The Dodd-Walls Centre
for Photonic and Quantum Technologies

Submission to consultation on

Te Ara Paerangi Future Pathways Green Paper 2021

The views expressed in this document have been collated and distilled from conversations across the Dodd-Walls Centre membership. They do not necessarily represent the views of all our members. Nor do they necessarily reflect the views of our Host Institution, the University of Otago, or our partner institutions.

The Dodd-Walls Centre (DWC) is a Centre of Research Excellence (CoRE) funded by the Tertiary Education Commission (TEC) through Vote Education. In this sense the CoREs are unique in being the only entities supported by directly contestable research funding through Vote Education rather than Vote Business, Science and Innovation (BSI). This makes us something of an anomaly in the Research and Innovation landscape and I think our perspective sheds a particular light on what we see as a disconnect in our current system.

Our problem – the problem of CoREs collectively – is that the budget appropriate for the funding of CoREs is the same from 2015 (when the DWC started as a CoRE) through to the end of 2028, when our current funding finishes. This is well over a decade of flat funding and hence a significant real-term cut in funding for the ten CoREs. And yet it seems universally acknowledged that the CoREs are the best exemplars of excellence (by definition) and expanded collaboration across our system. I don't think there is a desire to wind down the CoREs. It is simply that why, in budget negotiations, would the Minister of Education prioritise CoREs given the constraints across the education sector and similarly, why would the Minister of Research, Science and Innovation argue for more money to go to Vote Education? We therefore fall between the cracks in the system.

We raise this not because we want more money (although we do), but because it highlights the disconnect between our science system as seen from a BSI perspective and the actual role of our universities in the science and innovation system. From a TEC/Ministry of Education perspective, it feels that the role of universities is to teach and research is simply there to inform that teaching. In actual case, university research is in large part the real driver of innovation in the country. The latest *Nature Index* (www.natureindex.com) shows six universities, two CoREs, and two CRIs in the top ten institutions for research impact in New Zealand. Of those, 87% of New Zealand's research impact is delivered by CoREs or

universities and 13% by the CRIs. Of course this is a very academic measure of impact and belies the importance of the research undertaken by the CRIs, but it highlights the role of the tertiary institutions. What they generate is the high impact (in terms of publications) research. While a significant portion of this is at the applied or mission-led end of the spectrum, most of the high impact publications come from the more fundamental, longer term, blue skies efforts. The universities and CoREs therefore underpin the base resource upon which our future transformational economy is based. The high quality of the research also ensures we can attract and train the workforce for our future economy.

We think our small example of falling through the cracks highlights the disconnect between research in the universities and the role of university research as perceived by the Ministry of Education and the actual role of that research in the RSI landscape.

We therefore suggest that, to achieve a greater connection and collaboration across the whole of the RSI system including universities, CRIs, IROs and the private sector, the possibility of Research, Science and Innovation and Tertiary Education coming under a single ministry should be examined. This is the model in a number of other nations – for example in Ireland – and could potentially alleviate some of the tensions between CRIs (as entities "owned" by MBIE) and universities and other research organisations.

We note that this would be a significant change, but it would allow elements like base or capability funding to be discussed on a level playing field. Infrastructure questions could be addressed together across the whole RSI sector and research priorities and decisions around critical research requirements could be addressed and allocated to the most capable elements of the system. We therefore think this is worth considering.

The remainder of our discussions centred around three themes. These we;

1. Barriers to Tech Transfer,
2. How to enhance collaboration,
3. Excessive competition,

which we address briefly in turn.

1. Barriers to Tech Transfer

It was felt that the university tech transfer offices (TTOs) were under-resourced for the volume of research being undertaken and that the focus and drivers for the TTOs were not necessarily those best suited to the benefit of NZ, Inc.

Excessive worry at the level of the TTOs about getting "a good deal" for their university parent, or not wanting to waste their limited resources on the production and protection of IP, meant that TTOs moved very slowly. This had led to a considerable number of opportunities being lost and certainly curtailed much of the first mover advantage that should be available to a nimble, small country.

A desire to retain too high a percentage of the stake in any spin-out companies also seemed to impair future development and investment in spin-out companies with an unreasonable starting cap table.

In short, whilst some were perceived as better and some worse, it was felt that the current TTO model associated with each university was not working particularly well.

This raised the questions:

- Should the TTOs be under the umbrella of a national entity?
- Should resource be included in *Endeavour* funding (or elsewhere) to resource the exploration of exploiting the research undertaken?
- Should IP generated through public funding be owned by the universities? If the Crown retained the IP under a national umbrella organisation it could afford to take a small stake in the cap table of any company providing extra benefit/incentive to the Founder in a manner similar to Imperial College's *Founder's Choice*.

Significant discussions around how to ensure graduate students are exposed to the essentials of entrepreneurship and commercialisation of research and, especially, how to ensure more Māori and Pacific students were exposed to the benefits and opportunities of tech transfer were had. It was deemed this was important and should be built in early in to the research framework for projects, ideally co-designed with relevant partners, but no concrete proposals materialised. The question of a Māori-owned TTO or Māori stake in the umbrella national entity could ensure an appropriate Māori voice and a clear pathway back to benefit to Māori. This could also be a means of addressing some issues around, e.g. data sovereignty and exploitation of taonga species.

2. How to enhance collaboration

Most of our discussions were around how to increase academic and industry engagement, but similar stories around engagement and working with iwi came through in the discussions.

We reflected on the experience of CoREs and our Centre in particular. Direct collaboration across the Centre has increased dramatically since the inception of the DWC as a CoRE. Primarily this is through relationship building – **not necessarily through co-location**. There were examples of collaborations being established through the CoRE between people who had for years been working in the same building, but not together. Collaboration could be seeded through, e.g. a studentship or small initial investment. Flexibility and some discretionary funding/liquidity were seen as key to the establishment and nurturing of collaboration. The ability for graduate students to step out of their immediate research and work on another, perhaps an industry, project for a short time was seen to have positive results. We felt there were a number of initiatives overseas which worked well. In particular we noted the Fraunhofer model in Germany (and now elsewhere) as well as the UK Catapult entities with a similar model.

Suggestions therefore included:

- Develop CASE-like (UK) PhD scholarships which were funded for four years, with periods spent working directly in an industrial or other work environment. This could be tailored to New Zealand and include co-created projects with iwi-owned or other Māori industry.
- Relationships, not geographic co-location were key to collaboration. If co-location makes sense for fiscal reasons, great, but don't force it thinking it will drive collaboration. Better would be an increase in cross-appointments (we took the success of the Max Planck Society model in Germany as exemplar) and shared students between universities, CRIs, IROs and including in to Māori owned entities and industries.

3. Excessive competition

It was acknowledged that there is excessive competition in the current system. Base levels of targeted funding would be valuable. We agree that the need to chase grants to keep people in jobs is unhealthy and counter-productive.

If we moved away from a full cost recovery model to one where research capability and infrastructure were resourced at a base-line level (reviewed on a regular basis), then it was felt that universities and CRIs could interact more effectively with industry. The sheer cost associated with full-cost recovery meant that smaller companies could not simply afford to purchase research from a provider. Of course, we recognise that by not charging the full cost one is effectively subsidising the company, so this is a delicate balance.

It was felt that, at least, the full cost recovery model is transparent. This transparency would need to be retained in any future model.

Our comments around changes to the funding system were:

- National research priorities should focus on the essential – of course deciding what is essential is hard.
- Priorities should include maintenance of sovereign capability. For example, our public health expertise retained (rather fortuitously) in our universities has been invaluable through the pandemic.
- Collaborative mechanisms (like CoREs) that encourage “best team in NZ” approaches would be welcome for maintaining sovereign capability.
- Areas of significant international competitive advantage should be maintained (a biased plug for us there).
- Don’t throw the baby out with the bath water – significant competition for the best ideas should be retained in the system, e.g. Marsden and Endeavour.
- A real attempt to reach 3% of GDP in the RSI spend would go a long way to ensuring better health of the system.