Division of Health Sciences
Te Wāhanga Matua Mātau Hauora

Future Pathways – a submission on behalf of the Division of Health Sciences, University of Otago

Contacts in relation to this submission

Professor Ros Kemp, Associate Dean Research, Privacy - 9(2)(a)
Dr Michele Coleman, Research & Development Manager, Privacy - 9(2)(a)

Introduction

The Division of Health Sciences at the University of Otago comprises seven schools across three main campuses (Dunedin, Wellington, Christchurch). The scope of research in the Division ranges from clinical trials to fundamental biology of cells and molecules. 44 departments host >850 individual researchers, with approximately 40% also with clinical roles in medicine, pharmacy, physiotherapy and dentistry.

Our submission is based on consultation workshops open to the entire division and a series of focus groups addressing various career stages. The submission is structured as a discussion of the main points raised by our consultation process for each chapter outlined in the Green Paper, rather than directly addressing each question listed. Within each point, we raise challenges and opportunities relevant to the discussion points and the questions.

1. Ngā Whakaarotau Rangahau - Research Priorities

Q1. What principles could be used to determine the scope and focus of research priorities?
Q2a. What principles should guide a national research priority-setting process?
Q2b. How can this process best give effect to Te Tiriti?
Q3. How should the strategy for each research priority be set and how do we operationalise and implement them?

Summary of Main Points:

1. Consultation process for setting research priorities

Our consultation process led to two, potentially conflicting, views. One is that the setting of research priorities should involve a broad range of stakeholders, including public consultation, like that performed for creation of National Science Challenges. This view was supported by Māori researchers, who emphasised the importance of community consultation and input into research priorities. An alternative, (minority <20%) view was that those with the most involvement and specialised knowledge within the research sector should have more input in directing priorities.

Challenges	Opportunities
Determining who has input into setting priorities	Improved collaboration across the sector
Determining allocation of funding within priorities	Potential for long-term multidisciplinary research to be initiated and completed
Ensuring research priorities can respond to changing need in a timely manner	Introduction of a variety of measurements of research success, including impact on policy, population, economy, environment and society, as well as traditional academic measures
Measuring the success of a research priority	Build on success of mission-led NSCs, especially those with Māori co-governance
Ensuring fair and equitable distribution of funds and governance within each priority	Provide long-term development opportunities for those aligned to the challenge

Table 1

2. Research that falls outside priorities

An important consensus view was that research that fell outside the research priorities would also need a mechanism of funding and that this should equate to a significant proportion of the funds available.

Challenges	Opportunities
Managing and providing adequately for research outside the priorities	Potential for long-term multidisciplinary research to be initiated and completed

Table 2

Additional Comments:

No strong consensus for whether priorities should be determined as mission-led, investigator-led, technology-driven or outcome-based.

2. Te Tiriti, Mātauranga Māori Me Ngā Wawatao Te Māori - Te Tiriti, Mātauranga Māori and Māori Aspirations

Q4. How would you like to be engaged?
Q5. What are your thoughts on how to enable and protect mātauranga Māori in the research system?
Q6. What are your thoughts on regionally based Māori knowledge hubs?

Summary of Main Points:

1. Research needs to be Māori-led

A consistent theme from our consultation showed the requirement that for research to be effective, it needs to be Māori-led. This means Māori need to be present at the governance level when setting priorities, and that consultation for priority setting needs to encompass a very broad public audience, rather than a panel of government employees. Similarly, the Māori workforce needs to be reflected in government departments as well as research institutions (e.g., MBIE board and advisors). For true Māori-led research, non-Māori can be invited to participate - the current model of non-Māori determining the research goals and approaching Māori communities can be reversed. This allows Māori to lead responses to research areas and problems that relate most to Māori, and which are considered most important by Māori.

Challenges	Opportunities
Placing equal value on mātauranga Māori in the RSI system, including even distribution of funding	Creation of independent Māori-led research authorities (such as Te Mana Hauora Māori)

Table3

2. Creation of Māori workforce

There is a lack of visibility of science and research for Māori – success in this area (increasing Māori input into research, attracting Māori researchers) will require communication of research, how it works and even what it is, to communities and through schools and the education system. For example, teaching the value of mātauranga Māori as part of school science curricula and highlighting publicly Māori research and researchers to wider communities. Funding programmes and individuals to bring RSI into Māori communities and schools as part of their own training and the responsibility of research institutions would address some of these issues. Understanding the motivation of successful Māori researchers will have a large impact on recruiting and retaining new Māori researchers. Similarly, seeing Māori researchers in leadership roles and successful across an entire research career, not just at ECR stage, would support an increase in Māori researchers. For those already in the sector, long training times can be seen as unattractive, and developing Māori researchers with alternative pathways, combining multiple aspects of research, would increase uptake of research as a career. The embedded racism in schools and institutions has a negative impact (or prevents) Māori flourishing in Research Science and Innovation.

Challenges	Opportunities
Making a research career attractive to Māori	Incorporating education and outreach as key parts of a research career
Tackling endemic racism in institutions	Increasing visibility of Māori research leadership
	Reducing career precarity across the board will make the sector more attractive for Māori

Table 4

3. Regionally based Māori Knowledge

The regionally based Māori knowledge hubs were almost unanimously supported, with benefits for local Māori and to improve relationships between Māori and non-Māori researchers. These hubs should be independently funded and managed; this approach would address many issues highlighted in the sections above.

Additional Comments

Mātauranga Māori and Te Tiriti responsiveness are two different issues and will need to be dealt with separately.

3. Te Tuku Pūtea - Funding

Q7. How should we determine what constitutes a core function and how should core functions be funded?
Q8. 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?

Summary of Main Points:

1. Base grant funding model

Bulk funding models are generally supported, although there is significant concern about how these funding amounts and scope would be decided, at a national as well as institutional level. Management of bulk funding at Universities is particularly difficult (see "Institutions").

We propose a funding model with flexibility across all research, shown in **Figure 1**. This model:

1. Represents how one research priority could be funded – a core of bulk funding, surrounded by a pool of flexible, likely competitive, funding. The amount of funds in the bulk fund, and the proportional distribution of bulk versus flexible, and within each of the three defined sectors, would be variable depending on the scope and goals of the research priority.
2. Māori-led research is essential, and forms part of the research priority. While part of the bulk funding belongs in this sector, it remains separate from the rest of the bulk and flexible funding, allowing Māori-led research ideas and mechanisms to be independent.
3. The consensus that there are multiple funds for different purposes is represented by three sectors – Workforce, Infrastructure and Project. This model effectively separates salary and equipment / database funding from project funding, allowing a mix-and-match flexible option for individual researchers, programmes or institutes. Current funding models combine all of these, meaning that applicants must sacrifice one area to gain funding for another – this is especially true for overheaded salaries, which quickly use up the tradition $1.2m cap on competitive funds. The new approach allows progress and support for long-term research that can be managed at multiple stages.
4. Within each sector, we identify three areas of work that can be prioritised and funded differently within each priority:
    a. "Moon shot" large and / or long-term projects requiring significant investment, either by the nature of the research (e.g., super-specialised) or scope (e.g. longitudinal studies). These projects would represent a "quantum leap" in advancing knowledge but come with risk. The advantage is that bold and genuinely new initiatives could be supported.
    b. "Business as usual" funds, supporting solid research in much the same way as the current models work. This includes continuing existing and successful

research, or exploring new avenues resulting from previous research, projects of medium-term length (3-6 years).

c. "Start-up" projects, for new and pilot ideas. These provide opportunity for new research projects, new collaborations and would support innovation, particularly important for early career researchers.

5. The separation of Workforce, Infrastructure and Project allows the decoupling of salaries and fellowships from research projects – current models for early career researchers require salary support and input from institutions, limiting options for many, and reducing diversity of the workforce. Similarly, the provision for long-term and specialised projects supports the development and maintenance of specialised research support staff, providing stability in research and providing a viable career path.
6. Any funding model is likely to require commitment of funds above the current allocation to RSI.

Challenges	Opportunities
Limited funding pool in general – investment in research needs to increase	Development of a health focused research institution(s), for example, around national clinical trial and translational research
Overheads that prohibit research, especially for ECRs, and which are unevenly used by institutes; lack of transparency in use of overheads is also a problem	Collaborative model that better reflects society, especially recognising Māori research
Workforce precarity and lack of specialised long term roles – how to best fund an effective research support sector	Increase knowledge exchange as part of bulk funding
Traditional hierarchical funding structure (e.g. PI-led, rather than Team-led), leading to bias in gender, ethnicity and research funding; where early and strong mentorship is more closely associated with researcher success than research innovation, diversity or wider research merit	Funding that provides for travel to specialised equipment, training, collaboration, with meaningful support (e.g. flights, accommodation, costs to bring family members and / or return flights for care duties; akin to what club rugby players receive when playing internationally)
Allocation process of funding to support all research and researchers; PBRF bulk funding model lacks transparency within institutions, and still follows a cyclical model that well-funded researchers are more able to deliver research metrics that favour more research funding	Increased capacity for different types of research with large and small grants, outside of the one-size-fits-all $1.2m
	Reduce bureaucracy around competitive funding applications
	Development of a highly skilled workforce available for all sectors

Table 5

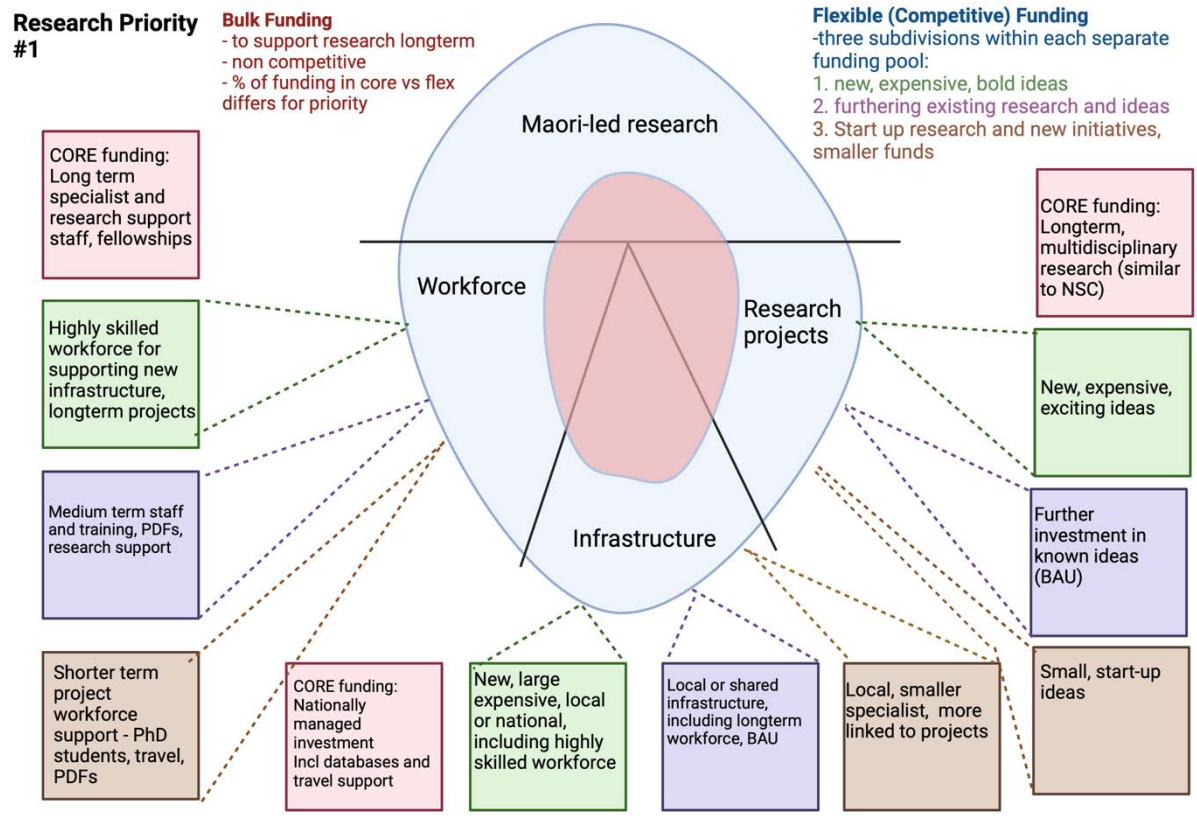

Figure 1

2. Research organisations

There is concern about what constitutes a "research organisation" and how traditional research institutes, CRIs and Universities are considered alongside community or small research groups. All these research activities need to be supported in a new model of funding but we do not know how bulk funding of these entities can be agreed on.

3. Incentives for Industry

We had suggestions that MBIE and its agencies could do more to incentivise industry investment in research and development. The thoughts were that currently NZ industry is not exposed to enough success stories where investment in research has made positive differences for a business, both financial and in different ways of working. Stories like these are what industry will respond to. Tax credits alone are not enough.

4. Ngā Hinonga - Institutions

Q9. How do we design collaborative, adaptive and agile research institutions that will serve current and future needs?
Q10. How can institutions be designed to better support capability, skills and workforce development?
Q11. How should we make decisions on large property and capital investments under a more coordinated approach?
Q12. How do we design Tiriti-enabled institutions?
Q13. How do we better support knowledge exchange and impact generation?

Summary of Main Points:

The Green paper refers mostly to CRIs in this section and therefore there was less feedback from our staff as we were not sure how this would be applied to the University sector. It was acknowledged that ideas that may work well for some institutions (e.g. CRIs wholly funded by MBIE) may not work well for others (e.g. Universities largely (under) funded by Vote Education).

1. Increasing Collaborations across the sector

Challenges	Opportunities
The company model and core business focus of CRIs has been less than optimal for establishing collaborations	Changing the CRI company model, focus on IP and core business focus would reduce barriers for Universities
Co-location or sharing of physical space needs to work financially for each institution as this has been tried in the past and abandoned by CRIs	Co-location or sharing of physical buildings would be welcomed and could lead to sharing of infrastructure, collaboration and flow of PhD students into CRIs
Placements and career breaks between institutions are not currently very attractive to staff	Availability of infrastructure could be used as incentives to increase collaborative activity across institutions e.g. Universities can provide animal-research facilities and can design and conduct high quality clinical trials for CRIs
Ministry of Health needs to be engaged in this discussion to ensure that DHB institutions cater for research activities such as clinical trials	Improving the flow people between institutions without co-location requires recognition of the true costs of living and working away from home for reasonable periods of time and include provision for whānau / families to travel with the researcher for periods of time
Geographical distance and poor Air NZ flight scheduling is a barrier to industry engagement	

Table 6

2. Skills and workforce development

Challenges	Opportunities
Opportunities for career development are not systematised across the sector or even within institutions	Some NSCs have provided good training/ capability development models- a section of funding is set aside for this alongside each project
Some skills that are valuable are not attractive to New Zealand students	There is space in the CRI portfolio for another or an expanded health-related CRI that could provide permanent careers for researchers
Funding for early and mid-career researchers focuses on future leaders	A fund for skilled people and not projects, where they could work across the sector wherever needed and improve connectivity and skill levels across institutions
Researchers train for a long time and cannot switch fields easily, so need long-term opportunities for funding / employment	Fund training / capability development opportunities from a separate pool e.g., not core funding. Hold institutions to metrics around capability / training
	Provide permanent positions for key personnel who can research and supervise students but do not want to be Principal Investigators – these people can be crucial for continuity and skills development

Table 7

Additional Comments

All our respondents agreed that Māori need to be established as true partners at the highest level of leadership in institutions for change to work.

For Health Research, Ministry of Health funded institutions such as hospitals and DHBs in general need to be included in this discussion.

5. Te Hunga Mahi Rangahau - Workforce

Q14 - How should we include workforce considerations in the design of research Priorities?
Q15 - What impact would a base grant have on the research workforce?
Q16 - How do we design new funding mechanisms that strongly focus on workforce outcomes?

Summary of Main Points:

1. Precarity of research careers

Research careers are not perceived as an attractive pathway – reasons for this include: length of training; poor pay compared to policy / government or the health system, although pay is higher than similar jobs overseas; lack of permanent or even long-term contracts. Research-only jobs are precariously funded, and permanent academic roles are very limited in number, internationally competitive and are themselves not attractive due to workload, lack of research funding, inequity issues and corporate systems that have pushed high administrative burdens onto highly trained researchers. Solutions need to address the whole lifetime of a researcher and not just early careers. Otherwise, the bulge is pushed further up the pipeline and results in older, stressed-out precariously funded researchers.

Challenges	Opportunities
Current fellowship opportunities, and funding designed for early career researchers are not fit for purpose. They are often short term, are very competitive, and there is no requirement for institutions to provide contracts at the end of the fellowship. There is often a requirement for part salary funding from PIs, departments or institutions, leading to inequity in who can actually apply	Creation of "Senior Scientist" roles (similar to those in UK, USA), where researchers are embedded in a research group with long term salary support but are not required to become independent researchers. Specialised areas within these roles include laboratory management, student training, as well as leading and supporting research projects. These roles used to exist (HRC fellowships that supported Programmes) and can free up the Principal Investigator to do engagement and fundraising activities
Currently our Health Sciences early career workforce (up to 10 years post PhD) consists of 42% with permanent roles and 58% with fixed term contracts. At the time of a recent survey 50% of fixed-term people had under a year remaining on their contracts	Long term fellowships with consumable and staff support (e.g. Discovery Program in Australia) offer more useful funding than the current short term Rutherford or Hercus Fellowships, although these still create some of the same problems (competition, traditional research pathway)
Research only careers are not supported, resulting in career precarity throughout the research lifespan. There are numerous inequities in terms of service loads,	Opportunity to create multidisciplinary and cross-fertilising PhD and postdoc positions, straddling academia, industry and CRIs. Partnerships throughout study and work

teaching requirements, distribution of funds, simply because research only ("soft funded") staff do not fit into a permanent career path job description	create a broader research workforce, and provide options for students to choose. Offering fellowships with commercial or community partnerships
Perception of "failing" in a workforce if a traditional academic pathway is not followed, this leads to negative wellbeing in a highly trained group of people	Setting of research priorities and funding plans can be long term, allowing new (and existing) researchers to establish a good research programme in line with these, not to have to "re-brand" continually
	Establishment of a specialised research workforce, with skill sets that ensure continued employment. Centrally funded research support positions provide long term security, alternative career options for graduates, and the creation and retention of a highly skilled workforce
	Funding for training included in grants e.g., SFTI provided commercialisation training with $ to postdocs

Table 8

2. Diversity

Workforce diversity needs to be a number one priority when setting up the Priorities. Current funding models prioritise a style of research structure that supports a traditional research framework. Emphasis on "Track Record' means that those who are embedded in previously successful research groups are advantaged over those who are not. Implicit in this model is bias against women, Māori and Pacific people. There is significant research in NZ and internationally that explain the why and how of this problem, so we haven't' gone into detail here.

Challenges	Opportunities
Achieving a research workforce that accurately represents society. We need to address how to make the research environment more inclusive and welcoming for Māori	Regional hubs as previously described would help to alleviate the burden on Māori staff by providing alternative routes for non-Māori to engage
Gender inequity is rife in research in New Zealand. Funding agencies need to collect data on not only who applies and who is successful or not but also on why women do not apply for particular opportunities	Inclusion of whānau-friendly research careers, allowing for periods of absence due to care or parenting commitments, flexible funding to allow travel and internships in other cities and countries with whānau, dedicated funding pools to alleviate disparities

	Inclusion of quotas at every level of the system (not just intake) will improve diversity
	Collection of a wider range of metrics of research success, as well as participation and funding opportunities
	Creation of part time, permanent research positions, and research priorities and systems that support a work-from-home flexibility

Table 9

3. Base Grant Funding

Given that 20-40% of a researcher's time is spent applying for competitive funding, with ~10% success rate, replacing overheads with a base grant feels attractive but the detail of what might replace them is crucial.

For example, salaries are especially difficult to obtain in NZ due to high overhead rates, leading to the use of PhD students to do postdoctoral or technical work, which is unfair and very inefficient in terms of research productivity. As part of our proposed funding model, we suggest separating salary funding from consumable (project) or infrastructure funding, allowing more flexibility in attracting and retaining staff.

Challenges	Opportunities
PBRF funding as a form of base grant can be difficult to quantify, as these are awarded to institutions without clear transparency or accountability in use. Hence, different researchers and different departments use PBRF allocations very differently. Institutions claim that the cost of doing research is not recovered with PBRF and overheads, therefore more investment is needed	Evaluation of base grant funding from overseas, shows several viable options for NZ, including the NSERC Discovery Grants Programme in Canada. Researchers apply once every five years and, like PBRF, are awarded a sum ranging from $20-50k that comes directly to the researcher every year. They can pool this money together if they wish to form a collaboration and can still apply for competitive funds for larger bits of work. This could be more productive than current grant writing activity
Potential inequities in applications for base funding and / or decisions about how funds are distributed. Existing inequities could easily be replicated in a base grant system, without accountability and transparency	Flexibility of base grants could provide more opportunity to hire and train staff

Table 10

4. Collaborations / Movement of Workforce

Effective collaborations cannot be forced, and there must be an aspect of organic evolution of relationships. Key to these collaborations is face to face contact, including travel between sites, conferences and workshops, and networking events. The pandemic has shown that the lack of physical contact between researchers, especially for NZ, has led to a decrease in innovative research activity, albeit an increase in "business as usual", "tidying up" research outputs. To effectively support collaboration, the movement between sectors throughout training and a research career needs to be funded well, and include all sorts of needs.

The suggested goals of increased collaboration between CRIs and between CRIs and other research institutes is supported. However, there is difficulty in managing resources across two institutes (e.g. University and CRI), and in managing commercial outputs, such as intellectual property. The latter is particularly difficult with students.

Challenges	Opportunities
Managing research collaboration with the current model of CRIs as businesses	Improve cross- institutional flow of knowledge by providing a pool of funding for early- and mid-career researchers with particular skills as opposed to projects. They could work at either CRI or University as appropriate and become more flexible
Periods of movement, e.g. short internships, need to be funded more realistically, including support for whānau and cover for external duties. An additional fund to support such movement would be required	Removal or adjustment of current barriers due to commercialisation and intellectual property
Creating collaborations rather than forcing collaborations	Incentivising travel between sites and internationally by providing a new model of travel support

Table 11

Additional Comments:

1. Narrow priorities could reduce NZ's specialised workforce
2. Provision of support to Universities to improve multidisciplinary and cross-sector training of PhD students, via funding or administrative support

6. Te Hanganga Rangahau - Infrastructure

Q17. When should government, rather than research institutions, assume a role in funding infrastructure?
Q18. How should we decide what infrastructure is important?
Q19. How should we support sustainable, efficient and enabling investment in research infrastructure?

Summary of Main Points:

1. Research infrastructure involves a collective action problem in a competitive research environment

Internally the University of Otago operates several different models for research infrastructure management. In some areas, research equipment ownership and control are devolved and run at the individual laboratory level. In others it is centralised. Examples of this is biostatistical support which is provided by an academic unit, and large biomedical infrastructure which has been centralised at the Divisional level into the Research Infrastructure Centre and operates under a partial top-slice and partial cost recovery model.

With whatever model is chosen, there are benefits and challenges. While efficiencies of scale can be achieved in the centralised model it is not always in the best interests of individual researchers to include 'their' laboratory, equipment, or hard-won research money in a central pool to support staff. A collective approach that may be better for research overall does not improve the position of successful individual researchers unless access to research funds is challenging. The tensions that we experience at our institutional level will be echoed at a national level.

Challenges	Opportunities
Clinical trials infrastructure requires co-operation from the Ministry of Health. Often research and teaching are cut when designing new hospitals to save money and this is detrimental to health outcomes in the long term	Coordinated infrastructure for health priorities is an important opportunity. This includes clinical trials and national biobanking services. While local relationships are important and research projects are managed locally, national administrative, storage and Māori consultation, tikanga and guardianship processes would greatly increase efficiency and efficacy of such work
National facilities need to be available to all research institutions and not clustered in one geographical location (think pandemic, earthquake), if there are national facilities there could be at least one on each island	

Table 12

2. Research facilities are expensive

Research facilities and instruments are expensive to set up and to run. Developments in research technology are fast-paced and involve serious financial investment as well as significant strategic foresight if Aotearoa / New Zealand researchers are to be competitive.

Challenges	Opportunities
Currently research institutions are struggling to pay the bills and research infrastructure may be cut	Large infrastructure should sit on government balance sheet (for depreciation); 'large" could be > $5M, institutions still need autonomy on investing in smaller items to drive their own research programmes
Any nationally funded facilities will need proper funding to move people around e.g., to cover up to several months stay in another city. This could be very expensive and needs to be considered versus the costs of multiple bits of equipment	A large equipment / infrastructure funding round would be good. Canada has one that allows for equipment that covers all scales $250K -20M. This requires institutional co-investment and covers the operating costs and staff
The people with the skills to run facilities are as crucial as the hardware and need to be considered as a part of the investment	

Table 13

3. Data and computing

Government long-term and stable investment is required for data handling storage management systems and high throughput computing / machine learning. This is an example of something that is really a national level infrastructure. However, interoperability between institutional and national structures is crucial. Some large datasets and collections should be funded nationally with long-term and stable investment. There will need to be strong guidance on what is designated "national". A national independent "Research Council" could help with making these governance decisions.

Challenges	Opportunities
Data sovereignty is essential and must form part of any infrastructure decision making. Cloud providers *are* a problem	There already exists a lot of valuable research data that is held in different institutions that could be made available for other researchers to utilise. This includes health datasets and datasets collected by CRIs
	Careers in data science could be marketed more effectively to New Zealand postgraduate students

Table 14

4. Funding models give rise to different research outcomes

Full cost recovery attached to grants does not cover the lifetime of equipment, meaning there is no guarantee the institution can continue to support the relevant people to support equipment after the grant is finished.

Club models (where each member entity using the facility pays an annual base award and in return their researchers get access to the facility and expertise at an internationally competitive price, and non-members pay a much higher price), work well during times of financial hardship; for times of strong research income, then independence is favoured over club models. Reconciling these for researchers over a career is difficult.

5. Research Infrastructure is more than just equipment

The people with the skills to run facilities are as crucial as the hardware and need to be considered as a part of the investment. The value comes from the people with expertise to get the most out of the facility. This includes research nurses for clinical research.

Finding appropriate salaries and adequate training for these experts adds to the cost of the facilities often pushing usage cost beyond what researchers can afford. Having experts with permanent jobs associated with facilities can immeasurably add value to the hardware / facility.

6 Capital Infrastructure

New Zealand lags behind in capital investment in research compared to countries such as Australia, and this extends to investment in buildings. Joint facilities occupied by more than one institution can support and facilitate partnership; however, it is generally unattractive for the up-front capital cost to be borne by a single party. In Australia, federal funding has supported large capital builds such as SAHMRI Adelaide (https://sahmri.org.au). SAHMRI is a flagship medical research institute with four focus areas, one of which is Aboriginal Health Equity. There is an opportunity for Government to follow the lead of the Australian model and facilitate research and partnership by investing in buildings, in particular those that facilitate collaboration and partnership between institutions, the private sector and the community.