

Introduction

This response to the issues raised in Te Ara Paerangi Future Pathways Green paper comes on behalf of *Kia eke kairangi ki te taikaumatatanga*, the Ageing Well National Science Challenge. The responses were developed through discussions amongst the Challenge's directorate, informed by five regional workshops held with the Challenge's researchers, with input from our Science Advisory Group, and signed off by our governance group. The response also includes reflections from community stakeholders.

Recommendations in this submission are informed by our experiences of what works:

1. to implement mission-led research, and
2. during the journey to become a Tiriti responsive organisation, and to deliver equitable outcomes for Māori.

Key evidence that Te Tiriti underpins everything Ageing Well does includes:

1. Māori are half of the members of an effective, strategic and collegial Governance Group,
2. The Chair and Director are Māori,
3. Half of the research funding allocated in 2019-2024 will support Māori research,
4. Mātauranga is valued and privileged,
5. Māori communities are determining and progressing research directions, and their science aspirations are being met,
6. All research teams have to deliver outcomes on the Vision Mātauranga policy, and
7. Research teams work with, and for, communities.

Rauika Māngai

Rauika Māngai brings a much needed voice to the review of the science sector discussion.

Ageing Well NSC would like to tautoko the principles for change that Rauika Māngai advocates.



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Summary of key points

1. Priorities design

We support defining a set of national research priorities, with the areas being those likely to be priorities over an extended period e.g. 30 years.

2. Priority-setting process

There should be no predetermination of priorities, because of existing structures or interests of organisations. Consultation should be deep and encompass harder to reach groups, such as Māori, Pacific, with processes that accommodate their needs.

3. Operationalising Priorities

Each priority ought to have independent, expert governance, reflecting true partnership with Māori. Governance expertise can be shared across priorities. Priority funding needs to be allocated for extended periods, and reflect the real costs of research, including those of stakeholders and communities.

4. Engagement

The old science sector does not work for Māori. **Success** will require starting with a clean slate and engaging in kōrero with an open mind. **Failure** would be implementing minor changes (Band-Aid approach) to the current system.

5. Mātauranga Māori

Māori leadership should be visible in science sector organisations at all levels, including governance and management. Organisational changes will also be needed within MBIE.

6. Regionally based Māori knowledge hubs

Regional hubs will help whānau, hapū, and iwi engage, but it will be important to consider inter-regional engagement to amplify outcomes for national Māori benefit. A national Māori Science Authority would provide a national level organisation to interact with the Crown and regional knowledge hubs.

7. Core functions

These should be identified by an independent national group.

8. Establishing a base grant and base grant design

Robust and transparent reporting, monitoring and auditing on how base funding has been used is critical, but performance metrics need to be re-thought. Any model of base funding should be scalable and work for small research organisations, not just universities and CRIs.

9. Institution design

Collaborative research institutions require strong, enduring relationships.

10. Role of institutions in workforce development

PhD training should incorporate a broader range of skills to fill the gaps between science, delivery, knowledge exchange, and policy. For all staff, there should be a *requirement* for training in Te Tiriti and cultural competency.

12. Institution design and Te Tiriti

Leadership (governance and management) at institutions needs to align to the cultural changes articulated in Te Ara Paerangi; cultural competencies are essential.

13. Knowledge exchange

Knowledge transfer requires designated funding support.

14. Workforce and research Priorities

National research priorities should inform strategic investment in research skills training programmes.

15. Base grant and workforce

Any model of base grant funding carries significant risks for workforce, underlining the importance of transparent and robust reporting, monitoring, and auditing of use by institutions.

16. Better designed funding mechanisms

Funding mechanisms should recognise the importance of postdoctoral scientists. Co-design and co-working with stakeholders/communities should be appropriately recognised through any funding process. Increased support provided directly into career grants is an alternative to using base grants to sustain the research workforce.

17. Funding research infrastructure

Investment in physical infrastructure should align with research priorities, recognise risks of damage and disruption, and follow engagement with Māori to determine which infrastructure will be necessary and important in order to best respond to their priorities.

Theme: Research priorities

1. **Priorities design** What principles could be used to determine the scope and focus of national research Priorities?

We support defining a set of national research priorities. Much good around the process for determining these can be taken from the way the National Science Challenges were defined.

Substantive and resourced Māori input to set research priorities is essential, and should be carried out at leadership (Iwi Chairs Forum, Māori leaders in the science sector, tohunga) and community (whānau, hapū, mārae) levels.

National research priorities ought to be those long-term issues/opportunities that are likely to remain as priorities over an extended period: e.g. 30 years. This time horizon would also provide support to the recently commenced system of Long-term Insights Briefings required by the Public Service Act (2020). Given this time horizon, it would be useful to set overarching 'long term' priorities, which are subject to review and refresh at regular intervals (say 5-6 years). Beyond this, there will always arise intercurrent "priorities" - issues that appear quickly and need rapid responses; these should be dealt with outside of the national research priority-setting and review system.

It is important that there should be coherence in the national research priorities: each needs to contribute positively to Aotearoa NZ's wellbeing, and not negatively impact other areas e.g. by exacerbating inequity, or by limiting climate change mitigations.

2. **Priority-setting process** What principles should guide a national research Priority-setting process? How can the process best give effect to Te Tiriti?

We support a genuine process for identifying national research priorities, with no predetermination of outcomes – implicit or explicit - by the roles or remits of existing structures, such as areas of interest of particular research institutions, like CRIs or Universities, or currently available infrastructures. As far as is possible, there should be no "givens"; the process should start with a blank sheet.

Given the significant impact on the research sector, and Aotearoa NZ more broadly, of any eventually determined national research priorities, it is appropriate that detailed consideration is given to developing the process for determining these. There should be roles for: the science sector, policy and government, Aotearoa NZ businesses, communities and the wider public in contributing to priority setting. Consultation pathways with Māori, Pacific, rural and hard to reach (i.e. marginalised) groups need to be developed by MBIE – in their spaces and at times that work for these groups. For Māori, wānanga will be needed; for Pacific, fono will be needed. We see this stage as needing to be more extensive and intensive than the process leading to the initial formulation of the National Science Challenges, and informed by the lessons learned.

3. **Operationalising Priorities** How should the strategy for each national research Priority be set and how do we operationalise them?

Each national research priority ought to have independent, expert governance, at the very least along the lines of current National Science Challenges. Governance should reflect true partnership with Māori, as modelled by some existing National Science Challenges. Governance groups should contain a mix of perspectives, including at least stakeholder, Māori, Pacific, and research.

It is important that governance expertise should be shared across priorities, so that a member may be part of more than one priority governance group. This is pragmatic given the currently limited pool of expertise in Aotearoa NZ in some areas, but also supports cohesion and communication across priorities.

The hosting of national research priorities needs to be re-imagined and not default to existing large institutions. There may be advantages in priorities being hosted, or managed, by novel (non-University, non-CRI) organisations. Regardless of hosting arrangements, the National Science

Challenge model of 'contract parties' has been useful in some National Science Challenges in limiting actual or perceived 'institutional grab' of resources, and should be incorporated into planning for the future.

While recognising the need to have multiple organisations involved in the governance and hosting of research, one criticism of the National Science Challenges structure has been the potential for convoluted administration-management and governance arrangements. If this occurs, the influence and accountability over science mission can be disrupted by the internal mechanisms of individual organisations. However, the structure can be effectively executed if the role of each group is clearly defined and maintained. In addition, an advantage of the collaborating parties structure is that the host is accountable to other research institutions, which ensures that the a National Science Challenge delivers the best outcomes for all of NZ.

Priority funding needs to be allocated for extended periods to ensure there is time to deliver truly transformational change for the public, thus, align to and provide evidence for development of Long-term Insights Briefings required by the Public Service Act (2020). An initial funding period is likely 10 years, with an expectation of a further significant period of funding. Regular comprehensive reviews (cf. Challenge mid-way reviews), say every five years, are appropriate: to inform decisions to stop, reduce, or increase funding depending on progress and relevant external developments.

Within a priority, it is reasonable that the majority of funding is allocated through commissioned or tightly defined contestable processes. However, there must be a reasonable component of funding that is set aside for open contest to attract new research directions, new approaches, and new teams. Careful consideration of the bidding criteria for such contestable funds has potential to support desired changes around collaboration and engagement.

While mission-led research could be positioned throughout the research and science sector, it would logically be placed within national research priorities. Mission-led research is driven by communities. Communities will want research and science to provide solutions to the challenges they face, in place, throughout the country. Community driven research provides a valuable opportunity for researchers to think outside the box and find pragmatic solutions that have real impact in the near future – it keeps researchers grounded. To deliver, mission-led research teams will need to develop and maintain strong and enduring relationships with the communities they serve.

Feedback from our stakeholders emphasised that any new research funding processes must be able to recognise the significant costs to community/end-user groups as they participate throughout the research process, including the costs during the scoping/planning phase that occurs prior to funding being available. Any new model of mission-focused research is dependent on these groups, for whom research has not typically been part of their primary role, and who have no ability to cross-subsidise research activity from their other income streams.

The collaboration and networking across diverse groups (not just research teams), which is required in priority-focussed research incurs costs and time, and needs to be recognised and appropriately resourced.

It is important for the research workforce that the balance of research funding to be allocated through national research priorities versus investigator-led proposals is carefully considered and made clear. It is likely that even with a significant number of supported national research priorities, that a majority of researchers will be working outside them and be pursuing investigator-led research funding.

Although we expect that priority setting will occur at the next stage of consultation, we highlight balancing public need and funding gaps within the current system. For example, within the broad area of health, a wellbeing focus avoids some of the siloing of expertise triggered by the term "health", and would preference a more interdisciplinary research approach that ought to be a characteristic of the new national research priorities.

Theme: Te Tiriti, mātauranga Māori and Māori aspirations

Recommendations in response to the theme questions from Te Ara Paerangi contain key content and processes that will need to be embedded into the new science sector (Crown) to work in Tiriti partnership.

This section details key steps that will be needed to envision and implement the new science sector. Content is purposely kept at an oversight level in anticipation of details being added during the next stage of the consultation process.

The old science sector does not work for Māori. **Success** will require starting with a clean slate, and engaging in kōrero with an open mind. **Failure** would be implementing minor changes (Band-Aid approach) to the current system.

Successful implementation will require the right Māori and tauwiwi leaders, mechanisms, and resources (money and time). Leaders will have to be fearless to overcome the resistance and barriers that will be presented. When the new system is announced, communications will need to be crafted to mitigate adverse discussion (risk) in the public and science sector. These communications could include tauwiwi sharing how their research has benefitted from embracing te ao Māori and working with Māori communities.

Te Tiriti partnership means equal resourcing and opportunity for outcomes. Pathways for Tiriti-led research and science systems have been presented for decades, for example, at Te Oru Rangahau Research and Development Conference held at Massey University 1998 led by Tā Prof Mason Durie in the 1990s, and more recently by National Science Challenges.

Clear guidance for processes in establishing meaningful working relationships have been provided by Te Arawhiti, the Office for Māori Crown Relations. Part 1, subpart 3 of the Public Service Act (2020) recognises the role of public service under Te Tiriti. Implementation of Tiriti-led relationships and restructuring can be evidenced in other sectors, such as establishing Te Pūkenga within Tertiary Education, and the Māori Health Authority within the health system.

Te Tiriti-led system will require a staged plan with 1, 2, 5 and 10-year milestones. This is consistent with te ao Māori i.e. long-term views to achieve outcomes. The process needs to start with changes in governance and leadership. The plan needs to include upskilling Māori leaders in te reo and te ao Māori, and also investing in broader skill development to expedite positioning them throughout all levels of MBIE and the science sector, including major funding organisations (HRC and Royal Society). Evidence that this approach will be successful comes from Ngā Pae o te Māramatanga, which supported 700 Māori scholars to obtain PhDs over a 10-year period.

Tiriti partnership within the science sector will need new sections to be written in Parliamentary Acts for leaders to use as levers for implementation. An example of this includes establishing the Māori Health Committee within the HRC Act (1990). Subsequently the committee has increased the expectation of health research to deliver equitable outcomes for Māori.

Implementing Te Tiriti partnership needs to start with changes in governance and management. Te Tiriti based membership of university councils and CRI boards should be written into the Education Act (1989) and Crown Research Institutes Act (1992, which refers to the Crown Entities Act, 2004). It is also possible that changes are needed to the HRC Act (1990) and Royal Society of New Zealand Act (1997). If this doesn't happen, the mechanism for change will only occur via ministerial appointments, which brings significant risk for failure as governments and ministers change.

A progressive stance on governance could include selecting Māori co-chairs and members from Māori leaders across sectors i.e. Iwi Chairs Forum, NZ Māori Council, Te Kāhui Amokura, Rauika Māngai, Te Ara Pūtaiao. The Regional Skill Leadership Groups and Workforce Development Councils within the Review of Vocational Education (RoVE) have adopted this approach. The Workforce Development Councils' model is contained in their legislated Orders in Council.

Alongside changes within the science sector, parallel work needs to be undertaken with Māori communities to build trust, for Māori communities to understand the new system, how they can engage and, more importantly, determine and drive the research agenda to benefit their community. Processes for Māori to drive the research direction need to be streamlined, and once established, this will also help all New Zealanders engage. Stereotypes of the “ivory tower” of academia and science need dismantled for science to maximise outcomes.

Mission-led research provides for the democratisation of science and innovation with some power and decision making going to communities. Communities will benefit most if their questions are answered. Many National Science Challenges have shown the success of mission-led research, and also how the science sector can be Tiriti responsive. There are multiple models of how mission-led research with Māori can be done successfully.

A critical step in designing the system for Māori will involve bringing tohunga into the kōrero with Māori scientists during a series of 1-2-day wānanga over 3-6 months. The high-level issues, outcomes and end-points need to be clearly defined. Then tohunga should lead the kaupapa.

- A series of wānanga is recommended so that tohunga have time to kōrero with their communities; to receive feedback, and questions and recommendations on the direction. Concurrently, Māori scientists will go back to their communities. A key outcome of this process is that it will build understanding and trust between the science sector and Māori communities.
- Although this process will take significant investment of resources early during implementation, it will be the most efficient and effective over a 2-year period because Māori are being brought along and are driving the journey.
- Defining the new structure could be completed in two ways. The Māori process, detailed above, could run concurrently with a similar process within the rest of the science sector. Alternatively, the Māori process could precede defining the structure for the rest of the science sector. A consequence of this structure will be that the current science sector may continue in its current form for 1-2 years while the new system is being defined. Another consequence is that an establishment Board and Management structure may be indicated for 1-2 years in order to properly establish any new system.
- A risk when 2 years will be needed to design and implement the new system is that a new government will stop this process, or change priorities within the first 5 years. To mitigate this risk cross-party agreement is needed now.

An important discussion point for Māori will be “regional hubs” – the number and how they will be defined. The discussion needs to include how tino rangatiratanga is maintained by iwi, and at the same time, how regional hubs will work together to ensure that silos aren’t created (see section 6 below). Māori political decision makers, policy analysts and scholars will need to be brought together within and across the hubs.

4. Engagement How would you like to be engaged?

Māori need to have an equal opportunity to set research priorities in the new system. To achieve this, consultation will need to be done differently than with other groups in the sector, with greater consultation throughout the regions. Consultation should be undertaken with diverse Māori groups: leaders in the Iwi Chairs Forum, CEOs in Māori businesses, Māori leaders in the science sector, tohunga, and kaumātua; rangatahi; and regional community groups. This is the right thing to do. It also ensures post-settlement iwi governance entities can represent their constituents’ interests.

The decision makers in the current science system have the opportunity to be the world leaders in recognising and honouring the constitutional rights of Indigenous peoples.

The preferred process, if Covid restrictions allow, is by kanohi ki te kanohi wānanga. Some will be for only Māori, others may have Māori only time and discussion, followed by all interested groups.

5. Mātauranga Māori What are your thoughts on how to enable and protect mātauranga Māori in the research system?

Most importantly, Māori leadership should be visible in science sector organisations at all levels, including governance and management. This Māori governance and management needs to be in Māori-led parts of the sector (e.g. Māori Science Authority) and within the rest of the system (e.g. Western approaches). This is critical to set the values and context of Aotearoa NZ's research sector. Some of the National Science Challenges have demonstrated this produces the best, most inclusive outcomes for all New Zealanders.

Key organisational changes that are needed within MBIE for it to deliver on Tiriti partnership and to privilege mātauranga include:

1. Changing the membership of the MBIE Science Board so that half are Māori,
2. At least one Māori Science Advisor at MBIE to ensure that mātauranga and te ao Māori are included in all recommendations to the Minister and Ministry, and to inform policy changes,
3. Creating and implementing a Māori Science funding policy,
4. A significant increase in the number of Māori staff with lived experience in the science sector, and tauwiwi allies, throughout all of the Ministry.

Aotearoa NZ should clearly define the purpose and main beneficiary of publicly funded research i.e. Aotearoa NZ public, with Māori gaining equal benefit from all research.

Māori must determine and secure mātauranga IP for whānau, hapū, and iwi. This would suggest that an entity and associated mechanisms need to be established or contracted to centralise skills to ensure that this happens.

Māori must maintain sovereignty over all Māori data. Te Mana Raraunga has developed governance, management and best practice processes to request access to Māori data. These principles need to be applied to all data sets in the science system.

Māori should receive appropriate remuneration for the unique skills, experience, and services they provide within the science system. This extends beyond Māori researchers being expected to also provide "cultural advice", to include recognition of commitments from businesses and communities. The cultural double time by Māori researchers needs to be acknowledged and valued within the science sector and academia in promotion and recruitment processes. Capacity growth of Māori researchers requires secure research positions to replace the abundant fragmentation of Māori FTE across research institutions.

Māori roles and leadership in the research sector are often deflated or devalued; te ao Māori and mātauranga Māori need to be privileged to counteract biases. Māori researchers are global leaders within the international Indigenous research sector.

We note the approach being taken by Aotearoa NZ's health sector, with the creation of the Māori Health Authority and Health NZ. It would appear that a parallel structure should be considered for our science system. Another consideration is how will knowledge from these 2 systems be woven together, and who will have the expertise and resourcing to do this?

A critical element in enabling and protecting mātauranga Māori in the research system is growing Māori research capacity and capability. This will require dedicated and long term support of research training and careers, with appropriate protection of developing careers.

Mātauranga includes traditional knowledge and all things that Māori communities are interested in knowing and understanding.

Mātauranga Māori and kaupapa Māori research methods require deep, trusted and enduring relationships with communities. These relationships need to be supported beyond the lifespan of research projects. The new system needs to build in support mechanisms to allow relationships to flourish when funding is scarce.

Consideration of research proposal assessment processes is important. Is there bias against valuing mātauranga Māori when using “experts” who primarily value, or only understand, Western approaches?

For the new science sector to deliver Te Tiriti partnership, the Vision Mātauranga policy will need to be replaced with a Policy that meets current and future Māori aspirations and needs. The new Policy will need to align with the new structure i.e. Science Board membership.

- This will involve more critical evaluation of delivering equitable outcomes for Māori during the grant assessment process than is currently used.
- Reporting, monitoring and auditing of outcomes for Māori need to be significantly upgraded in most parts of the sector. If Māori capacity building, engaging with Māori communities, unskilling the team in tikanga and reo during a project, or a specific outcome change or service delivery recommendation has been promised, these need to be monitored.
- A critical step in this process is ensuring that recent final reports are available to grant assessment committees – this aligns with the long held view that the “best predictor of future success is evidence of recent success.”
- Māori communities need to be consulted to ensure that the new Policy will deliver outcomes for them.

6. Regionally based Māori knowledge hubs What are your thoughts on regionally based Māori knowledge hubs?

Regional hubs will help whānau, hapū, and iwi engage. However, it will also be important to consider how inter-regional engagement will happen to amplify outcomes for national Māori benefit, and so that silos aren't created. For example, will regional hubs be based on waka or traditional federations, mimic Māori landcourt districts or follow the Māori Health Authority? What is the ideal number of hubs? How will urbanised Māori be represented? Importantly, Māori need to decide this after consultation in wānanga.

If the Māori Science Authority structure is implemented, it would provide a national level organisation to interact with the Crown and regional knowledge hubs. The Māori Science Authority would receive funding directly that would then distribute funding to regional hubs. The Māori Science Authority could house expertise that will be needed across hubs e.g. to protect mātauranga IP and data sovereignty. The Māori Science Authority would also be a conduit to connect across the regional hubs. However, it is critical that regional hubs have tino rangatiratanga within their mandated work. This means regional hubs will have strategic decision making and operational research roles.

For the Māori Science Authority and regional hub structure to work effectively, leadership from each hub will be needed on the Māori Science Authority governance board. A new management structure may be needed. Directors of regional hubs need to have autonomy within their rohe, but will also need to collectively deliver for the Māori Science Authority. One way this may be achieved is that Directors spend 1-2 days per week working within the Māori Science Authority and the rest positioned in the regional hub. In this structure, Directors will have a key role in bridging national and regional mahi and outcomes. An existing model that incorporates many of the elements outlined is Te Mātāwai, a government funded organisation that works in partnership with the Crown, but is led by iwi and Māori communities. Te Mātāwai's kaupapa is to revitalise te reo in Aotearoa NZ.

The Māori Science Authority would bring together Māori political decision makers, policy analysts and scholars within and across the hubs.

Substantial infrastructural support has been provided to research organisations of the Western model to date. How will Māori *infrastructural development* be supported to reduce inequities?

Māori communities, researchers, leaders and kaumātua will need to be consulted on the structures that work best for them. Any structure will likely require communities (whānau, hapū, iwi) at the centre of the system, with research and governance serving their needs and aspirations.

Theme: Funding

7. Core functions How should we decide what constitutes a core function and how do we fund them?

These should be identified by an independent national group, with representatives from different (existing) organisations and institutions, for example including – but not limited to – CRIs and Universities. Representation of groups such as emerging researchers, small independent research organisations, and key stakeholders (e.g. health service, business) is also important.

8. Establishing a base grant and base grant design Do you think a base grant funding model will improve stability and resilience for research organisations, and how should we go about designing and implementing such a funding model?

An important component of any model must be robust and transparent reporting, monitoring and auditing on how base funding has been used; research organisations must be accountable for how base funding is used.

With monitoring in mind, there is an opportunity to reconsider performance metrics. Attributes that could be measured include collaboration/networking, connection with communities/stakeholders/end-users, workforce diversity, career development etc.

If the science system is to be meaningfully shifted to “understand and honour te Tiriti obligations and opportunities” and to have a research system that is Tiriti-led, then this carries the expectation of major shifts in the way existing research organisations, especially universities and CRIs, function. These organisations are dominated by Western epistemology, so consideration needs to be given to how base funding would be used to give effect to te Tiriti and Māori aspirations. How can base funding address historic inequities and whakamana (empower) mātauranga Māori and Māori researchers?

Funding allocations need to be consistent with Tiriti partnership. This would mean that up to half of funding envelope would support mātauranga Māori and Māori research. This can be achieved without adverse public opinion, as evidenced by Ageing Well’s Phase 2 funding priority.

If a base funding model is to be introduced, then consideration needs to be given to research organisations other than universities and CRIs. Which organisations would be eligible? Is the base funding model scalable – is it workable for small independent research organisations as well as universities and CRIs?

The research workforce and institutions would appreciate security around base funding: how can the funding model be protected from political change?

Theme: Institutions

9. Institution design How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?

Collaborative research institutions require strong, enduring relationships for them to also deliver adaptive and agile research programmes. It will be essential to have the right leaders in key positions for longer periods of time. When enduring relationships are critical for outcomes, adequate time will need to be built into the system to allow key personnel to train and guide new relationships to develop.

10. Role of institutions in workforce development How can institutions be designed to better support capability, skills and workforce development?

Training for PhD students needs to incorporate a broader range of skills to fill the gaps between science, delivery, knowledge exchange, and policy.

Institutions have a vital role to play in ensuring the research workforce has the requisite skills, and adopts approaches that break down silos, encourage multi-disciplinary teams, and foster strong collaborations and enduring relationships with communities. The current drivers for research career success often do not align to these skills. If this is what is needed in the future of science, performance assessment by institutions of their researchers should reflect and reward these skills and not just for publications and grants received.

Research-host institutions are also best placed to enable knowledge exchange with stakeholders, engagement with policy agencies etc, by recognising and rewarding these activities by their researchers.

We recommend that training on Te Tiriti and cultural competency should be a required part of employment for *all* staff in universities and CRIs and organisations that receive public money across *all* science and research disciplines.

11. Better coordinated property and capital investment How should we make decisions on large property and capital investments under a more coordinated approach?

12. Institution design and Te Tiriti How do we design Tiriti-enabled institutions?

Leadership (governance and management) at institutions needs to align to the cultural changes articulated in Te Ara Paerangi; cultural competencies are essential. More Māori leaders need to be on Councils and Boards, and also at management levels i.e. Vice-Chancellors and Deputy Vice-Chancellors; and CEOs and general managers.

Tiriti partnership institutions can be modelled from some National Science Challenges and Te Pūkenga. Fundamental outcomes are equitable research outcomes for Māori, free from bias and racism, research that does no harm to Māori and shares benefits.

Institutional racism in research and science has been forefront in the media in the last two years. The Parata Gardiner report (September 2020) needs to guide development of new research and science institutions, and be considered when determining the metrics and drivers of excellence and success within the new science sector.

All institutions ought to have reporting processes to MBIE so that delivery of Tiriti partnership outcomes can be monitored. Some institutions may require large shifts that would benefit from a 10 year strategic plan on how partnership will be implemented, plus articulation of annual priorities. A team of Māori with research experience will be best placed to evaluate if plans will effectively deliver Tiriti partnership.

13. Knowledge exchange How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge into operational environments and technologies?

Knowledge transfer is based on an assumed uni-directional process, and some forms of this are usually part of the research training given to emerging researchers. Priority-driven research and the desire for impact depends on researchers and research hosts going beyond knowledge transfer and engaging in knowledge exchange. The bi-directional to- and fro- kōrero between knowledge creators and users require a different set of skills, and training in these will need to become more prominent as part of research training.

Knowledge exchange is not resource free: it requires designated funding support (cf. funded 'research into practice' initiatives in UK health sector), which is not currently factored into funding models. Whether there should be dedicated (separate) funds available for these activities, or these are directly incorporated into funding awards is a matter for consideration and further consultation with stakeholders.

The experience from the National Science Challenges, and elsewhere, is that effective knowledge exchange critically depends upon early (*a priori*) and meaningful engagement with relevant stakeholders and communities. This is supported by funding opportunities requiring evidence of such early engagement as part of application processes.

Theme: Research workforce

We begin with a few points not directly asked through the questions.

The research and science workforce in Aotearoa NZ does mirror society. There are very few researchers who are, for example, Māori, Pacific, LGBTQ, refugee, or living with disabilities.

There needs to be a robust discussion about PhD training in Aotearoa NZ.

- We need to define the place of PhD students within the science system. Are they in a training position, or are they part of the workforce? This distinction is important, as it implies different expectations of the student and commitments from the host (e.g. stipend vs salary; employer vs. host responsibilities). If PhD students occupy a hybrid position, this needs to be acknowledged, and expectations and commitments clearly articulated.
- The broader ramifications, and the societal and personal costs and benefits, of the current PhD training model need to be explored.
- Opportunities for research skills training opportunities should reflect the needs of not only future academics, but also the needs of the wider science sector, and Aotearoa's current and future knowledge economy.
- Research training starting at graduate research skills level should include designated elements on achieving impact through knowledge translation and exchange, and also incorporate cultural skills (including cultural competency and safety).

We recommend that all postgraduate students receive training on Te Tiriti so they understand the role and obligations that they will have as future scientists to implement the principles and articles. This would include cultural competency and safety training.

Intergenerational relationships are critical in te ao Māori. Ideally, intergenerational mentoring occurs throughout a science career. Are early career scientists getting enough opportunities to engage with older scientists to learn leadership skills, understand historical trends and the wisdom that only comes from walking the path for many years?

More generally, the research workforce is unregulated. There is no agency that has overall responsibility for strategy and policy around research workforce training and development, and little information on skills and competencies, measurement of which must become part of any effort to move away from the current precarity towards sustainable careers. If the intention is to commit to development of the Māori research workforce, there will need to be some meaningful reporting and monitoring metrics, beyond counting graduate student completions.

14. Workforce and research Priorities How should we include workforce considerations in the design of national research Priorities?

National research priorities should inform strategic investment in research skills training programmes and opportunities – including scholarships, post-doctoral support and career development awards. Such an approach will require careful consideration of the current profile of the research workforce (including skills, career stage etc), 'gap' areas for specific support and development, and commitment to supporting life-long learning and skills development.

A long-term strategic approach to filling the gaps in workforce development could include investing in internship programmes. Internships are already available, or are being introduced, at secondary and tertiary education levels in some of the research and science sector e.g. Pūhoro STEM and NZ Institute of Economic Research. Should more opportunities be offered and funded or co-funded from the research and science sector?

Māori scholars should be valued in all fields. Too often we see able scholars leave institutions altogether or shift their field of interest to areas where they feel valued, such as Māori studies departments. Equally we would like to see institutions recognise, in appointment and promotion processes, the "cultural duties" often taken on by Māori scholars (e.g. support for Māori students, provision of advice on tikanga, reo, teaching tauwiwi to engage with Māori etc).

15. Base grant and workforce What impact would a base grant have on the research workforce?

There are significant risks for workforce, depending on how the base funding model is applied: both in terms of drivers (or criteria applied by the funder), and how any such base grant is allocated through an institutional resource allocation model (which may effectively end up cross-subsidising other areas of activities). Such risks may be managed by:

- Signalling that such support is to be exclusively used for specific designated purposes, including for workforce development, and diversity of identity, thought, skill and knowledge needed in the future science sector must be an expectation;
- Transparent reporting, monitoring and auditing of host institution-level use of base funding and the outputs.

Skilled Māori researchers are embedded in Māori communities. They are often named as “contractors” on research grants that are administered by universities and CRIs. How would a base grant allocation support the development of this critical cohort of Māori researchers?

Capacity building of Māori and Pacific scholars needs to start at high school. Given this, we recommend that capability base funding supports the Pūhoro STEMM Academy, a Māori led organisation with an exemplary record to grow future Māori scientists. Similarly capability base funding will need to support Pacific high school students to attend Science Academies. Critical elements of these programmes are that students have the opportunity to translate research and science methods and theories into life situations.

Such investment needs additional funding to track career trajectories into tertiary education and the workforce more generally. We acknowledge that some of these organisations (e.g. Pūhoro STEMM) already do this

16. Better designed funding mechanisms How do we design new funding mechanisms that strongly focus on workforce outcomes?

The current system of “full cost research funding” disguises the true costs of research. Grant proposals often include unrealistically low full-time equivalent (FTE) commitments, and even “time only” commitments (where the researcher is doing work at 0 FTE). Typically, these manipulations of real costs are a response to expectations of specific grant types, such as budget caps. At the least, there should be no place for “time-only” contributions in any funding contract; however, that means that budget caps, if instituted, should be more reflective of actual research costs.

Realistic recognition of time commitment should address the custom and practice of senior “names” being included in funding proposals. This may help with success of the grant proposal, but does it actually reflect the commitment of the senior scientist over the ensuing contract? Contract variations, where the FTE funding from that senior scientist is redistributed should be an exception, not a routine.

Funding mechanisms should recognise the importance of postdoctoral scientists. In the current university model, it can be difficult to include postdoctoral positions on grants because of the cost multiplier of the overhead model, the influence of research proposal budget caps, and proscription of inclusion of colleagues employed on short term contracts. Any revised model should recognise the importance of postdoctoral scientists, as future science leaders, and also specifically recognise the critical importance of their skills development.

In some areas of research, a move to co-design and co-working with communities will mean involvement of community members not just as research participants but as researchers *per se*. This will add great value to the research endeavour, will provide a legacy for the community beyond any individual research project, and therefore should be appropriately recognised through any funding process.

Future independent science leaders can obtain funding to address questions in their burgeoning career focus, with a mentor guiding career and leadership development. However, many postdoctoral positions are funded when a principal leader (PI) receives project funding. Here, the

postdoctoral fellow is conducting research that the PI is leading, rather than allowing for the development of a personal niche area of expertise. Both approaches to funding postdoctoral positions are valid; however, is the relative proportion of currently available funding appropriate to foster the requisite development of future science leaders?

To enable diverse skill development, some scholarships or fellowships could allow secondments/placements (e.g. of researchers to policy agency) to fill gaps within the broader definition of the science sector.

Aotearoa NZ currently provides limited support for individual career transition, by which we mean the shift from working for a team leader, to heading independent research. Rutherford Discovery Fellowships and HRC's Sir Charles Hercus Fellowships contribute, but are restricted in number and career stage. Other jurisdictions provide greater opportunities that might be considered in redesigning research workforce support, particularly focusing on this career transition stage. Examples include the K99 awards (NIH, USA), Canada Research Chairs, and NHMRC (Australia) Investigator Grants. Increased support provided directly into career grants is worth considering as an alternative, or complement, to expecting institutions to direct base grants to sustaining the research workforce.

Theme: Research infrastructure

17. Funding research infrastructure How do we support sustainable, efficient and enabling investment in research infrastructure?

This question presupposes that research infrastructure is physical, as it typically is for many parts of the science sector, but for social sciences and for some types of wellbeing and health research, people could be considered infrastructure.

To deliver Tiriti partnership, greater infrastructure and resourcing will be needed in most research institutions to manage Tiriti relationships, that is, have the facilities and policies for wānanga, have sufficient people with the requisite te reo and tikanga skills, and to be able to provide training for staff and students.

Our response to this question focuses on issues around *what* and *where*, in relation to critical research infrastructures.

- Investment in large research infrastructure (i.e. of national importance), should be aligned with the needs of the identified national research priorities. Some level of redundancy, and distribution across the country, is necessary to ensure business continuity, and *inter alia* to support wider economic goals such as distributed investment at regional level.
- Establishing and sustaining infrastructures should take into consideration the risks of damage and disruption. Our recent history (e.g. pandemic and earthquake) highlights the risks of “centralised” infrastructure. If an infrastructure has to be hosted by an institution, can that hosting be distributed? By definition, these infrastructures are of great national significance, and if they have a physical location, consideration of hosting location should account for risks of disaster, rather than just default to the “usual” location of the hosting institution.
- Ask Māori which infrastructure will be necessary and important in order to best respond to their priorities, and which types of infrastructure (datasets, collections) may have cultural safety implications and require more careful consideration. All infrastructure involving data and physical items should recognise the importance of Māori sovereignty and build in appropriate access, reporting, monitoring and auditing accountability processes.