EARTHQUAKE COMMISSION
Kōmihana Rūwhenua

18 March 2022

EQC Submission on Te Ara Paerangi Future Pathways

Thank you for the opportunity to provide feedback on the discussion document Te Ara Paerangi Future Pathways.

About the Earthquake Commission (EQC)

The Earthquake Commission (EQC) is a Crown Entity providing insurance to residential property owners for the impact of natural hazards. We also invest in and facilitate research and education about natural hazards, and methods of reducing or preventing natural hazard damage.

The Earthquake Commission's interest in Te Ara Paerangi Future Pathways

EQC is interested in Te Ara Paerangi Future Pathways as a research funder, as a user of research that benefits Aotearoa New Zealand, and because we have several staff who have worked within the science system, within CRIs and Universities in New Zealand and overseas. We believe our experience and varied perspectives can provide valuable insights. EQC closely follows changes in the science system as it can have significant impact on how we fund research and what we need to invest in.

Our detailed submission follows, with our key messages being:

- EQC has funded significant science services and research infrastructure because of lack of funding through other schemes. We are keen to see long term commitments to invest in these services and infrastructure, especially those that relate to maintaining databases and upkeep of models.
- EQC supports a base grant model that covers the overheads costs commonly applied to research grants.
- EQC supports a research system model that creates a level field for researchers from CRIs, universities and private organisations.
- EQC recommends removing or reducing the commercial requirements of the research institutions.

We have not provided answers to all the questions posed in the Green Paper, only those where we can meaningfully contribute to the discussion.

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1: Research Priorities

Comment on 1.2.1 What do we mean by a priority?

We generally agree with the suggested design features, however would like to add some specific points:

- *General:* EQC's research investment priorities[1] are made up of Research Themes, which are our enduring high-level interests, such as "Resilient Buildings". We then have specific areas of interest, which are reviewed/updated every 2 years and have specific topics within that theme that we think are key gaps. Our recent experience has been that researchers will consider the theme but ignore the specific topics or adapt their research (which may not always be appropriate) to address a topic.
- *Feature 6. Priorities should not try to describe all science activity but based on what matters most for Aotearoa New Zealand* – Priorities should also consider what makes New Zealand the ideal place to conduct the research. Why we are best place to lead the way in research in this field or why is it crucial for New Zealand to build capability to do this sort of research?
- *Feature 7. Priorities need to support a full range of research activity….* The priorities need to be supported by existing research infrastructure or include the development of new research infrastructure to support the delivery of the research. For example, we can't expect fast delivery of innovative data science when the underlying data infrastructure is immature.

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

Focus: At EQC we focus our research investment on our mission "To reduce the impact on people and property when natural disasters occur", with supporting priorities. These priorities are based on a gap analysis with our partners and is focused on what is required to achieve our mission through the opportunities, or distinct problems identified as a result of natural hazard events. For example, red-zoning due to liquefaction-prone land, or failures of particular foundations or building types. If research is going to be used it needs to be focused on a problem or opportunity. For example, our main research themes are around resilient buildings and smarter land use.

Scope: Size and scope of a research project or programme tends to be influenced by what budget and capacity is available. This can result in unusable research, due to limiting the scope too much, or unused research due to delivering things that are not needed by the users of the research. Allowing for variable size/scope is important so that it reflects what is needed.

We recommend that general principles for setting research priorities should include:

- A focus on problems or opportunities – innovation stems from a creative response to these;
- Kaupapa Māori principles;
- Size and scope of a research project or programme budget should reflect what is required rather than what is available;
- Transparency, where priority setting is based on evidence not assumptions;
- Multi-disciplinary teams, or at least balanced across disciplines.

[1] EQC's Research Priorities Investment Statement https://www.eqc.govt.nz/assets/Publications-Resources/Resilience-and-Research-Publications-/Research-Investment-Priorities-Statement_2021_2023.pdf

Key Question 2: What principles should guide a national research Priority-setting process? How can the process best give effect to Te Tiriti?

Diversity is key for the process. Everyone's experiences will provide a different perspective. When EQC gathered input into our research priorities, we asked both the science community (University researchers, CRI's), industry (practicing engineers), partners (RNC, QuakeCore) and end users (central and local government). Sometimes the results fell outside the scope of our mission, but often the same problems and opportunities were identified by multiple stakeholders, and these became our focus areas for research.

Principles based on science being useful, usable and used should be considered. EQC has found this approach to be useful to frame our science to practice 'value chain', which is to ensure that 'useable' tools and outputs are 'used' to assess and prioritise risk reduction actions (see Figure 1). This often requires new partnerships and engagement with policy-makers, planners, engineers, asset managers and homeowners to ensure the right knowledge in the right form reaches the right people at the right time. This may also involve the development of new capabilities to synthesise and transform knowledge into useable products and tools, such as quantitative impact models and technical guidance, for both researchers and other stakeholders.

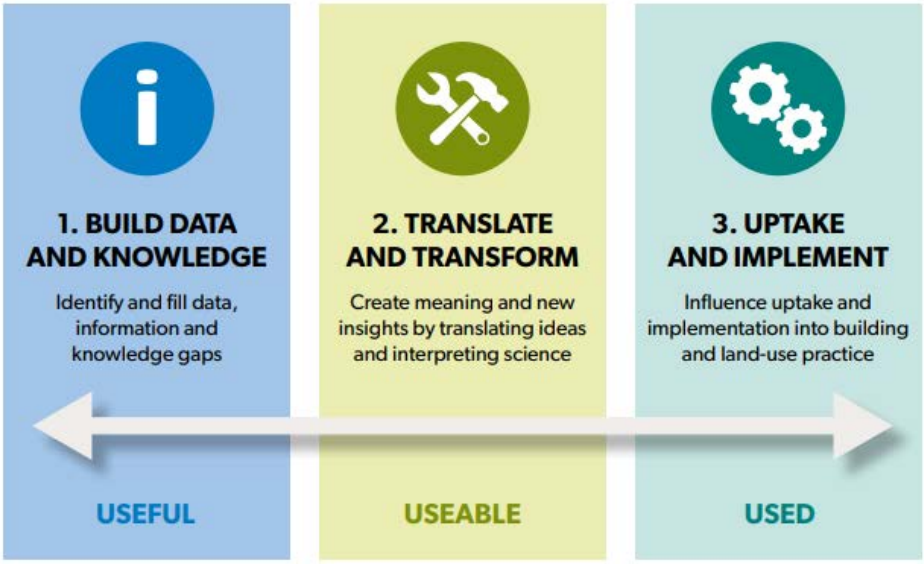

Figure 1: EQC's principles of research being useful, useable and used[2]

All research should consider Mātauranga Māori and incorporate it where and when applicable. For this approach to be success, the science system needs to provide formal acknowledgement of the value of Mātauranga Māori, and support, encouragement and mentorship for Māori scientists (and non-scientists i.e. those that hold knowledge but not a science degree), to build capability and capacity to ensure meaningful contributions.

[2] EQC Resilience Strategy for Natural Hazard Risk Reduction 2019-2029 https://www.eqc.govt.nz/assets/Publications-Resources/Resilience-and-Research-Publications-/EQC-Resilience-Strategy-2019-2029.pdf

Section 4: Te Tiriti, mātauranga Māori, and Māori aspirations

For this section we refer to the submission "Te Korenga – A Research, Science and Innovation System Devoid of Māori and Pacific Genius" from the early career Māori and Tagata o le Moana of the Te Apārangi He Pito Mata.

Section 5: Funding

Key Question 7: How should we decide what constitutes a core function and how do we fund them?
Core functions need to drive research that delivers clear benefit to New Zealand. Core functions need to extend beyond research itself, to services that *enable* research to be conducted. Critically, this should include raw data collection, and the monitoring, curation, analysis, assessment, storage, and display of data. Core functions could even extend beyond pure science, research, and data, into policy and practice, or services that *support* better policy and practice. These latter two categories – data collection and management, and other *science services* that support policy and practice – has always been a gap in the New Zealand science policy and funding system.

EQC has funded several initiatives that could be considered such services, including to keep key data collection, databases, and models up to date – for example, GeoNet, the New Zealand Geotechnical Database, and the National Seismic Hazard Model, respectively. EQC is an end-user of these products, but by no means the only end user, or even the primary end user; all three underpin core functions and services of government, and perform a core service for all New Zealanders. As such, we believe these are a core function, and should be centrally funded, for stability, consistency, and the benefit of all New Zealanders.

EQC has a relatively small amount of funding allocated for research, data, and education (~$20 million per annum) compared with MBIE and the Royal Society. This has resulted in EQC spending up to 75% of its research funds to support GeoNet and the National Seismic Hazard Model. The costs of maintaining these are increasing every year, while EQC's research budget is not. These services, data and models are recognised as nationally significant, with wider benefits than what EQC gains from them. The National Earthquake Information Database and New Zealand Volcano Databases (of which there are approximately 13 individual databases) receives approximately $350,000 pa as part of the SSIF Nationally Significant Database and Collections funding. The actual management and costs of these get absorbed by the GeoNet programme, with EQC as the primary funder. In recent years it has been encouraging to see MBIE come to the table to support the increasing costs of event response (including initiatives such as the National Geohazards Monitoring Centre), however the benefits of funding the data infrastructure has more enduring, and broad value for science both in New Zealand and internationally. It is appropriate that these are considered Core Functions and are provided with appropriate support from Central Government, rather than from EQC.

EQC has no preference at this stage for how Core Functions are funded, but we do acknowledge that short- to medium-length contestable funding is not appropriate. Longer term funding commitments of greater than 5 years is required, particularly to show impact of investment, which can take 10 years or more to see. Any user pays model tends to create barriers in accessibility and funders will end up paying for data or services multiple times. For example, researchers paying for access to high

resolution weather data using grants from organisations who have already paid for the initial collection and management of the data.

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?

EQC supports a base grant that covers the overheads, which are currently paid at the expense of the actual research funding. This approach would see relatively small funders like EQC get more value for money from the researchers. It would also provide more flexibility for how the funding is spent, such that postdocs and experienced researchers would be more active in projects because their time would be covered. Currently, we ask researchers to apply for overhead exemptions or restrict the charging of overheads to only 30% of researcher time, instead of over 100% that is normally applied. This can be difficult for CRIs who have overheads built in as part of their chargeable rates, which may result in CRI researchers understating their time on a project or using bits of funding from other projects to cover the shortfall in funding.

At Universities, small grants tend to be used for funding students, which builds capability, but makes it slow for research to be delivered as it includes training of the students, the dissemination through thesis, and the research time can be quite short (i.e., 1 year for a Masters, 3-4 years for a PhD).

A research model that creates a level field for researchers from CRIs, universities and private organisations is important.

Section 6: 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 into operational environments and technologies?

Research institutions need to support and encourage the role researchers increasing must play in communicating their science in ways other than writing publications in high impact journals. It is not just a knowledge exchange; it also involves an exchange of skills. This may include upskilling those who can operationalise science, so they understand the limitations and how to incorporate the science into their operational systems.

There is a large lag between undertaking the research and then having usable outputs that could inform policy, practice, or incorporated back into science services. Often the researcher is uncomfortable sharing too much about their results until they are published. Early engagement with end-users regarding research (see Figure 2) helps operational people plan for the uptake of the research so they can prepare to use it when it is published (noting that publication can be 12 or more months later from when the research was completed).

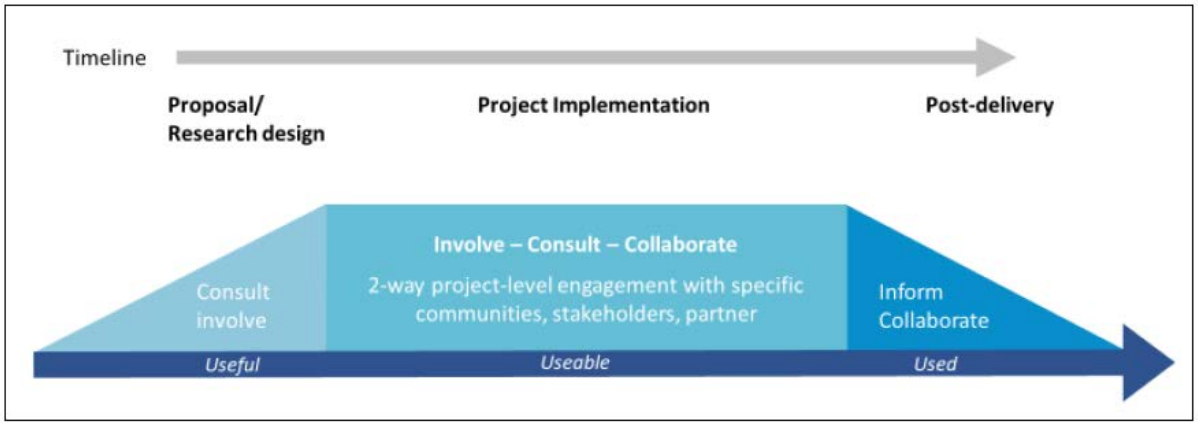

Figure 2: Engagement with end users needs to happen at all stages of the research, including post-delivery[3]

Ensuring researchers budget their time (or the time of others) to engage with end-users and produce materials to support uptake of science outputs should support this translation. Some of the base funding could be used for the necessary engagement required before submitting research proposals for grants. Funders are increasingly expecting researchers to have already started engagement as part of their proposal development (as shown in Figure 2).

EQC recommends removing or reducing the commercial requirements of the research institutions i.e., to make a profit. Access to information, either free or paid, can become a grey area between public good (i.e., 'free' information) vs making profit (i.e., charging for information). This situation can create tension internally and externally and can be confusing for those contracting a service from a research organisation that is leveraging research funds, in order to stretch the research budget.

Section 7: Research workforce

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

A key consideration that is not mentioned explicitly in the Green Paper is around the challenges that people face when they require a "break" in their career, in particular, but not limited to, women when they have a family.

Though there has been improvement in the number of women in academic careers there still a lack of women in senior roles[4]. From our experience, women will often leave academic or other short fixed-term roles for more permanent roles, so they have some security and support while on maternity leave. The lack of stability early career researchers face, as acknowledged by the Green Paper, could contribute to women delaying having a family until they have more stability in their academic career or leaving the research workforce.

[3] Saunders, W.S.A. 2019: Principles of project-based engagement. GNS Science Miscellaneous Series 129, Lower Hutt.

[4] S. Hamilton (2017), *New Zealand Scholar Mamas: The Influence of Motherhood on Academic Careers*, MBus Thesis, Auckland University of Technology
https://openrepository.aut.ac.nz/bitstream/handle/10292/10992/HamiltonS.pdf?sequence=4&isAllowed=y

Career success often comes down to the support that women get from their department and institution during this time, but there are some things funders could consider as well, such as:

- being flexible around research project grants by negotiating how to manage the break with the Principal Investigator, such as accommodating extensions and changes to funding schedules (note: science services should be designed and support by host organisations such that they have the capacity to accommodation staff taking such leave)
- ensuring grants to host institutions acknowledge the researchers involved. If not, this could result in the grant being given to someone else if a researcher needs to go on leave. This takes away the opportunity for the researcher to conduct the research and publish the findings.
- Providing support and opportunities to publish once returned to the workforce

Section 8: Research infrastructure

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

- It is important for government to be involved and invest when:
    - There are barriers for researchers to access research infrastructure. These barriers may be based on technology, specialist skills/capability, or high cost.
    - There are a large number or range of users, i.e., census data or natural hazard databases
    - There is a wide range of applications, can be used across disciplines, such as high-performance computing or data centres
    - The infrastructure is reusable, i.e., instruments can be redeployed.
- Most governments overseas have some national research infrastructure, there is a mix of these being purpose-built institutions such as UNAVCO[5] and IRIS[6] which are funded by the National Science Foundation[7]. Others have the infrastructure hosted at a university or government agency; however, they are accessible to all. This is common in Australia, with the National Computational Infrastructure[8] (hosted at ANU) or AuScope (hosted across multiple universities and Geoscience Australia) both funded through the National Collaborative Research Infrastructure Strategy for Australia (NCRIS)[9].
- National Computational Infrastructure is a good example of where government investment in infrastructure has broad benefits for the science system. It offers a host of services for all researchers regardless of research domain or institution. The services include: supercomputing, data services, data collections management, virtual research environments, data storage, virtualisation and HPC optimisation. It means that an institution or research group doesn't have to build all this from scratch, instead it can tap into the resources already available.

[5] UNAVCO is a community of scientists, educators, and professionals working together to better understand Earth processes and hazards using geodesy. They operate the GAGE Facility on behalf of the National Science Foundation with support from NASA https://www.unavco.org/

[6] IRIS (Incorporated Research Institutions for Seismology) is a university research consortium dedicated to exploring the Earth's interior through the collection and distribution of seismographic data. https://www.iris.edu/hq/

[7] National Science Foundation is a US federal government agency https://www.nsf.gov/

[8] https://nci.org.au/

[9] https://www.dese.gov.au/ncris

- An important part of sustainable infrastructure is keeping it up-to-date, modern, accessible, and secure. This often involves specialist skills, which can be hard to come by in the current competitive job market. Looking at ways to attract people with those skills and retain them can be challenging.

How EQC can help

EQC has been a funder of research, data, and education for many years. EQC is also playing an increasingly active role in cross-government efforts to build New Zealand's resilience to natural disasters. In recent years we have invested time in better leveraging our research, transforming it into useful tools and products, and getting it into the hands of people who can make a difference.

We have a material interest in how research is funded and supported, how research is translated, transformed, and operationalised into products that are useful, usable, and used, and how these products are, in turn, leveraged for better outcomes for New Zealanders.

We would welcome the opportunity to use this expertise and experience to help support the further development of Te Ara Paerangi Future Pathways, if that is useful in any way. Please don't hesitate to contact me if you would like to discuss this further, or any other points raised in this submission.

Yours sincerely,

Dr Natalie Balfour
Manage Research
The Earthquake Commission
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