Te Ara Paerangi Future Pathways

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Background.

I have some 45 years closely involved in the science and innovation system. This includes:
- Working in the energy innovation sector
- A senior role with a Crown Research Institute including close interface with MBIE, the commercial forestry industry and in partnering with Māori.
- Contract role with commercial entities who partner with research and innovation providers.

General.

This green paper touches on some very important issues. It is very timely although disappointing it only reviews part of the Government role in investing in and directing science. The exclusion of PBRF and the direct role of universities is missing.

This paper does not touch on the rationale for Government investing in science and neither does it describe what success looks like which is a disappointing omission.

My view is that the New Zealand Crown dominated investment in science (excluding tax or business facing activities or the PBRF) is characterised as:
- Dominated by typically small (<$10M) projects and short time spans (less than 7 years)
- Very fragmented with multiple overlapping schemes (SSIF, Endeavour, NSC's, Databases etc)
- MBIE taking a very hands-on role with investments which impacts on actual governance and independence of many of its crown owned entities such as CRI's.
- Numerous entities within the system with business models that force competition and reduce clarity,
- Often changing priorities,
- Success not defined and hence lack of clarity whether the millions the Crown invests each year in science is achieving a useful outcome be it creating some economic, environmental or social or other outcome,
- Measurement focused on investment into an activity rather than outcomes of that investment.
- A preoccupation that only competition delivers the best outcome rather than prioritising what is invested in, and how well managed or governed that investment is.
- A system that encourages competition between Universities and CRI's and a belief that there has to be a level playing field between CRI's and Universities where they have quite different purposes and operating models.

Environment
- A very small country with limited investment available,
- Hardly any companies that would even meet medium enterprise status on a global basis.
- Our economy depends heavily on use of natural products and the environment, and we should be cautious about moving support away from this. The role well managed crown entities can play in leading the strategic direction of many industries or activities should not be underestimated. We saw more of this prior to the CRI reforms in 1992 than afterward.
- Leveraging international activities is critical
- Too much focus on seeing the world through a single sector focus (e.g., forestry or pastoral or conservation etc) when they are all just land use systems and highly interactive.
- A clutter of funding systems, Endeavour, SSIF, NSC's etc.

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Summary thoughts.

If we see success as a healthy science and innovation sector that is driving economic, social and environmental growth and building futures for this nation then it is hard to see how the current system is achieving this.

CRI's and Universities (and others) are seen as simply a component parts of a science system where their differences and roles they can play should be maximised and celebrated.

Universities to drive education and ensure research-based learning.

CRI's to drive the big national research priorities.
- The latter need to be structured to achieve these. Larger, well Governed and mandated to focus on those national priorities.
- Key themes that need to be addressed within each national priority.
- Financially resourced to achieve their mandate.
- Supporting large long-term (but dynamic) programmes that must address their workforce, technology transfer and can effectively partner locally and globally.

A much smaller Endeavour Fund that focusses on more specific topics for futures.

An environment where important national assets (e.g. databases are naturally housed and new ones developed).

An ability for the key entities to come together to build nationally focussed science infrastructure.

Below I have addressed the specific questions in the paper.

1 Research Priorities.

Priorities design.
Why should the nation through Government invest in research, science, and innovation?

To maximise benefits to New Zealand (social, environmental, and economic) and this requires:
- Ensuring a healthy technically capability (workforce),
- Staying globally connected so we can leverage off international efforts,
- Smart investment alone or with industry or departments,
- Protecting what we have and
- Building futures

In that case…

Q1. What principles could be used to determine the scope and focus of national research priorities?

Principles:
1. To ensure that New Zealand sustains a vital research capacity and system that enables support to those activities that "pay the nations bills" (e.g. primary industry) and the infrastructure that supports this such as health (and with a forward focus). This should be the bulk of Govt investment into research. More the domain of CRIs.
2. Define critical areas (themes) for the nation to be 'future-proofed' e.g., climate change, environment, productivity, health etc.
3. That we build significant and long-term research and innovation programmes that address 1 above and incorporate 2 above so that they can be well managed with quality oversight.
4. We sustain smaller, shorter term research activities focussed on challenging existing paradigms and creating futures. For example, Artificial intelligence, new gene technologies. More the domain of Universities.
5. That we ensure that activity in 2 will be able to interact with 4 above. To ensure strong global interconnectivity and ability to influence the core research activities.

We must cease creating silos of research, for example focus on 'land-use' and not just sub sectors such as pastoral or horticulture, forestry or conservation. The future (which we are seeing now with many Māori owned land systems) is about how they all work together to secure the best outcome.

Notes:
- Just investing in climate change (or addressing pests and pathogens) is very narrow. It is about what activities we do that will have a positive (or negative) impact on e.g. climate change.
- Large and long-term programmes can properly address work force, partnering with other organisations and industry, meeting tiriti obligations and have good oversight systems in place.

Ensuring we invest in those areas of national priority where the nation need There are two elements: Setting the national priorities, evaluating progress with these priorities and how they can be changed and evolve.

National priorities – what are the big issues that New Zealand needs to address to build a stronger society. For example, how to grow sustainable productivity from our land, minimise the impact of climate change etc.

Critical elements – what are key areas where we need to ensure we have national capability and strong international connections e.g. artificial intelligence, gene technologies etc– including an ability to create new capability.

For clarity setting research priorities is an activity that needs to involve many players **beyond those in research** such as policy, commercial, investment etc.

For example where should we be building the big programmes. For example:
- Land -use / natural environment
- Built environment
- Health
- Etc

And cross cutting themes such as:

- Climate change
- Meeting tiriti obligations

Q2 1.3.2 Priority setting process.
What principles should guide a national research priority setting process?
How can the process best give effect to Te Tiriti?

If we follow the principle that:

1. We invest the bulk of Government research investment into substantial programmes that protect and grow our nation strengthening those activities that pay our bills and ensuring these activities address key themes such as climate change, improving the environment, improving productivity and so on.
2. We invest a smaller amount of funding into shorter term programmes that refresh and influence the system with a narrower focus such as Artificial Intelligence or gene technologies or similar.

A national priorities Panel could develop (1) considering:
- What are the major areas where New Zealand needs to sustain and grow value (e.g. land use, housing and urban development, public health etc) and,
- What are the major cross cutting themes we need to ensure are addressed in the above (e.g. climate change, environment, productivity etc.

For (2) through a smaller scale Endeavour fund system specifically aiming to revitalise New Zealand.

Q3 1.4.2 Operationalising priorities.

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

As stated above.

Rethink the CRI system as a truly nationally important asset and not just a research provider.

The above could be the home of the big programmes, with long-term investment, a greater focus on governance and management of such programmes (including capability development, technology transfer, addressing tiriti obligations), and within these addressing key national priorities such as climate change, environment etc).

A smaller scale endeavour fund or similar that seeks to refresh the system.

Build an environment where there is positive capability exchange between CRI's and Universities.

Better what we need to stop doing.
- Pretending that all research providers operate on a level playing field. Universities and CRI's are different and should be doing complementary but different things.
- Allow CRI's to have in place truly accountable Governance structures with a clear mandate. Bigger in size and a greater base of stable investment.
- Move beyond the view that only competition brings out the best.

2 Te Tiriti, Mātauranga Māori and Māori Aspirations.

Q 4 2.2 How would you like to be engaged?

I am not qualified to answer this question.

Q5 2.3 What are your thoughts on how to enable and protect Mātauranga Māori in the research system?

There is increasing confusion about what is science and what is Mātauranga Māori!

The existing debate is adding to this confusion.

Are they all part of a system or is science and Mātauranga Māori different?

I hope that we can bring all this together into some special system for New Zealand. It would be sad if we start creating parallel systems.

Until this is resolved, and we are clear what success looks like it is hard to comment on operational aspects.

Q6 2.4 What are your thoughts on regionally based Māori knowledge hubs.

Firstly, what is the problem we are addressing? If we answer that then we can answer this question.

3 Funding.

Q7 3.2.1 How should we decide what constitutes a core function and how do we fund it?

What are the big questions that New Zealand must respond to?

Maybe!

The natural environment. How do we use our land and water most effectively to sustain and grow our nation. Sustainable productivity, conservation, respond to climate change, build new tech. capacity and innovate.

The people. How do we enhance the health and welfare of the people? Public health, education.

The built environment. How do we build the infrastructure that sustains and protects our nation? (Buildings, infrastructure, energy, hazards and transport).

The manufacturing environment. How do we build those industries that best fit to New Zealand's current and future needs? (Bio processing etc)

There are cross cutting themes sitting across these such as climate change, environment, public health.

Q 8 3.3.2 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?

Yes, a base funding model for those big programmes (or entities) is essential. If they are the right structures why would they not be simply a vote funding model rather than going through multiple levels such as SSIF then distributed as sub programmes to other entities. Strive for simplicity.

A board that has accountability ensuring the entity undertakes the research and innovation, builds and support capability, ensure themes (e.g., climate change and or other themes are addressed).

4. Institutions.

Q 9 4.4.1 How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?

Adaptation and agility occur at the Programme level. Institutions should be much more enduring?

For example, if we think of an institution at a 'natural environment' level and not a sectoral level (pastoral or horticultural or forestry) then these should be future focussed and long-term.

The programmes sitting within this would be shorter term and if well governed and managed then they should be dynamic.

Q 10 4.4.2 How can institutions be designed to better support capability, skills and workforce development?

Large scale, stably funded entities with large and long-term programmes should be addressing capability (workforce) creating partnerships nationally and internationally and connecting to activities that build their own futures.

Q11 4.4.3 How should we make decisions on large property and capital investment under a more co-ordinated approach?

A large organisation should be able to address many of these matters itself directly and have the capacity and infrastructure to deal with this. But these could come together with others to address high-cost science infrastructure that has broader application.

Q12 4.4.4 How do we design Tiriti – based Institutions?

Setting the culture at the board.

The board sets it at the programme oversight level

It becomes a natural part of the programme.

Q13 4.6 How do we better support knowledge exchange and impact generation?

- Test the quality of the science?
- Ensure that technology transference is part of the mandate?
- Reduce the need for organisations to chase dollars as the primary approach to use of knowledge.
- Accountability for making impact is with the Organisations board.

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

A critical part of their mission.

It is imperative that an organisation has sufficient independence that it does not have to chase short term investment to survive but rather be able to engage with other entities through having a strong value proposition that attracts investment from other parties.

In particular:
- Not have to put excessive energy into chasing dollars.
- Be able to build effective partnerships with industries and challenge paradigms.
- Be able to develop the best benefit for New Zealand (as opposed to organisation) technology transfer mechanism (anything from a simple transference or licence to a NEWCO)

5 Research workforce

Q14 5.2 How should we include workforce considerations in the design of national research priorities?

If we have:
- The right national research priorities (see thoughts above) and
- The right sized entities with
- A clear mandate and fully accountable governance and
- With large long-term enduring programmes

Then

Such activities should be focussing on
- Their own capabilities and ensuring succession
- Partnering with e.g., educational entities so that education focusses on actual national needs and post graduate programmes can be embraced,
- Creating an environment that allows early career scientists to learn the business of science, and have a career path,
- Partnering with international players to further expand knowledge and people growth.

Q15 5.2 How should we include workforce considerations in the design of national research priorities?

If we choose the best national priorities (and avoid having too many) then such programmes supporting this must be addressing workforce.

Q16 5.3.1 What impact would a base grant have on a the research workforce?

It is not clear why the phrase 'grant' is used. It we are talking about rethinking the CRI approach then why not look at having them being supported through their own vote.

Funding stability should be an enabler of building the right workforce.

Q16 5.3.2 How do we design new funding mechanisms that strongly focus on workforce outcomes?

This is addressed above.

6 Research Infrastructure

Q17 6.2.2. How do we support sustainable, efficient and enabling investment into research infrastructure?

National databases should naturally fall into certain entities and be appropriately curated. For example, insect collections into that entity focussing on the natural environment.

Where bigger national needs are required. For example, a super whiz bang new analytical tool costing billions – then these entities and Universities etc can all come together and build the business case.