

Feedback on Te Ara Paerangi - Future Pathways:

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The Biochemistry Department at the University of Otago is a research-intensive academic department that functions within the School of Biomedical Sciences and Division of Health Sciences. Our Departmental makeup is heavily tilted towards junior researchers: our 208 total members are comprised of 117 postgraduate students, 15 postdoctoral fellows, 12 research fellows, 38 other research staff (SRF, SO, ARF) and 26 permanent academic staff. Our makeup means that many of our views are shaped by our goal to train the next generation of scientists—who will make up the scientific workforce of the future—while simultaneously carrying out internationally recognised cutting edge research. We support many aspects of the Future Pathways Green Paper, particularly the need to wholistically consider the science system and future pathways for science in New Zealand. Our position at the juncture between training and research means we view the future workforce to be a critical element of this discussion, that pervades most of the sections of the document. We need a research system that entices our best and brightest to have the best chance of tackling future challenges, and can only do this in a vibrant science system with scientifically-minded decision-makers at all levels. Hence, we frame our response to the particularly relevant questions through this lens below.

NGĀ WHAKAAROTAU RANGAHAU RESEARCH PRIORITIES

KEY QUESTION 1: What principles could be used to determine the scope and focus of research Priorities?

The Green Paper states "*Despite researchers' natural tendencies to align behind grand challenges, the overall picture of our system is one of unnecessary fragmentation and priority clutter.*" Many in our department agree with this statement, however we would posit that a major reason for clutter is historical efforts to 'unite' researchers behind specific research priorities through new funding mechanisms (COREs, National Science Challenges), which have become numerous and overlapping and themselves fragment the science system. Any efforts to prioritise research areas, if they are deemed necessary, should strongly consider if they are contributing to this issue rather than making it better.

The Green Paper implies setting translational priorities over fundamental research, commenting that "conducting a large amount of fundamental exploratory research at the expense of more immediate needs" is a risk. However, applied research is the natural subsidiary of newly-developed basic knowledge (Belenzon, 2016, Basic Research and Sequential Innovation) and basic (non-applied) research is recognised in an International Monetary Fund report as being hugely important for economic growth (<https://blogs.imf.org/2021/10/06/why-basic-science-matters-for-economic-growth/>). The major problem in Aotearoa/NZ is that we have historically, and still today, underinvest in basic research and all stages of our science system relative to other modern economies. This fundamental problem was reported in the National Statement of Science Investment (2015-2025).

KEY QUESTION 2:

- A) What principles should guide a national research Priority-setting process? B) How can this process best give effect to Te Tiriti?*

One of the ongoing issues with previous attempts to create specific priorities has been that the process has called on many with vested-interests setting the agenda for prioritising research areas. Any new process for setting research priorities should avoid this, and aim to be future-focussed, given the process aims to produce a resilient science system for the future. One major way to achieve this is by giving greater influence to leaders of tomorrow (i.e. early career researchers) rather than to researchers who are already tied to major programs and involved in the priority setting. Similarly, the obvious way for the process to give best effect to Te Tiriti is major involvement for Māori in real partnership.

KEY QUESTION 3: How should the strategy for each research Priority be set and how do we operationalise and implement them?

We have existing funding bodies that work very well (Marsden, HRC, MBIE Endeavour Fund) but are woefully underfunded, leading to low funding rates and significant systemic wastage. Any strategic priorities could be administered in an existing framework with some modification as necessary—a streamlined system that bolsters existing channels of research support, rather than inventing new ones. This could mean specific calls within research channels at the Marsden, HRC or MBIE. This may require bolstering the workforce within these funding systems, but would leverage their already efficient workflows.

Strategically supporting specific research areas through existing mechanisms would be enabled by having more scientifically-trained graduates at various levels of the decision-making process. A model in which program officers whose full-time focus is to *independently* administer priority research areas would serve two purposes: removing vested interests from the decision-making process, and; having expert-trained individuals be focussed on achieving specific priorities, rather than researchers who are trying to both set the agenda and administer it.

TE TIRITI, MĀTAURANGA MĀORI ME NGĀ WAWATA O TE MĀORI

KEY QUESTION 4: How would you like to be engaged?

KEY QUESTION 5: What are your thoughts on how to enable and protect mātauranga Māori in the research system?

KEY QUESTION 6: What are your thoughts on regionally based Māori knowledge hubs?

A large proportion of the engagement with Māori that we have in our department is through undergraduate teaching in feeder-courses for health professional programs. Many outstanding students are motivated by improving the future of their communities, which fundamental research could play a major role, and recruiting such individuals would massively benefit our science system. However, with the precarity of the scientific sector, and lack of true career pathways, it is difficult to strongly advocate choosing research over a professional qualification in good faith. More mātauranga Māori research begins with having more Māori people, which will require active policy measures and importantly funding. Targeted support for Māori at an earlier stage (undergraduate and postgraduate support) with future pathways visible can help, and needs to be part of a broader consideration of supporting our scientific workforce. We also strongly support the concept of regional Māori knowledge hubs—which would help build linkages to identify pressing local issues, build dialogue to share local knowledge, and facilitate using science to tackle challenges in true partnership.

TE TUKU PŪTEA FUNDING

KEY QUESTION 7: How should we determine what constitutes a core function and how should core functions be funded?

KEY QUESTION 8: 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?

We can certainly see benefits in moving to the base-funding model. In particular to allow institutions certainty to strategically invest in long-term research-only staff and infrastructure to a greater extent. Both of these which would bolster both the quality of our science and provide additional career opportunities for our scientific workforce. From our perspective within the University, we would strongly advocate that checks-and-balances are in place to ensure that base-funding funds the researchers to contribute to their research goals, rather than bureaucratic creep within the University. Presumably having specific targets aligned with the overall strategic imperatives (scientific impact, mātauranga Māori) built into the base-funding model would be the best way to do this.

NGĀ HINONGA INSTITUTIONS

KEY QUESTION 9: How do we design collaborative, adaptive and agile research institutions that will serve our current and future needs?

KEY QUESTION 10: How can institutions be designed or incentivised to better support capability, skills and workforce development?

KEY QUESTION 11: How should we make decisions on large property and capital investments under a more coordinated approach?

KEY QUESTION 12: How do we design Tiriti-enabled institutions?

KEY QUESTION 13: How do we better support knowledge exchange and impact generation? What should be the role of research institutions in transferring knowledge to operational environments and technologies?

At present our Department has various ties to Crown Research Institutes (CRIs) and District Health Boards (DHBs), but these are generally instigated at the level of individual staff, and require significant time commitment and lead-in work to develop and maintain. In contrast, it appears there is less drive at higher levels (Divisions, Universities and CRI/DHBs themselves) to have systemic co-operation for greater benefit. This is likely driven by the fact that these institutions are largely competing with Universities for insufficient funding. A base-funding model could potentially decrease this competition, and allow true institutional collaboration, which would enable greater efficiency.

Given that CRIs and DHBs tend to have greater direct links with end-users than Universities, greater collaboration allows a more natural pathway to application for scientific discoveries. More integrated links between Universities and CRI/DHBs would also provide a more diverse career structure for early-career researchers. Collaborative funding calls between CRIs and Universities would allow more involvement of researchers at an earlier career stage, and connections for those scientists who tend towards application. More integrated efforts between CRIs and academics could provide momentum to early-

career researchers to pursue commercialisation of research and innovative companies, an area which is generally undersupported in New Zealand.

TE HUNGA MAHI RANGAHAU RESEARCH WORKFORCE

KEY QUESTION 14: How should we include workforce considerations in the design of research Priorities?

KEY QUESTION 15: What impact would a base grant have on the research workforce?

KEY QUESTION 16: How do we design new funding mechanisms that strongly focus on workforce outcomes?

Current support for workforce development in New Zealand research is underfunded and fragmented. We would argue that proper support of a scientific workforce and career structure should be *the major* priority of any reorganisation of the research system in New Zealand, which underlies mātauranga Māori, research impact, institutions, and infrastructure. The green paper itself starts from the premise that “Scientists have a natural tendency to align behind grand challenges”. If we truly prioritise science and our scientific workforce, we need more comprehensive pathways for individuals to have an impact, so we can attract the best and brightest to the sector and get the best outcomes for the country.

Having people-driven funding models has a clear record of success overseas—HHMI (USA), Wellcome Trust (UK), and NHMRC (Australia) to name a few—and can also be leveraged towards the underlying goals of the research system. We have schemes that invest in individuals—such as the Sir Charles Hercus Health Research Fellowships, and Rutherford Fellowships—that have an excellent track record in supporting future leaders. However, these schemes are limited in number, and in scope. For instance, having fellowships for researchers who are more policy-driven would allow them to be integrated into government roles, benefitting both the individual and the system by having more research-trained decision makers. The HRC currently facilitates targeted support to some Māori and Pacific researchers. However these are relatively limited and could be expanded to broader research fields beyond health. Similarly, incentivising collaboration between CRIs and Universities through early-career researcher support at the interface between the two would strengthen ties and decrease competition.

On the whole, facilitating diverse career-tracks by prioritising people would benefit individuals in research, but importantly the cohesiveness of the science system and the impact it can have on society.

TE HANGANGA RANGAHAU RESEARCH INFRASTRUCTURE

KEY QUESTION 17: How do we support sustainable, efficient and enabling investment in research infrastructure?

In line with our point above, any investments in infrastructures also need to consider people as well as capital expenditure. There is a tendency to invest in capital infrastructure, but not the experts who can run the often-expensive infrastructure. To get the most out of any investment, we need to invest in experts. Frequently we find our NZ trained technical experts can only find stable employment at overseas institutions, who support

infrastructure along with staff to run that infrastructure. From the NZ research standpoint this wastes a massive pool of talent who would love to share their world-class technical expertise in New Zealand. Stable support for technically trained people would help achieve research impact and societal gain, and train the next generation of researchers in cutting edge-technology.