly will need to adjust to our new reality. The science system could muddle along, and we plan on chance to get us through. Currently, we rely on the belief that scientists chasing contestable (with an opaque decision-making process) and commercial funding will head in the right direction. The current crisis calls this out as lacking the vision and strategy a national science system deserves. There must be a better way driven by a combination of evidence and horizon-scanning.

What's working now?

Clearly not everything is broken, and the review would want to identify and protect those things that are working well. What are they? Some components of our science system are clearly agile. During the initial stages of Covid-19, even though the field had been under-supported there were still enough scientists with enough connections to policy and decision-makers to rapidly provide an evidence base to those decision-makers and to motivate the population to support those decisions[3]. A look at what's working in comparable socioeconomic systems is something often raised. But really are there any comparable systems? Saying that, a recent Danish review is worth reading[12].

It is one thing to say the government sees a use and benefit for science and knowledge. What do the public think? It is fair to say on balance "science" has a social license to operate generally but how far does this go, and can it be better developed bi-directionally?

It is not all about the money. Many of the present portfolios (Marsden Fund, HRC: Health Research Council, CoREs: Centres of Research Excellence, Endeavour, Te Pūnaha Hihiko: Vision Mātauranga Capability Fund[10]) are ok although success rates and transparency need to be improved. Some are hazy (SSIF: Strategic Science Investment Fund, Unlocking Curious Minds) and others are possibly a disaster (NSC: National Science Challenges) but with no independent data who knows? Indexing of funding, actual evidence of a review process and meaningful assessment to restrain expectations are starting points.

Pretty much every review of the science system concludes that certainty and continuity is very positive, so we are by no means suggesting we rush towards complete upheaval. At the same time, it is clear the system can, and must, do much better.

What's gone wrong?

What has society lost by making the connection between economic growth and science the singular pillar of our science system? For starters it is a narrow view of "economic growth" that doesn't directly factor in the environment[12] and social well-being[8].

In some ways it is hard to know where to start. Science is built around evidence, but we have precious little data on our science system. Existing data with which to make decisions for re-building a better research system are fractionated and hidden as one can cobble together only limited data from PBRF (Performance Based Review Fund), budget tracking, CRI annual reports and partially available grant

information. The delays on the MBIE NZRIS (New Zealand Research Information System) are holding the system back.

The method which was developed to tackle actual challenges can't really be said to have worked well. The National Science Challenges (NSC) devolved into an archipelago of topic-based research ecosystems all behaving as island ecosystems do - insular and idiosyncratic. Probably the worst tragedy of all was the amount of money spent on governance rather than ideas, application and nurturing the next generation. The proposed review needs to reflect on the mid-term roll-over of the NSCs which occurred without a single visible modification and why there was no Challenge focused on infectious diseases.

Existing policies have allowed research funding, CRIs and Universities to be governed largely by neo-liberal thinking, with only short-term steering toward the next perceived opportunities. The short-sightedness is perhaps best represented by having our main science funding run out of the government's economic development agency (MBIE). We live in a time when this mode of thinking, and the motivations it has created, are being robustly questioned globally, and so it should be, as we seek to rebuild conceptual foundations of our science system.

What should the Review do?

People: Much of the government talk around shaping the science system is top-down. In some situations, this might be fine. However, our science system's unpreparedness for Covid-19 makes it questionable that the system (as opposed to notable individuals and teams) actually worked. The process must start by valuing people - make them, and their careers, the foundation of a good science system. Then it should build a culture of inspirational ideas and knowledge grounded in what is possible locally. Mandate a healthy and diverse workforce and career-path. This specifically includes early career researchers[6] and technicians[15]. This also includes boosting investigator-led science. This is as much about the resilience and productivity of the research ecosystem as it is about the well-being of individuals.

Honoring te Tiriti: Sow and nurture the seeds for more Māori and Pasifika scientists in ways that build pathways for them to benefit from, and contribute to, science[9]. Like every aspect of life in Aotearoa New Zealand there is an ethical motivation to understand and connect with Māori perspectives on science. The opportunity is there to shift the too common perspective from one of a difficult obligation to an equitable benefit. Furthermore, there is an opportunity to mature the expectations placed on Māori scholars. With all the posturing by all parties around the Vision Mātauranga initiative[10], very recent actions at the University of Waikato[14] throw light on potentially deep-seated problems.

A Ministry? Noted economist Joseph Stiglitz attributes the truth source of success as being due to science, technology and the rule of law[16]. Can we (re)create a Ministry focused on Science and Research in a way that balances ministerial connectivity with all the aspects of New Zealand that stands to benefit from science and research. The present ministerial setup has science held within economic development, which can directly be at odds with other aspects of science like environment[12] and health. It is also likely not good for economic development in the long run because it removes understanding of the wider scientific process in supporting the economy. Evidence of this can be found in the present struggles MBIE are going through actually explaining what "Impact" is. The review would examine the MoRST/FRST/MSI model as

well as international models and recommend something that builds on this. Denmark has a Ministry for Higher Education & Science, Norway Education and Research, South Korea has a Ministry of Science and ICT.

Science and Policy: Develop better pathways for the science-policy nexus and elevate their profile and the role of science in the Nation's policies. Covid-19 has thrown a spotlight on the effectiveness of evidence-based policy and open lines of communication between science, policy, decision-making and communication. Visibility of Ministerial CSAs and their profile needs to be considered[1].

A functional ecosystem: Build alignment across the system so that components work together rather than in competition - both in the public and public-private sector. A connected, evidence-based, adequately funded science ecosystem plus an improved transferal of skills across sectoral divides

The Purpose of Institutes: Clarify and support what Universities and government funded research institutes are for and support that at the board-level. The highly corporatized modern university will need to re-vision itself, and be supported to do so, in a way that strikes a different balance between revenue and the pursuit and passing-on of knowledge.

Science for the nation: Do we build a second version of DSIR? The Te Pae Kahurangi 2020 CRI Review[17] essentially recommends something not dissimilar to DSIR. DSIR was broken apart for some valid reasons. Let's return to a for-the-nation research institute that is better internally connected and with manageable internal politics and resource allocation processes? It would connect with the universities sufficiently functionally to maintain a sustainable scientific workforce.

Actual Science Challenges: Develop a better approach to key science challenges and the ways in which teams and organizations are brought together to tackle them. Make Challenges open and dynamic.

International: Build a nuanced understanding of our place in global research and what the present limits are on better collaborations. Recent advances in remote collaboration and communication can enable better, and more sustainable, international collaboration.

Determine pathways to leverage from Aotearoa New Zealand's non-science strengths: We, as a nation, are good at a number of ways of working outside of the research sector. Number-8 wire and flat hierarchies are arguably such niches, give or take a pandemic. Where can the connections to science be developed, expanded, communicated to the wider stakeholder communities and built-upon?

Evidence: Develop processes to generate the data and evidence to assess the system and its impact. A connected, excellent research ecosystem that has impact is a great target. It is meaningless if the definitions are hazy, contradictory or unobtainable. Identifying what is measurable and doing that is a start. The lack of information with which to make informed decisions in our research system is as remarkable as it is disappointing. NZRIS is taking too long - why? A new equivalent to the 2008 NZAS Survey of scientists and technologists[7] would generate data and understanding – especially around our early career researchers where information is so important[10]. The data collection would need some independence and ability to examine the truth. It would also include transparency in decision making.

This call is for a review of the sector driven by lines of evidence for a rebuild of many parts. A connected, evidence-based, adequately funded, harmonized research ecosystem is a goal we need to pursue. Now is the time.

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Further Reading

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The New Zealand Association of Scientists (NZAS) is an independent body that stands for and advocates for science and scientists in New Zealand. We are made up of a wide cross-section of the New Zealand science community, from University departments to CRIs to those working in independent research organisations or in science-related policy development 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 co-operation,
- 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.