

TE ARA PAERANGI: FUTURE PATHWAYS

Submission on the Green Paper from Malcolm Menzies PhD

(also sent by post with enclosure)

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Introduction

The Green Paper *Te Ara Paerangi: Future Pathways* seeks to “start a wide-ranging and deliberative conversation about the future of New Zealand’s research system”. It reprises many of the same issues and questions that underpinned the last major reform of the system in the early 1990s¹.

The fact that these issues and questions remain unanswered suggest that the 1990s reforms and subsequent tinkering have now run their course, and different approaches need to be tried. At the very least, past mistakes should not be repeated.

The Green Paper notes that consultation has revealed a significant amount of fragmentation that results in a lack of role clarity for institutions, unproductive competition, and lack of integration between our universities, CRIs, and other parts of the research system. There is a proliferation of governance arrangements and competing strategies and priorities, which struggle to be given effect and connect directly to funding. System responsiveness to Māori is weak and models of engagement poor.

These are all issues that existed prior to 1990, to which might be added another flaw in the system that was identified at that time, which was unnecessary duplication of research effort in different parts of the system. It may be that this is the only major weakness to have been rectified in thirty years, partly because in 1990 data was collected for the first time to show what research was being done, where and by whom.

Despite the gathering of data, another common element in the debates of the 1990s and 2020s is the reliance on consultation and “conventional wisdom” about what is wrong, and what needs to be done to fix the New Zealand science system. The strengths of the system often seem to be downplayed. For example, that the proportion of New Zealand publications in the top 1 per cent of the most cited publications worldwide in all research fields increased from 2.0 to 2.7 per cent between 2010 and 2019. International co-authorship rates have increased by 16 per cent since 2008. Across all fields of research, the citation performance of New Zealand publications with international collaboration now significantly exceeds those that do not. The number of New

¹ See Palmer (1994) for an excellent summary.

Zealand publications with more than one author has increased. Engagement in research and innovation has expanded to a variety of connections across individuals, institutes and countries. (MBIE 2021a).

In other words, there are high rates of collaboration, productivity and quality in New Zealand science. Remaining problems in connection with business arise from both directions and their solutions require evidence-based analysis.

It is instructive to note that the science reforms of 30 years ago deliberately introduced competition into the science system, as part of wider reforms within the public sector, aimed at avoiding “capture” of strategic decisions by operational departments such as the Department of Scientific and Industrial Research (DSIR) (Scott, 1996: 12).

The various new frameworks were seen as a way of correcting this capture through increased transparency, changing organisational structures, and contestability in the provision of services (ibid: 13).

The rationale for these moves had some merit, but the unfortunate corollary of their introduction has been the growth of resource-intensive bidding processes, top-heavy governance, management, and accountability structures which take up resources that would be better allocated directly into science. MBIE received 544 applications for research funding in the 2021 round of the Endeavour Fund and 69 were approved for funding – a 13 % success rate. It would be instructive to calculate the transaction costs involved in those 475 unsuccessful bids (MBIE 2021b).

That current levels of competition are seen as “unproductive” may be a function of poor system design, or of incompatibility with the values and methods of science and scientists.

Whatever is the case, after three decades, underpinning assumptions and biases need to be challenged. Perhaps it is time to trust scientists to do the right things (they have surely learned their lesson) as long as they are provided with clear, well founded strategic priorities for research investment and made subject to more creative accountability mechanisms.

Such a change is more likely to reduce burdensome transaction costs and achieve the Green Paper’s expressed aim (page 19:

We want to create a modern, future-focused research system for New Zealand. It needs to be adaptable for a rapidly changing future, resilient to changes, and connected: to itself, to industry, to public sector users of research, and internationally....establish a clear line of sight to national goals and challenges.

Background

This submission draws on my experience of the last major reform of the science and research system, as an employee of the Ministry of Research, Science and Technology (MoRST) 1991-95 and subsequent involvement - up until the present day - in various aspects of research policy and management.

At MoRST, I worked in a small Priorities and Funding Division and helped to manage two rounds of consultation on setting priorities for the investment of government funds in scientific research. After leaving the Ministry, my Manager and I were commissioned to write a retrospective report on our experiences of the priority-setting process. A copy of that report (*Cutting the Cake*) is enclosed with this submission. While some of its content is inevitably dated, a considerable amount (referenced below) resonates with questions posed by the Green Paper and there is no need to “reinvent the wheel”. The whole report has been provided, rather than excerpts, to help illuminate the context of the time.

My submission is primarily focused on questions of priority-setting, but these are inextricably linked with overall system design.

Research Priorities

1. Priorities Design

Key Question 1: What principles could be used to determine the scope and focus of national research Priorities?

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

“Cutting the Cake” describes principles of priority-setting on pp 5-11 and 27-35.

At the highest level, the Government needs to determine what goes into the “science envelope” via Budget Funding Allocations for Research and Development This includes components for research infrastructure, institutional funding, investigator-led research (The Marsden Fund) and strategic research (which may itself be subdivided, e.g., into a fund for technology transfer).

The above ordering is intentional. National research priority setting should first determine what research infrastructure (databases, national collections etc) is essential, and fund that adequately. In other words, priority setting for strategic research should be applied to what is left after infrastructure has been fully funded. The past practice of funding infrastructure from “what is left

over” is absurd, threatens the viability of essential strategic capabilities, and leads to cutting corners in Vote RS&T.

It is pleasing to see on page 20 of the Green Paper recognition of the importance of treating the *research system as a distinct system*, as opposed to a set of operational functions that feed into disparate industry sectors, government departments, or exist as adjunct functions of other public services. As outlined in “Cutting the Cake”, the science funding that was pooled (from departments in 1990) was only that which had previously been used to fund ‘output’ research in those departments, as opposed to operational research (research performed to support departmental activities such as purchasing, regulatory activities or policy advice). It is important that the current process does not become an opportunity for departments to grab funding back – i.e., for operational research to crowd out strategic research in Vote RS&T.

Also important is the principle of *subsidiarity* – decisions about priorities at each level should be made by the people closest, most affected, most competent and with authority for implementation. This would mean that national, strategic priorities are set at the level of central government (based on a mix of top-down and bottom-up process) with agency management responsible for detailed research priorities and, incidentally, the development of scientific human capital.

Subsidiarity is linked to appropriate *granularity* of priorities for strategic research. As outlined in “Cutting the Cake”, the number of categories used to allocate funding in the 1990s was very contentious. When they were too finely grained, the system became overly prescriptive and prone to gaming. Too “coarse” and priority-setting lost its ability to direct investment.

To enable the system to be “adaptable for a rapidly changing future and resilient to changes”, national priority-setting needs to be *continuous* rather than episodic. Ideally, changes in priorities should apply to new money only. But changes should be well *grounded in evidence, consensual and signalled* well in advance. Constant chopping and changing undermines confidence in priorities and is extremely damaging to the system. On the other hand, major ten-year reviews should be empowered to make *bold* decisions, in the context of *futures thinking* about key trends, opportunities and threats facing Aotearoa over the ensuing 30-50 years. These major reviews could be informed by Long Term Insights Briefings being prepared under the provisions of the Public Service Act 2020.

There needs to be *accountability* for delivery on priorities, to guard against the real risk of provider capture. It should still be possible to signal broad directions for government and industry expenditure and to develop alternative approaches to accountability such as performance audits and the market valuation of new ventures.

There are metrics on page 60-1 of the Green Paper that could be used to guide monitoring of performance and accountability. But the examples contained on page 27 are micromanaging and not appropriate for national priorities – these are the sort that could be set by the science institutions (assuming they become larger) for sign off by an oversight panel (see below).

National priorities should reflect desired *outcomes* and *align* more closely onto (non-university) institutions' respective missions, along with a degree of *overlap* to foster inter-disciplinarity and collaboration. In other words, the whole system architecture should be much *simpler* than it currently is and avoid the second-guessing that has occurred frequently in the past, with the overlaying of additional priority mechanisms such as National Science Strategies, Strategic Result Areas, Key Science Areas and National Science Challenges. Nevertheless, each high-level priority needs to be given effect through the development of Research & Innovation Strategies at the appropriate levels, containing “sub-priorities” and themes derived from widespread consultation and taking account of other stakeholder strategies (e.g., of government departments, industry bodies).

2. Priority-setting process *Key Question 2:*

A: What principles should guide a national research Priority-setting process?

B: How can the process best give effect to Te Tiriti?

3. Operationalising priorities

Key Question 3: How should the strategy for each National Research Priority be set and how do we operationalise and implement them?

Refer to “Cutting the Cake: pp 37 – 87.

The whole New Zealand community has a stake in priorities that are set for public investment in scientific research, so the process used should be as *systematic* and *transparent* as possible, to enable communication of intent and build “*ownership*” of the outcome.

The process should be overseen by a standing panel of “guardians” with a mix of expertise, including scientific and user perspectives, and meaningful representation from Māori. This panel should be made up of ministerial appointees after consultation with other political parties, to ensure broad political support, and terms of five years to overlap election cycles. This panel would be charged with establishing weightings at the level of national outcomes along with other criteria, continuous oversight of the priority-setting process including public consultation, communication of results, confirmation of research strategies and overall accountability.

Priority-setting at the level of scientific objectives should be the responsibility of science institutions governed by expert and representative boards within the parameters of their charters, five-year statements of performance expectations and science area strategies, cascading down to the operational level of science programme leaders. Accountability would flow upwards in the reverse order. The performance of the whole priorities framework would be subject to periodic review by the Office of the Auditor General and scientific excellence will continue to be assured through normal processes of publication and peer review.

How can the process best give effect to Te Tiriti?

Priority-setting in the 1990s struggled to adequately consult with Māori (see *Cutting the Cake*, p 86-7). Things have changed enormously since then, but challenges remain in consulting with a community that is already stretched (over consulted) in so many fields. There is no one answer, but Te Tiriti can be given effect through meaningful representation of Māori on the high-level priority-setting panel, Kaupapa Māori-based consultation, the establishment of a Mātauranga Māori Research Institution (with regional hubs) and further representation on the boards of other science institutions.

Te Tiriti, Mātauranga Māori, and Māori Aspirations

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?

Key Question 12: How do we design Tiriti-enabled institutions?

The claims of Mātauranga Māori on the science system have increased exponentially over the last twenty years, often justifiably but also sometimes based on misrepresentation of modern scientific method (e.g., that it is always reductionist) and including direct challenges to scientific values (e.g., “universalism”).

There is more heat than light in the current debate, and there is a need to allocate more resource to understanding the interface between Mātauranga Māori and “Western” science. Unfortunately, Māori research capacity is overstretched, and individual Māori researchers (particularly young researchers) are subject to many competing demands. A partial solution to this is to consolidate capabilities in one centre of excellence.

As indicated in the Green paper, an institution dedicated to Mātauranga Māori should be securely funded as a national priority, with regional units as suggested in the Green Paper to recognise the central importance of place (other institutions are also likely to establish regional presences, with opportunities for collaboration). This investment would have to be done in a way that avoided “ghettoising” Mātauranga Maori and would not relieve other institutes of their responsibilities - research across the board would still need to be cognisant of Māori interests², and support the development of Māori researchers.

Institutions, workforce, and knowledge exchange

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

Key Question 10: How can institutions be designed to better support capability, skills and workforce development?

Key Question 13: 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?

Key Question 14: How should we include workforce considerations in the design of national 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?

The Green Paper answers question 9 perfectly well on page 48. Essentially, there is a need to create fewer, larger, more resilient, interdisciplinary, collaborative, and connected Crown Research Institutes. These would allow more scope for complementary *research workforce development* and many of the requirements contained in the green paper, e.g., on page 68.

As discussed above, institutions could be aligned with the outcomes used to set high-level strategic priorities as follows: (after infrastructure has been funded and excluding the investigator- led Marsden Fund). For the sake of debate, some possibilities are shown in the following table:

² An excellent case study of how this can happen is described in “Where Tikanga Meets Technology: Connecting Hāu Kainga to Whenua Ora” by Merata Kawharu, Leonie Jones and Paul Tapsell (see references).

National Outcome	Priority weighting	New Research Agency Focus	Made up from
Healthy environment	TBD	Biophysical environment	Landcare, NIWA, GNS, ESR
Thriving biological economy	TBD	Primary sector	AgResearch, Scion, Plant and Food Research, NIWA
Thriving manufacturing sector	TBD	Manufacturing	Callaghan Innovation, plus parts of Scion and other CRIs
Healthy population	TBD	Public Health	ESR
Māori achieving their aspirations	TBD	Mātauranga Māori plus cross-cutting theme	New and existing Mātauranga Māori scholars and practitioners
A cohesive, inclusive society	TBD	Cross-cutting	Social research capability across all agencies*
Total	100%		

*Experience has shown that a stand-alone social science research agency is unlikely to be sustainable (see Preston: 2018).

With mostly secure funding, overlapping capabilities and the right incentives, institutions will be more inclined to jointly address the key strategic issues facing Aotearoa New Zealand. Shared appointments and secondments of key staff will be much easier, and help break down “silos”

However, it is not reasonable to expect CRIs to develop all the workforce that will be needed in the future science system. Development of young talent is properly the role of the Universities (albeit in collaboration with other institutions) and this role must be within scope of the next stage of consultations on the science system. Particular attention should be paid to the impact that the Performance Based Research Fund (PBRF) has had in incentivising Universities to regard their research as an end rather than a means for developing leading edge human capital. It is difficult to fathom how the PBRF can be out of scope for the Green Paper, which at the same time poses the questions 9-19 above.

Beyond training, an important issue is providing attractive career paths for young researchers. They are looking for stable, good paying, research positions. Remuneration for post-graduate and post-doctoral researchers is often low, as are expectations of advancement, meaning talented researchers are leaving NZ permanently, or moving into other careers. NZ is at risk of becoming even more dependent on overseas students for post-grad and post-doc researcher roles, undermining capability development (Hickson 2022).

Another critical element is a highly skilled cadre of research managers, and the lack of attention given to their role and development is a major deficiency in the Green Paper.

Some related ideas on how to promote scientific entrepreneurship and transfer of knowledge into operational environments and technologies are described in Menzies (2008, 2013).

Summary

the 1990s reforms and subsequent tinkering have now run their course, and different approaches need to be tried. At the very least, past mistakes should not be repeated. That said, while the New Zealand science system has weaknesses, it also has many strengths, and these should not be overlooked. Changes need to be grounded in evidence, not solely consultation which risks group think.

After three decades, underpinning assumptions and biases need to be challenged. Perhaps it is time to trust scientists to do the right things (they have surely learned their lesson) as long as they are provided with clear, well founded strategic priorities for research investment and made subject to more creative accountability mechanisms.

The enclosed report: "*Cutting the Cake: A retrospective view of Science Priority Setting in New Zealand 1990-95*" describes principles that underpin priority setting and associated consultation processes. While some of its content is inevitably dated, a considerable amount resonates with questions posed by the Green Paper and there is no need to "reinvent the wheel".

Based on observation of the science system over 30 years, a key conclusion is that the whole system architecture should be much *simpler* than it currently is and avoid the second-guessing that has occurred frequently in the past, with the overlaying of additional priority mechanisms. Future priorities should also be better aligned with a clear line of sight between desired outcomes and institutional missions, while allowing for overlaps to enable multi-disciplinary approaches to urgent national priorities.

The overall priority-setting process should be overseen by a standing panel of "guardians" with a mix of expertise, including scientific and user perspectives, and meaningful representation from Māori. Te Tiriti can also be given effect through Kaupapa Māori-based consultation, the establishment of a Mātauranga Māori Research Institution (with regional hubs) and further representation on the boards of other science institutions.

More detailed priority-setting should take place at the appropriate level, with accountability flowing in the reverse direction.

Fewer, larger, more resilient, interdisciplinary, collaborative, and connected Crown Research Institutes will allow more scope for complementary *research workforce development* and many of the requirements contained in the green paper.

However, it is not reasonable to expect CRIs to develop all the workforce that will be needed in the future science system. Particular attention should be paid to the impact that the Performance Based Research Fund (PBRF) has had in incentivising Universities to regard their research as an end rather than a means for developing leading edge human capital. Beyond training, an important issue is providing attractive career paths for young researchers.

Other critical elements are a highly skilled cadre of research managers, and the recognition of scientific entrepreneurs to promote transfer of scientific knowledge and expertise into other realms.

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