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THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

14 March 2022

Future Pathways Policy Team
Ministry of Business, Innovation & Employment
Wellington 6140

Re: Submission to Te Ara Paerangi – Future Pathways Green paper

Please find attached a submission on behalf of the University of Waikato

Yours sincerely

Bryony James
Deputy Vice Chancellor (Research)

Te Ara Paerangi – Future Pathways Green Paper

Submission from The University of Waikato

Introduction

The University of Waikato welcomes the opportunity to contribute to this conversation. This submission represents the collective view of the University. Individuals and groups within the University will have views, and make submissions, that emphasise or challenge aspects of this submission, as is appropriate.

This submission speaks broadly to the themes raised in the Green Paper, and addresses a few of the key questions explicitly.

What a National RSI system should be

The Green Paper states that the desire is to achieve a future-focused research system that is adaptable, resilient and connected. To that we would add “world-class”, not because of hubris but for the simple reason that we operate in a global environment. We face planet-wide challenges, and connection to the international research eco-system requires our research quality to be benchmarked to international standards to ensure it is fit for purpose. Researchers were highly mobile before the pandemic, and will be again, so attracting and keeping talent demands a world-class RSI system.

The role of Te Tiriti o Waitangi in the RSI system enhances our world-class standing and our ability to solve problems that are specific to New Zealand. A full recognition of indigenous people and knowledge adds significant value, it is not a case of “either/or”. Likewise, our place in the Pacific, and the role of Pacific researchers in our system enhances our ability to create and innovate. As it stands the Green Paper is relatively quiet on Pacific research, and on the international aspects of an RSI system.

Creative and innovative solutions to the challenges facing the world, including entrepreneurial activity and innovation that enhance our productive and knowledge economies, will not come from a single discipline. The role of the social sciences, the arts and humanities, and educational research is pivotal to delivering transformation, and the S in the “RSI” abbreviation must not be seen as exclusionary. Our future RSI system must be structured to support all disciplines and, in particular, the intersection of those disciplines. National priority setting can be a catalyst for this inter- and transdisciplinarity.

Turning research outcomes into positive and just transformation across all sectors of society means understanding the various ways that research can create impact. Our knowledge economy, tech and start-up sectors offer opportunities, not only for economic transformation but for environmental and social transformation. Lowering barriers to industry and entrepreneurs accessing research and researchers will require different types of institutional structure than exist at present.

Equally a fit for purpose RSI system ensures and enshrines support for the most speculative research, the true “blue skies” thinking that won’t, necessarily, answer today’s questions but might be the only way to answer tomorrow’s. Across all the themes of the Te Ara Paerangi process we see value in supporting the full spectrum of research endeavours.

National Priorities

There is not only fragmentation but inefficient duplication between research providers in NZ. In a larger country, duplication could provide a healthy level of competition but in NZ, it is wasteful. As such, a rational approach to setting national research priorities is very much needed. If we accept that research priorities will be set by some central body then they will inevitably influence every other aspect of the RSI sector considered in this Green Paper.

It is imperative, therefore, that national priorities are set using a process that divorces them from the electoral cycle and from partisan politics. A national body such as a Research Council or Commission, of some form, would be essential in order that priorities could be set that have longevity and the potential for national transformation. At this early stage in the Te Ara Paerangi process it would be impossible to speculate as to what form such a national body might take, but Te Tiriti must be central to its decision making, as would be the place of Aotearoa in the Pacific. Such a council would need to have broad expertise across multiple sectors, not simply the RSI sector, and would need a global understanding of research excellence.

Priorities should align to social, environmental and economic outcomes, and will require benchmarking to international standards so that NZ does not slip into a pattern of decreasing living standards for all.

Indicators of success in pursuing research priorities need to be well defined, and a politically-independent central body would be critical for measuring progress and assuring accountability. Since these indicators are likely to be multi-dimensional, the Treasury's Living Standards Framework, coupled with the Vision Mātaraunga policy would offer a suitable *starting place*, and this could evolve into a holistic assessment of success relevant to our national aspirations.

National priorities can have a stifling effect on independent research endeavours, as researchers can feel compelled to align their work with these "grand challenges". Universities, in particular, need to maintain their role as critic and conscience of society, and ensure academic freedom is not eroded. Since any national priorities will drive funding decisions it is equally critical to ensure that there is sufficient funding, and recognition, for research that falls *outside* any stated priorities. Some balance between mission-led and curiosity-driven research is essential to future-proof NZ against the "unknown unknowns". As such, one important question will always be what is an appropriate balance between types of research enquiry and how will this be monitored.

We submit:

- that national priority setting can be improved and formalised, but must be politically independent.
- that independent and expert oversight is required and a body such as a National Research Council could be an effective mechanism for setting and monitoring research priorities.
- any national body must have Te Tiriti as an essential part of priority setting.
- there must be well thought out balance between national priorities, and more speculative "blue sky" research endeavours.

Te Tiriti o Waitangi

No less than a full embrace of the rights and responsibilities agreed to in Te Tiriti o Waitangi is appropriate as the RSI sector is reshaped in the future. Each theme discussed by the Green Paper has aspects specific to Te

Tiriti. A strong and independent national research council will be able to set directions that are co-created between tangata whenua and tangata Tiriti.

For Māori researchers, in particular, the greater (and welcome) emphasis on mātauranga Māori approaches to research and rangahau has brought the perverse outcome of diluting their time as they do “double duty”, as both researchers and cultural leaders. This can be addressed by recognising that the cultural leadership and guidance of research programmes is a central aspect of successful delivery, and funding it accordingly. Equally, the time it takes for researchers to build meaningful relationships that empower Māori communities must also be acknowledged and supported by funding mechanisms.

The Green Paper’s specific questions relate to how Māori would like to be engaged in the process of reshaping the RSI system. Māori voices are needed to answer that question but Universities have a role to play in creating the space for conversations that lead us to a win-win situation for the whole country. Māori are under-represented in the research workforce, so support for Māori aspirations must include support for training a greater proportion of Māori researchers. Universities have a role to play in this, along with wānanga, Te Pūkenga, schools and kura.

Pacific research, researchers and research excellence

The Green Paper has largely neglected the place of New Zealand in the Pacific region, its links with Pacific nations, and the importance of its RSI system in the wider research environment of the Pacific. As a leader in Pacific research, New Zealand’s RSI system should also strongly reflect the value that Pacific research, researchers and research excellence can bring. That value lies not in current policy settings and mercurial funding priorities, but in the diverse, regionally aware and fresh perspectives that Pacific research, researchers, and research excellence can bring to projects, institutions and outcomes.

At present there is no Pacific equivalent of Ngā Pae o te Māramatanga, New Zealand’s Māori Centre of Research Excellence. Such a Centre would be a focal point to answer how we engage with Pacific people in order to better create equity, alignment, and linked innovation.

Funding

The intent of the Future Pathways process is to deliver an RSI sector that lifts the whole population and “meets the challenges and opportunities of the future”. This will require a step change in the quanta of funding available. To reach the OECD average investment in research of 2.5% of GDP would require an additional annual investment of approximately \$4.7bn. In a healthy and productive RSI system, this funding would not come exclusively from Government, and it is important that funding system settings pave the way for a transition to balanced investment from government, business and industry.

Once the amount of funding is more correctly calibrated to the ability of the RSI system to deliver national aspirations, then the allocation of that funding becomes the next critical step. Currently government funding is employed to drive behaviours by aligning funder criteria to specific aims related to, for example, collaboration or specific research areas. This approach is not the most efficient, as priorities are not always clear to the research providers resulting in perverse outcomes and wasted effort.

The Green Paper has correctly identified some of these perverse outcomes particularly in terms of collaboration with iwi and with industry (where some stakeholder engagement has been driven by funding applications rather than genuine relationships). The Green Paper has also identified *unproductive*

competition. Success rates of 10-12% for a flagship fund like the Marsden Fund suggest that much researcher time is being taken up in applying for funds rather than delivering research outcomes for the good of the country.

If national priorities are recognised and made apparent then this will enable researchers and government to work in concert to help reduce unproductive competition, as some quota of funding would necessarily be explicitly aligned to strategic priorities. However, it is essential that a quota of funding is explicitly kept as a competitive mechanism to support excellent investigator-led research as outlined above. How the fulcrum of this balance is decided is a challenging question, though less challenging if the overall amount of funding available is both lifted and diversified. This balance will be difficult to strike within any individual fund (MBIE, Marsden, HRC etc) but must be considered across the funding system as a whole.

Base grants

The question of base grants vs the current “full-cost” funding model is simply a question of mechanism. The current model has an excellent level of transparency, inasmuch as many funders are prepared to recognise the full costs of conducting research. These costs are no greater than other countries and, in fact, NZ is arguably one of the most efficient in terms of research productivity. Still, University-based research is substantially cross-subsidised by full fee-paying international students, a necessity as funding to Universities has not kept pace with the cost of delivering world class, research-informed education.

Base grants or bulk funding models might be one answer to some of the challenges identified in the Green Paper. If they are structured well, revised frequently, and their purpose is well understood then base grants could assist with research workforce planning and investment in research infrastructure. One immediate advantage would be to align this country’s funding models to those of international collaborators, making international collaboration easier.

We submit:

- that the amount of funding available within the RSI system is a greater limiting factor than the current funding mechanisms
- that once the amount of funding (from a variety of sources) has increased then funding must be balanced between support for longer term national priorities and more speculative curiosity-driven research
- that funding mechanisms must preserve maximum transparency of the true cost of research, and we would support a responsive bulk-funding model that facilitated such transparency, and was structured to support efficient delivery

Institutional structures

An RSI system that supports connection and collaboration will also support excellence in research outcomes by ensuring that the best teams can come together as required, and by limiting unproductive competition. The Green Paper states that integration is lacking between CRIs and universities (and other parts of the research system). Examples such as CoREs and NSCs, as well as large collaborative Research Programmes supported by the Endeavour Fund, amply demonstrate that researchers themselves are able and enthusiastic collaborators, in spite of current structural and funding barriers.

The CRI model, where each CRI is aligned to a sector, and structured as a company, has reached the end of its productive life, and needs to radically evolve to embrace emerging sectors and increased agility. The university model, too, needs to evolve, to recognise new ways of creating impact from research, and supporting mobility for world-class research talent. Each needs structures that allow rewarding career pathways for researchers that are aligned to national workforce needs. The Green Paper considers co-location of CRIs and Universities. Co-location can facilitate collaboration by providing opportunities to meet easily, and to share research infrastructure, for example. Co-location can also work well for initiatives such as co-supervision of PhD students. However, co-location is not sufficient, on its own, for increased connection and collaboration and, in many cases, is not necessary.

A structural model based on capability platforms would be effectively blind to whether that capability was located in a CRI, university or other research provider. Institutional structures can be designed to explicitly drive activity to geographical locations, particularly by investment in research infrastructure and concentrations of expertise. For example, mātauranga Māori expertise is frequently found in the regional areas of the country so understanding the role of, for example, wānanga as a vital part of a vibrant research and innovation sector is essential.

Institutional structures that support engagement between industry and the RSI system, and policy makers and the RSI system, need to be part of the design of the system as a whole. Part of the structural problem that limits research uptake is the different timescales that operate in industry, in government, in CRIs, in universities, and in iwi and Māori authorities. The basic “building block” of university research is a 3-year (minimum) PhD. Industry wants product innovation in months. Some Māori authorities have 100-year (intergenerational) strategic plans. COVID has shown that government sometimes needs policy input in days. These different timescales can be addressed by structural settings within the research institutions that allow for maximum workforce flexibility and agile allocation of capability and resources.

Enabling movement of researchers between the various institutional structures can be a mechanism for reducing the precarity of the research workforce, but this need not be through the linear route of leaving one institution for another. Sabbaticals, internships, adjunct appointments, and agile teams are all approaches that could be put in place right now if the reward and recognition processes of the institutions were able to recognise the impact of research in its broadest sense. This suggests a new type of institutional structure with fluid human resource systems, that enable applied and fundamental researchers to form agile teams that advance the new knowledge-rich sectors we cannot yet fully imagine. It would be essential that such a structure enables the end-users of research to more easily engage with researchers across the spectrum, not just those working at the highly applied end in fields obviously and directly related to a sector.

Institutional structures based on fewer larger institutions (such as through merging CRIs) could contribute to highly efficient systems internal to those institutional structures but make it even harder to penetrate for researchers outside of those structures. Diversity of institutional structure is as important as diversity amongst individual researchers.

Knowledge exchange

As noted in the Green Paper many of the channels that result in knowledge exchange will be interwoven with other aspects of the system, such as institutional structures, and so focuses this question specifically on commercialisation. It is worth noting that the “valley of death” as it is often referred to, between research findings, and implementation and translation of those findings applies across all capitals, not just economic.

The prime mechanism for knowledge exchange is connection between end-user and researcher, so institutional structures that make that boundary as porous as possible will improve knowledge exchange. Effective Technology Transfer Offices are able to identify the links in the chain from research results to technology application.

In the context of commercialisation particularly, the “valley of death” reflects a lack of funding for the “D” part of R&D, and sometimes even the less cutting edge aspects of the “R”. Development activities are not favoured by researchers who wish only to push forward the state of knowledge in their field, and NZ’s predominantly small to medium enterprises lack resources to invest in developments based on the latest research.

As a result the costs of commercialisation are often borne by the research institution and, sometimes, the Pre-seed Accelerator Fund (PSAF). As only a fraction of all commercialisation projects result in any net return at all, early-stage research commercialisation *per se* is often not profitable for the institutions. As such industry partners and early-stage investors in commercialisation projects, can feel the research institution has put too high a valuation on its IP and spin-out companies at the time they invest.

On the one hand if the Government paid a higher fraction of pre-seed commercialisation costs than the current maximum of 50% (through PSAF), then research institutions might accept higher risk levels in commercialisation than would be desirable. On the other hand, at the current co-investment percentage, there is a clear shortage of pre-seed funding. The total amount of pre-seed funding (and thus the amount of research being commercialised) could be significantly increased if the Government increased the size of its investment, while retaining the minimum 50% match.

Workforce

Internationally ranked Universities are magnets for talent and essential to a productive and world-class RSI system. They are also a major part of the “production facility” for the research workforce, and so a responsive and high-performing RSI system needs close alignment between university capacity for PhD training and the needs of business, industry and government for highly skilled talent. The research workforce also needs to be conceptualised far more broadly than it is at present. Whilst a PhD is usually a prerequisite for an academic role, academic roles are not the only career pathway for those with PhDs, nor should they be. The employability of future PhD students could be enhanced by supervisory teams that spanned Universities, CRIs and industry. Such a team approach to supervision would provide more robust training (and so future agility in a research career) because it would diversify access to approaches, technical skills, research networks and resources.

A large proportion of researchers are highly specialised, though this specialism might be in terms of capability and discipline, rather than a narrowly defined topic. Much of the precarity in research careers stems from a funding landscape that funds projects and programmes rather than capability. The current funding mechanisms also incentivise budgeting for research students (PhD and Masters) over budgeting for post-doctoral researchers. This has denuded a stratum of the NZ system whilst contributing to increased precarity. If nationally set priorities become a central feature of the RSI system then there is the opportunity to fund longer-term capability building. This has two advantages, firstly its impact on career stability and progression, secondly, and possibly more excitingly, the opportunity to commit to growing our own talent with the attendant chance to increase diversity.

Diversity

NZ has a diverse research workforce in terms of nationality, but there is a lack of equity, inclusivity and a sense of belonging for many. Women are still under-represented, particularly in the STEM subjects, and Māori and Pacific researchers are not only under-represented but frequently stretched across their disciplinary role and the pressure to provide cultural leadership within research programmes. Disabled people, LGBTQ+ people and people from socially disadvantaged population groups can struggle to find the RSI system welcoming or navigable. Cost of living increases mean that access to advanced research training, the ability to bridge gaps between temporary and continuing-employment, and to fund the typical length of parental leave, are increasingly supported mostly by personal wealth.

Diversity in the research workforce is critical to deliver the most innovative and transformational solutions. If research is about creating new knowledge and new ways of achieving, then those that question the norms will be the ones that propel us forward, fastest. Evidence, from overseas of the efficacy of specific equity, diversity and inclusivity requirements built into funding mechanisms should be assessed to determine best practise applied in an NZ context.

Precurity

The pandemic has raised awareness of the precarious nature of research careers, especially for certain groups such as women, early career, Māori, Pacific, and disabled researchers. In many cases the reason for this disproportionate impact was the caring and social support demands placed on these groups during the lockdowns, but the situation was exacerbated when researchers were also on fixed term employment contracts, often the case for early career researchers.

The current system funds projects, not capability. Project-based funding will always carry some level of precarity for individual researchers, as research providers win funding for finite and short-term activity. This is not exclusively negative, as it provides for flexibility and agility in the system, but it needs to be balanced with support (based on capability and capacity within the system) that creates more certainty for individuals.

This is somewhere a “base grant plus competitive funding” model could offer most benefit, though the structure and requirements of the base grant would need to be carefully designed. If a base grant was only to fund what is currently covered by a budget’s “indirect costs” then this would give research organisations increased certainty (and have a beneficial effect on the ease of seeking international collaborations and funding) but would not substantially decrease precarity for the individual researchers

Novel institutional structures discussed above, related to workforce mobility also contribute to reducing precarity in the workforce.

It is worth noting that precarity is not unique to NZ and our funding structures, it is something all developed nations are grappling with. Nor is it a new problem, but the pandemic has shone a light on it in a new way. There is a need to understand the scale and nature of the problem and this would be a first step in designing any base grant related to this issue.

Infrastructure

Current funding models do not allow for optimal decisions around research infrastructure. Expensive items (from microscopes to ships) cannot be budgeted for in a single 3-year project, or even a large multi-year programme. Databases and collections need to be maintained over decades. Access to infrastructure is

enabled when governance, administration and technical support is good and when the infrastructure is divorced from a “for profit” model.

Intra-institutional models for administration and access can be variable and are within the power of the institutions to change, but research providers are forced into making initial infrastructure investment decisions that are for the good of their own institution rather than for the good of the country.

The suggested approach for setting national research priorities (an independent body such as a council) is also needed to make decisions on central investment into infrastructure. These investment decisions would be informed by any national priorities, the ability of the country to support independent research in critical areas, and the ability to attract international talent. Where infrastructure is hosted will be part of the decision-making process.

The country has an opportunity to develop National Facilities in many areas but our scale means that these might need to be for smaller tools than are usually considered for “national” investment in larger countries. These facilities can be open, shared and could easily be linked to the funding system so that access costs are covered if users have a current award. This has already been done in NZ with super-computer access and our involvement in the Synchrotron. We need this for much smaller tools *e.g.* electron microscopes, mass spectroscopy. National facilities could also become centres for instrument/technique R&D itself. Currently researchers can be hampered by a lack of ability to innovate technology. There are no real mechanisms to get consistent support to develop new tools to advance science, meaning researchers have to buy “off the shelf” technology that may not be ideally suited to their needs (and is often at the end of a long supply and maintenance chain, meaning long down times).

Having once decided what is *critical* to have in the country, what is *desirable* to have in the country, and what is critical to have access to internationally, then managing access to optimise use and support excellent research is essential. There are several models for sharing research infrastructure; full cost recovery, membership/subscription fees, competitive access ... etc. Sharing research infrastructure is, in theory, easier now than ever with the use of technology and remote access. Location can be used to seed a concentration of specific expertise but will always be dependent on robust access requirements.

Leveraging the value of investment in research infrastructure relies on highly skilled technical support staff to directly support researchers, and to train the next generation of researchers. Research technicians and technologists are a vital component of a flourishing RSI system. Any consideration of how infrastructure investments are made, and operation of that infrastructure is optimised, must include consideration of the ongoing operational costs related to staffing.

Submissions against the specific questions in the Green Paper

Section 1: Research Priorities

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

If “National Priorities” are conceived in the broadest sense (as a direction of travel toward what we want our country to be) then an independent body such as a National Research Council or Commission is needed to ensure as much independence as possible from political interference. This body would need to be constituted to ensure long-term vision for the benefit of the country as a whole.

If “National Priorities” are conceived more like grand challenges that require a solution within a finite timeframe, then care would be needed to avoid recreating some of the issues that arose as a result of creating the National Science Challenges without addressing the other structural issues of the RSI system identified in the Green Paper. It would be a mistake to simply layer new challenges/priorities across the existing system.

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

A national body would need balanced membership to ensure the expertise and will was present to embed Te Tiriti into priority setting. The process will best give effect to Te Tiriti where it recognises its role in New Zealand’s history and society as part of the constitutional arrangements of New Zealand

Built in mechanisms to review and refresh priorities, as well as measure progress toward any end-point, are crucial. Some of our current funding mechanisms would be fit for purpose if they offered “ways in” to the priorities, eg. SSIF being seen as a stage-gate for evolution into, or alignment with, an existing priority.

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

A national body would need to be integrated into a decision-making framework in some way, so complete independence from the machinery of government is not possible, but every step must be taken to ensure political interference cannot derail long-term aims.

As above, review and refresh of priorities and overall direction of travel will be an important role of a national body.

Section 2: Te Tiriti, mātauranga Māori, and Māori aspirations

4. Engagement: *How should we engage with Māori and Treaty Partners?*

No further comment.

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

The special place of Maori as tangata whenua and mana whenua should be regularly acknowledged. Research that is undertaken should enhance tino rangatiratanga and be guided by active protection and partnership. Te Tiriti should also be seen as embodying equality and non-discrimination as well as requiring that the knowledge created, transferred, exchanged and stored during research activities should be treated as taonga.

Researchers should have training in Te Tiriti. The Waitangi Tribunal Report 262 on flora and fauna may be a good place to start to develop training materials. Training should also draw attention to moments when research has, historically not engaged well with Māori.

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

No further comment.

Section 3: Funding

7. Core Functions: *How should we decide what constitutes a core function, and how do we fund them?*

The pandemic has shown that a level of national autonomy in some critical research capability should be safeguarded. It is important to differentiate between research activity and research capability, though, as research activity will change more frequently and, arguably, can never be considered a core function. Core functions are better conceptualised as inputs into research activity and so organisations tasked with delivering high-priority services (such as health) are best placed to define what are the foundational needs of providing that service.

When conceived as “input” it is clear that data management and access needs to be considered when considering other core functions. This will become increasingly important as “big data” is more and more a driver for addressing social and science issues. Data management practises, including sovereignty, storage and access require specific attention as the RSI sector is redesigned.

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? How should we go about designing and implementing such a funding model?*

A base grant could be one tool in addressing some of the current challenges of the RSI system but would only work when balanced with other funding tools such as competitive grants. It will be essential to identify the optimum balance point between base grants, which might be aligned more strongly with national priorities and outcomes such as workforce planning, and competitive grants which preserve agility and flexibility as well as rewarding research excellence.

A base grant model could increase stability and resilience, but it will be important that transparency is preserved as to the true cost of research. It would be unlikely that a base grant would materially improve stability unless such funding represented a very large proportion of the full cost of research programmes,

which could then limit system flexibility and so worsen the precarity of research employment for new and emerging researchers.

One of the greatest advantages of a base grant would be harmonisation with international norms, making international collaboration easier.

Allocation of a base grant on performance grounds is fraught as performance metrics for research are notoriously difficult to structure. A balance of activity and negotiated systems, potentially with some performance incentives would be a reasonable approach.

Section 4: Institutions

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

The current corporate model for CRIs should be exchanged for a system that rewards collaboration between CRIs and universities and other research providers. This could possibly be achieved by fully funding the CRIs and requiring that a proportion of the funding be made available to other providers through very targeted subcontracts (as happened with the National Labs in the USA). This new model would automatically facilitate interaction, collaboration, sharing of knowledge, increase capacity building and student development, and sharing of resources.

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

No further comment.

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

No further comment.

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

No further comment.

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?*

Successful knowledge exchange includes both “pull” and “push”. In the “pull” case companies, government departments, iwi and non-profit organisations realise they have a knowledge gap and seek knowledge from research institutions. In the “push” case, operational organisations may not know they have a knowledge gap

or need (being focused on delivering to their operational purposes) but researchers may think that new knowledge developed in their research may meet unrecognised or ill-defined needs.

The “pull” case can be supported better by building the human capability of operational organisations to strengthen their capacity to engage with and absorb new knowledge. Research organisations (particularly universities, due to their focus on capability-building) can help with that if sufficient funds are available to support this activity.

The “pull” case can be supported better by investing more in Pre-Seed funding to bridge the “valley of death” between research and successful commercialisation. That “valley” is appreciably wider in NZ than in other countries because our predominantly small and medium-sized enterprises are less able to invest to take up early-stage research results than are large R&D-intense companies like those found in the pharmaceutical or defence-equipment industries in other countries.

Section 5: Research workforce

In this section, we want information to help us understand how workforce considerations affect Research Priorities and how base grant funding would affect the research workforce, as well as information to help us design funding focused on workforce outcomes.

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

No further comment.

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

Base grants might contribute to workforce development if they were designed with that specific purpose in mind. One option would be to allocate some portion of any base grant to a merit-based mechanism that explicitly supports research-focused positions so that 5-year or even 8-year contracts are possible. In other words, base grants could be used to further incentivise institutions to hire diverse workforce of emerging researchers.

A review and refresh of priorities, as above, would allow us to regularly examine mechanisms which do not enhance equity and inclusion, and adjust.

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

Investigator-led funding mechanisms, specifically aimed at early career researchers, would help restore the bridge that was removed with the disestablishment of the FRST Postdoctoral Fellowships. With a large focus on collaboration and cooperation within a well-designed RSI system we must not lose focus on how an emerging researcher can create their own niche and add value to the country as they grow their own research career.

Section 6: Research infrastructure

In this section, we want information to help us understand how we can improve the efficacy of investment in research infrastructure.

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

No further comment.