Submission on Te Ara Paerangi/Future Pathways Green Paper

Thank you for the opportunity to contribute to this critical review of the future of New Zealand's research system. Our Land and Water (OLW) National Science Challenge's collective submission reflects the experiences of senior researchers and managers within the Directorate, members of the Governance Group and members of the Science & Stakeholder Advisory Panel. This experience includes working as researchers in various universities and CRIs, and of managing or providing governance for, researchers in these and other organisations.

Overview

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Ehara taku toa i te toa takitahi, engari he toa takitini

My strength is not that of a single warrior but that of many

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Although the current RS&I structure may have served some sectors of Aotearoa well, it has unfortunately disillusioned and alienated many others. The last 30 years have provided little evidence to suggest that discipline-based, siloed research organisations competing for limited research funding is the best model to obtain the best return on research investment. We believe this operating model now stands as an active impediment to effective collaboration between researchers, to the inclusion of Māori researchers and to embracing the opportunities that exist at the intersection of the traditional biophysical sciences and other knowledge systems. These collaborative opportunities have the potential to create the changes needed in Aotearoa, rather than simply create knowledge about what the changes should or could be.

While we do not promote the National Science Challenge model as a perfect one, it has certainly demonstrated the benefits of a different approach. The focus on strong leadership teams, largely unfettered by research institute priorities, reporting to independent governance boards of key stakeholders and iwi, has enabled greater flexibility in resource allocation and in the definition of "research" and "researchers".   This model has enabled the best research teams for particular research priorities to be brought together, regardless of their affiliation. It has enabled resources to be allocated to those activities that add value and impact to research efforts, such as co-design processes, plain language communication of research outputs and effective stakeholder engagement.   Most importantly for Our Land and Water, it has enabled a genuine recognition of the value of mātauranga Māori in a research framework, and support for Māori researchers to hold their place at the intersection of biophysical science and Te Ao Māori.

The Challenge journey will likely be over before they have achieved their full potential impact, but we trust the lessons learnt (some of them with difficulty) and experience gained, will not be lost when they conclude in 2024. We are keen to contribute further to this important kōrero.

In the following submission document, we have organized our comments and opinions under each of the specific questions posed in the green paper.

1. Research Priorities

What principles could be used to determine the scope and focus of national research priorities?

- National research priorities should include those with the potential to improve the health and wellbeing of our population and Te Taiao.

- There is no need to duplicate research where an international effort is already underway, and where international expertise, infrastructure and (better) resourcing is likely to yield a useful outcome, which can then be readily applied in Aotearoa.

- Priorities for research funding would best be focussed on **issues** of critical importance to Aotearoa, rather than fashionable topics or specific areas of expedient expertise.

- Co-designed **inter- or transdisciplinary** research is most likely to deliver useful, applicable research outcomes on many priority issues. We would consider mātauranga Māori to be a key component of this interdisciplinarity for national priorities concerning land and water management.

- The best interdisplinary teams include individuals with interdisciplinary skills as well as those with disciplinary depth. This creates an environment in which both top-down, mission-led and bottom-up, discovery-led research can work together to address a priority.

- Mission-led research is often responding to future and present policy needs, in response to environmental, socioeconomic and cultural pressures.   Sufficient lead-time needs to be allowed for research to be completed, before such pressures mount and policy needs become urgent.

- Dividing priorities into different categories, and being prepared to consider different funding models and workforce arrangements for each category, would likely be more effective than a one-size-fits-all approach. For example, priorities needing short- or long term attention, aiming to achieve incremental or transformational change, or addressing acute or chronic policy needs, need different support frameworks.

- Quick wins need not always be expected or even considered desirable. Taking the time to engage widely has been shown to lead to better long-term solutions. "Faster alone, further together".

- We note the absence of an overarching national strategy to guide the future development of Aotearoa. Should such a strategy be developed, it could certainly inform the nature, scope and focus of national research priorities.

What principles should guide a national research priority-setting process?

- Priority-setting would best be informed by a collaborative, consultative team representing stakeholders and researchers, selected for their experience and national-level perspective, rather than representing their sector, industry or employer.   A transparent and independent process would help to allay concerns that particular interests or agendas have

influenced the outcome. An iterative approach may be required in order to achieve consensus.

- Priority-setting should be responsive to the wider sector needs, including those of the community. The set-up of the National Science Challenge topics was a good example of how consulting widely added value, when public opinion was canvassed through media campaigns reaching into all sectors and cultures making up the society of Aotearoa.

- Priority-setting also needs to encompass both the current and anticipated research needs of national policy development, particularly policy which impacts on significant sectors of the population and natural resources of Aotearoa. Researchers, and the research community as a whole, can provide a valuable assessment of the potential for a NZ-centric research effort to effectively address these needs.

How can the process best give effect to Te Tiriti?

We note that the Rauika Māngai submission offers informed and useful feedback on this question, and we strongly endorse their comments. We also offer the following suggestions, based on OLW experience;

- Genuine collaboration takes time and a willingness to engage and learn; too often the processes we currently use to initiate research do not allow for this, particularly with Māori.

- The development of Māori researchers should become a national priority, encompassing secondary and tertiary education as well as support and mentoring for emerging Māori researchers. This would need to occur in a context of wider acceptance and implementation of Te Tiriti in Aotearoa, so that these researchers do not emerge into a vacuum.

- Recognising the value of mātauranga Māori in interdisciplinary research, would provide support and space for this value to be realised.

- Rebuilding the confidence of Māori end-users of research will be a precursor to their future involvement as stakeholders. This confidence has too often been eroded through damaging interactions with researchers in the past, leading to scepticism and mistrust of involvement in research efforts.

How should the strategy for each national research priority be set and how do we operationalise them?

- The strategy for each national research priority could be co-designed by appropriate researchers and end-users including Māori, government and industry stakeholders. The process of strategy development needs to be well resourced (e.g., participants paid for their time), and allowed an appropriate timeframe for completion. This would be longer than we currently tend to allow for such processes, and may require a more flexible funding approach so that strategy development begins well before research is anticipated to commence. As a NSC we have learnt this lesson, and now recognise that co-design of research strategy is a lengthy and sometimes difficult process, but one which is key to the relevance, acceptance and impact of the anticipated research.

- Informed, strong leadership for strategy development would be key to the success of the co-design process.

- Independent oversight of strategy development, by central government or an independent governance group, would be needed. If this oversight rests with individual institutions or agencies, they may be perceived to be exerting influence over the strategy development process.

- The application and adoption of research outputs to create impact beyond the research sector can be a lengthy process. Strategies (and subsequent investment models) need to allow realistic resources and timeframes to achieve impact.

- To operationalise the strategies, a consistent but flexible array of processes could be employed to allow for new ways of working; those that support interdisciplinary research teams, inclusive of Māori researchers and private sector end-users, and are adaptive enough to allow for course corrections when needed.

- Overall consistency in the processes used for operationalising research strategies, would require fewer governance entities and operational teams. Each could contribute across multiple research priorities, according to a consistent set of operating principles, reducing administration costs.

2. Te Tiriti, mātauranga Māori and Māori aspirations

The Rauika Māngai submission addresses the questions posed for this theme in detail, and we strongly support and endorse their responses. We also offer the following suggestions, based on OLW experience;

How would you like to be engaged?

- Māori researchers, Māori communities and research interests sit across the entire spectrum of the science and research system. Engagement should be designed in a way that responds to the breadth and diversity of interests, rather than using one approach for all Māori.

- The NSCs can provide a unique perspective on engagement with Māori, and have been able to make some significant advancements in this space because they have operated outside the established institutional structures. Resourcing a series of wānanga led by Māori researchers across the NSCs to unpack the key learnings and feed into future design would be useful.

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

- OLW has found that a combined Governance Board, requiring 50% of the membership to have a deep understanding of te ao Māori perspectives, has proved far more effective in fostering research within a Te Ao Māori context, than having separate kāhui and governance groups.

- Similarly, the inclusion of a Kaihāpai Māori within the Directorate, and a Kaiarataki Māori within the science theme leader team, for the Challenge has significantly increased the

number and contribution of Māori researchers funded by OLW, and the role of mātauranga Māori within the Challenge.

- National-level tools, policies (including IP) and frameworks are urgently needed to provide clarity and understanding regarding the enablement and protection of mātauranga Māori, within the context of broader research initiatives and research institutions.

- Investment in pan sector resources to enable and protect mātauranga Māori, would be of benefit in the redesign of good practice processes and standards for future research structures/institutions. This might include guidance on the design of funding pools, for example, and requirements for proposal development, standards in programme management and evaluation of programme performance (etc).

- All researchers should be required to undertake Te Tiriti and Wai 262 training (awareness and tools).

What are your thoughts on regionally-based Māori knowledge hubs

- Regionally-based Māori knowledge hubs are a good idea. However, to support this at a central policy level, there would also need to be a dedicated mātauranga Māori research entity that is tasked with partnering with the regional hubs. This entity could design and protect the space that the regional hubs would be operating within, including resourcing and advancing mātauranga Māori policy.

3. Funding

How should we decide what constitutes a core function and how do we fund them?

- Core functions could be defined as those that build expertise in key knowledge areas and knowledge systems, and generate the information needed to better understand processes of relevance in Aotearoa.

- Core funding is an important factor in the creation of a stable, capable research workforce. A long-term investment commitment, insulated from the political agenda of the day, would be needed to create this.

- Core funding for research institutes that have nationally important capabilities, monitoring programmes and/or collections, and for tertiary training in core skills, would increase research career stability and quality for our emerging researchers.

- However, we acknowledge that what constitutes a "core" function will likely change with time, given the rapid advancement of science and technology. The research workforce will need to have opportunities to retrain at regular intervals throughout their career, to keep their skills relevant.

- There are international examples of long term, stable research institutions with (apparently) successful models for funding core research areas. Often these support the needs of long-term experiments or living laboratories.

- Base funding (funding to keep the lights on) of research organisations should indeed be independent of research funding in our opinion, but also monitored to ensure ongoing value for money.

- Separating base from priority or core research funding would enable research funding to be used as an incentive to encourage research on priorities, or in the fields required to address these priorities. This could be done without destabilising research institutions.

- The current model of accounting for all overhead costs in research funding has led to a proliferation of overhead costs and services in many of the larger institutions. It has greatly constrained the amount of research which can actually be resourced in a successful research application, and consequently increased the tension between researchers and their institutions' administration in many cases.

- However, any model that provides separate base (or core) funding to research institutions, would need to ensure that smaller research groups, who may not have access to such funding, are not disadvantaged when it comes to their inclusion in national research priorities. OLW has found researchers within these smaller, nimble research entities to be very collaborative, innovative and delivery-focussed when engaged in Challenge research programmes. They are often more flexible in terms of time frames and budgets, relative to researchers from the larger institutes, who can be more constrained by restrictions on available time and resources.

4. Institution design

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

- Institutional design will need to accommodate and facilitate *genuine* collaboration for research on national priorities. Collaboration between institutions does not tend to occur when there is duplicated effort and expertise, unless very significant incentives are put in place. Instead "in house" approaches, perhaps with "token" collaborators, tend to develop.

- We note that many research institutions seek to make a profit from national research investments, and this can act as a disincentive to collaboration. It can also restrict the resources available for the research. Any alternative institutional operating model should seek to avoid this situation.

- Institute design also needs to accommodate free open access to data and information generated through government research funding. There has been significant movement in recent years towards open sharing of research data and information of benefit to Aotearoa, and this needs to continue. Stakeholders and end-users engaged in such research programmes, will need to be made aware and accept the open access requirements for research outputs.

- For addressing specific research priorities, there are lessons to be learnt from the National Science Challenge model when it comes to designing a suitable institution or arrangement. There have been benefits to being able to design bespoke processes and systems to fit the specific mission for each Challenge. However, centralised administration using a team skilled in the management of interdisciplinary research teams and projects, and in the communication of research to achieve impact, could reduce costs, create greater agility and avoid duplication of effort across research institutions.

How can institutions be designed to better support capability, skills and workforce development?

- Capability, skills and workforce development are long term commitments. It would be useful to recognise a clear distinction between national research institutions designed to foster and build capability and expertise in particular fields of research, and interdisciplinary research clusters (potentially virtual or semi-virtual) to address specific research questions/priorities.

- As noted above under "core funding…", given the rapid advancement of science, many researchers will need opportunities and incentives to retrain during their career, to remain relevant and innovative. Providing fellowships to facilitate this upskilling or redirection of the research workforce would provide an incentive.

- The requirements for open access information (noted previously) need to accommodate the importance of publications to a research career. The peer-review process is also valuable for confirming the quality of the research. However, publication delays cannot be allowed to prevent the release of information in a timely fashion. Reasonable time-limits on publication could be used to address this issue.

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

- As a NSC, we have little relevant experience to offer on this aspect of research funding.

How do we design Tiriti-enabled institutions?

- We endorse the insights provided on this in the Rauika Māngai submission.

How do we better support knowledge exchange and impact generation?

- OLW has experienced greater success when co-design processes are well resourced and supported, paying participants for their time and effort, and allowing the appropriate time frames for this to occur in a socially, commercially and culturally meaningful way. This needs to be included as a budget item when undertaking the initial scoping for a research project.

- Budgets for effective communication and extension of impact to end-users are also rarely included in current research initiatives. In our experience, *at least* 10% of the budget of most research programmes is required to achieve this.

- Similarly, a specific budget for measuring outcomes and impacts over the duration of the research activity would ensure that work is undertaken to demonstrate whether outcome targets are being met. Assurances that research outcomes have had impact are easy to give, but few are supported by credible information.

- One very significant obstacle to creating greater impact from research is the deeply imbedded perception of what constitutes research excellence. Few researchers, or research institutions, recognise impact generation as a valid measure of research excellence. Impact generation is rarely considered as an important criterion in promotion processes in universities or national research institutes, or in research quality assessment processes such as the PBRF. If greater impact from research is to be achieved, then it is critical that careers in applied research fields can be built on research impact and creating change, as well as the current research excellence metrics.

What should be the role of research institutions in transferring knowledge into operational environments and technologies?

- Research institutions can provide the human and logistics resources to facilitate co-design and co-development processes. If connections into operational environments and technologies are strong from the beginning of the research, this can lead to more effective transfer of knowledge and implementation of tools.

- Research institutions can also incentivise researchers to transfer their knowledge in ways that reach more diverse, non-specialist audiences, outside of the immediate research community. They can also provide staff with the training and skills to do this effectively. This may create staff who are more specialised in extension than in research, but who can connect commercial and other end-users back to researchers, while still contributing very effectively in a research team to achieve outcomes (e.g., as experienced in the US Land Grant Universities).

5. Research workforce

How should we include workforce considerations in the design of national research priorities?

- Building stronger connections between national research institutes and tertiary training sectors would encourage training in the specialist skills most needed to support research on national priorities.

- It is important to phase these connections correctly, so that we are creating a pipeline and not a shotgun of appropriately skilled new researchers and that emerging researchers can see a viable and stable career path. This may require incentives to encourage students to enter certain disciplinary or interdisciplinary fields. The Pūhoro Academy's mahi to support and encourage Māori students into STEMM (STEM + Mātauranga Maori) subjects, is an excellent example of what can be achieved with appropriate incentives and support.

- We note that for some research priorities, rigorous training in specific, narrow research disciplines may be essential to maintaining an appropriately skilled "discovery science" research workforce. This requires stable long-term resourcing, which should not be subject to the disruption of changing national research priorities.

- Allowing for greater workforce mobility between different workplaces would help to address many of the issues raised on this submission. Currently, in the UK, greater "porosity" between tertiary training, research institutions and industry is being sought, to enable researchers to move between these employers without detriment to their careers.

What impact would a base grant have on the research workforce?

- An appropriate base grant could increase institutional stability and thereby increase the prospect of a rewarding research career in Aotearoa. It could reduce the threat of a position ending when a research programme ends, and reduce the number of researchers on "soft" money. It could also mean that fewer graduates would need to leave Aotearoa to pursue their careers, and more could return after furthering their education and experience overseas.

How do we design new funding mechanisms that strongly focus on workforce outcomes?

- We could provide more funding for postgraduate students, at both Masters and PhD level. This would be facilitated by overheads not being charged on externally-funded scholarships, across all tertiary institutes. Charging overheads is a significant disincentive to industry, government and other agencies and individuals seeking to support postgraduate students via such scholarships.

- More postdoctoral fellowships would help emerging researchers bridge the gap between their PhD and a permanent academic or research position. This would also offer opportunities for them to be mentored within larger research initiatives, and by experienced researchers.

- Funding incentives could be provided to institutions to seek out opportunities for interagency on-the-job training or secondment. This would encourage cross-fertilisation, future collaboration and career opportunities, and reduce duplication and competition between research institutes.

6. Research infrastructure

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

- We could view research infrastructure, such as expensive instruments and dedicated, purpose-built facilities, as national assets, rather than duplicating such assets across regions and institutes.

- Dialogue with industries with aligned interests could help to resource large research infrastructure

- Research infrastructure such as long-term experiments or monitoring programmes, or stable accessible data platforms, do present a challenge within a government funding context. One option that could warrant further investigation is the use of charitable organisations or trusts, set up with government research funding but required to self-fund in the long term. OLW is currently seeking research to identify a viable model and business case for the

development of a data platform that would fulfil these requirements, and anticipates a useful advance on previous attempts to do this. We are also looking to learn from international examples (e.g., Rothamsted Research Institute's work in the UK).

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