

3. Designing Base Funding to Support the Research Workforce

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Previous briefs^{1,2} addressing Te Ara Paerangi Future Pathways [Green Paper](#) evolve from awareness that the pandemic has raised serious concerns about the sustainability of today's research institutions and funding systems. Aotearoa's highly contestable funding raises concerns that our system may be among the most unstable internationally and prone to the problems observed in increasingly hypercompetitive research systems worldwide. Hypercompetition is associated with poor behaviours and mediocrity, undermines diversity, equity and inclusion (DEI), and reduces the likelihood of funding innovative projects and careers.^{3,4} How can we build more collaborative, connected careers within research systems appropriate for taking society on innovative journeys to solve the biggest challenges such as climate change and protecting endangered biodiversity? This paper and previous work describes analysis to arrive at design suggestions for an innovative base funding proposal that better achieves the historical intentions to meet national research needs that have evolved considerably over 30 years. The proposed system would reallocate existing and possibly additional government funding to support 30–50% of researchers' salaries and related costs. The intent is to enhance the overall well being of the research workforce and knowledge systems by creating or incentivising a number of features that overcome current dilemmas, improving the responsiveness, connectivity and use of research within Aotearoa New Zealand, though self-organisation following Ostrom's principles of common resource pool allocation. The proposed scheme has advantages over the current highly contestable system, and is expected to outperform tenure-driven systems.

It appears sensible to propose that the nation's knowledge, research funding, infrastructure and the time of researchers could all be considered common pool resources, to which eight principles embedded in Ostrom's Nobel Prize winning work can be applied to overcome the social dilemmas that trap a system in poor outcomes.^{2,5-7} The *Tragedy of the Commons*⁸ provides the most famous example of a dilemma, and others can be identified, often matching known game theory examples. Therefore, a useful step is identifying dilemmas or system traps operating at present, or consistently over time, that may explain the state or dynamics, or problematic features of the system.

This paper provides below a few illustrative examples of dilemmas or system traps operating in the research system, saving a more exhaustive list and detailed analysis as a separate piece of work. Illustrative examples that clearly raise concerns, and the observed outcomes include:

- Hypercompetitive⁴ systems trapped in full contestability yield career-driven bullying and mediocre outcomes, combined with the reinforcement of poor diversity outcomes.
- The lack of early career mobility (trapped and dependent nature of PhD and early career employment works against reporting bullying and toxic, unproductive workplaces.³
- PhD training [under poor or exploitative pay conditions](#)⁹ to generate internationally relevant research, not matched to current or future national research employment needs.
- Accountability applied vertically down complex applied research contract chains that loses responsiveness to changing research needs or research findings.¹⁰
- Requirements to include Vision Mātauranga in all research places huge 'double-shift' demands on Māori researchers and iwi/hapū and other Māori organisations, capturing most Māori researchers into small roles in many programmes with too little time to develop leadership in their own field.¹¹

Each of these concerns might benefit from careful exploration in an evidence-based approach, but it is also important to suggest that complex systems approaches are appropriate and sometimes preferable to support and apply Anticipatory Innovation Governance.¹² Taking the latter approach, we move forward from the observations that these problems are observed and growing internationally and in New Zealand, so that taking action is both needed and precautionary.

Historical and systems analysis² finds that the current research system is poor at prioritisation, connectivity and support for the research workforce due to the combination of funding mechanisms and institutional pressures. Hypercompetition leads generally to mediocre performance anticipating and responding to the need for capability in new or expanding research areas, and there is recent evidence that poor or incomplete science can be locked in by policy capture.^{13,14} The dilemmas undermining the well being and effectiveness of the research workforce are therefore the target for solutions. Among these, the ‘rich-get-richer’ phenomenon (or [Matthew effect](#)) associated with competitive funding is well known and measurable in research systems.¹⁵ It delivers unacceptable consequences for smaller more remote institutions and for DEI.¹⁶ These effects are commonly countered by ‘earmarked’ funding to institutions, but if not carefully targeted this leads to unaccountable slush funds controlled at the highest level of institutions.¹⁶ Thus, any base funding solution should be carefully targeted.

After considering the requirements of today’s big issues—such as climate change—a unique but flexible solution appears possible. The debate leading up to 1990 chose a fully contestable system because neither support nor affordable workability was found for tenure systems. A rationale for tenure systems was the development and maintenance of knowledge and expertise, and there was no way to understand the full consequences of switching to a funding policy recognising institutions and making the research workforce increasingly invisible outside universities. There is now a sensible opportunity to design base funding in a novel way that is intermediate between tenure and NZ’s current fully contestable model, targeting funding specifically to a stabilising proportion of researchers salary and support—perhaps 30–50% is appropriate and appears affordable using straightforward calculations.

This proposal largely follows what then-Minister of Research Science and Technology (RS&T) Simon Upton [had concluded](#)¹⁷ from half a decade of analysis and debate leading to 1990 decisions—base funding of at least 40% was sensible. Yet he lost the budget battle with the Treasury, which based its decisions on untested theory that has not stood the test of time.² As Upton pointed out in 2010, how funding is arranged makes a big difference,¹⁷ so there is a real opportunity to design a system to incorporate recognition of the growing hypercompetition problem, as well as research such as Ostrom’s that was nascent in 1990 but well accepted today.

This paper proposes initial design concepts for a base funding scheme applied to the nation’s research institutions and infrastructure, starting with the following questions:

1. What is the best way to forge a new and strong ‘contract between science and society’? (Does this imply supporting the well being of the research workforce to lead self-organising processes?)
2. What is the best way to build collaboration and community to maximise gains from the trust-reciprocity-reputation cycle within a system treating the research workforce’s time, built and equipment infrastructure, knowledge and data as a common resource pool?

Paradigms and goals addressed:

- Well being of the workforce and research system drives long-term net benefits and outcomes, targeted through short-term funding
- By default, the nation should receive the appropriate benefits of publicly funded research, while IP and commercial capture in public institutions and funding is neutral or discouraged except in careful consideration.
- Collaboration and co-governance should be encouraged over confusing post-New-Public-Management, principal–agent, contractor–customer and managerial chains² that disconnect prioritisation and knowledge flow
- Stability, mobility and incentives should be optimised: create a system intermediate between tenure and full contestability
- Appropriate levels of labour-force mobility should be ensured to support innovation, between institutions, sectors, and internationally
- The system should attract and retain talent from students through functional careers.

Proposed design features of a base funding system include:

- A base of 30–50% of salary scaled by career stage
- A proportion of salary-related costs and operating expenses might also be covered
- Incentives can be included for productivity, public, or stakeholder engagement, and contributions to the research community – mild financial incentives avoid hypercompetition and can be reinforced with incentives linked to social standing in the research community
- Strong competitive incentives remain to acquire additional funding to cover the remaining (50-70% of salary and other costs) – these can be targeted to national priority areas, while research community plays a role in priority setting (within Ostrom's principles)
- Additional targeted base funding can be provided to develop specific capabilities, support infrastructure, or data systems, consistency with Te Tiriti
- Reporting to populate a NZ Research Information System (NZRIS) occurs annually, and incentivises or requires appropriate knowledge dissemination, enabling much greater connectivity and appropriate benefits within 'NZ inc', rather than single institutions.

Further intent can be built into the system:

- Repurposes escalating overheads (typically >100%) to restore accountability and compatibility with international funding sources.
- Takes a long-term approach to human, built, infrastructure and knowledge capitals.
- Encourages investing time in relationships and collaborations that generate essential net benefits through positive cycles of trust, reciprocity and reputation.⁵
- Creates, on average, a no change situation for researchers and institutions performing well.
- Equalises the playing field for independent research, regional research activity and integrative research that fills important gaps^{18,19} and generates innovation and connectivity.
- Creates flexibility to support Māori researchers and institutions in similar or parallel ways to other tiers or nodes of activity, while enabling additional funding mixes to give effect to Te Tiriti or DEI
- Enables the level of labour force mobility that enables innovation through connectivity and transdisciplinarity and holds poor employers to account.
- Sufficient resource to avoid poverty traps, such as requiring funding and contracts with IP clauses to initiate meaningful collaborations
- Enables early career research fellowships, and fellowships across careers that better enable

researchers to build credibility in new directions and actively support innovation

- Enables compatibility for international exchanges of staff and funding within collaborations
- Encourages the maintenance of careers across parental leave, health issues, etc.
- Can establish rules to retain knowledge and expertise without high 'deadwood' costs that prevent ECR hiring.
- Re-energises international recruitment including pulling kiwi back home, but emphasising lifestyle and opportunity.
- Enables evolution of coupled contestable funding sources, for example a concept grant system, fellowships, and or smaller proposals with higher funding rates where large scale impacts are achieved more through signalled aims.

Solvable challenges include:

- Entry to the system will still require some selection—searches for replacement roles, and competitive fellowships are likely to suffice.
- Exit should be encouraged as a result of non-productivity or more attractive full-time employment, but not where benefits accrue to New Zealand rather than the employer or may take time to develop.
- Should encourage regulation or tapering of support towards a retirement age commensurate with employment of early career researchers.^{20–22}
- Allow and encourage researchers at all career stages to bridge into pathways of full or partial employment by startups, industry, government, and NGOs to supercharge innovation.
- Initial system set up will require census and a first reporting period, where independents may require new support.
- Will need to enable restoration of collaborative centres, co-governance within institutions or fields

Remaining questions:

Many simple but tricky questions will relate to untangling funding currently spent on overheads, and ensuring the administrative capacity to direct funding toward the well being of the research workforce, built and equipment infrastructure, and support for data and knowledge. Policies and contracts will need examination, particularly where there might be transition from output to capital expenses.

Other questions are deeper. For example, is the development of base funding and restoration of collaborative culture and a sense of community at least partly prerequisite to the successful development of new funding mechanisms? Perhaps new targeted research councils such as one governing environmental research funding proposed by the Parliamentary Commissioner for the Environment²³ serves as a useful example? In that case, it is modelled partly on the Health Research Council (HRC), but it must be remembered HRC has a continuous history. In contrast, a Social Science Research Council was proposed but never established, leaving a significant gap. Considering that Environmental Research outcomes depend strongly on behaviour, policy decisions, and economic assessment, there needs to be some consideration of the scale of research that needs to be built, and that standing up well-functioning institutions from 'scratch' is difficult. It is sensible to suggest that successful impacts (benefits) of mission-oriented research will drive the social licence and contract between science and society toward increased funding from the government. Specifically, the contract between science and society preserves the stability and independence of fundamental research and expertise so that applied missions can be pursued rapidly when required.²⁴ In contrast, prioritising mission-oriented research also tends to imply presupposing research structure, implementation and uptake in ways that are likely to result in poorer outcomes than building healthy components of research within healthy institutions, able to self-organise to

achieve common missions. Most national research systems successfully attract research toward priorities stated in funding requests for proposals, in the same way that climate change mitigation is currently encouraged by the Endeavour Fund.

Similarly, the ability to steer the system or ensure it is self-steering in sensible directions is not a given. At present, New Zealand has not yet built the intended research information system ([NZRIS](#)), and therefore lacks important public data on its research system, particularly when compared to well-performing systems, most notably the [US](#). A well functioning base-funding system for people should have the advantage of populating NZRIS as well as helping a wider range of researchers and research users better connect with research activity and outputs. A system that incentivises this collection annually might therefore be publicly supported in a similar way to the first cycles and funding growth in the Performance Based Research Fund (PBRF) for universities.

During its first three cycles (six years each) PBRF achieved a goal of lifting research quantity and quality, but appears to have entered a state of hypercompetition combined with no clear model of accountability for \$315m of expenditure each year. Can a researcher-focused base funding scheme provide an alternative to the now mature PBRF by overcoming the following concerns:

- Encourages hypercompetition and discourages collaboration
- Has difficulty defining research excellence
- Lacks accountability and transparency regarding how funds are allocated back to research activity
- Exploits PhD students on stipends below living costs, in research fields suited to international academic comparison, but not delivering on New Zealand's research employment needs.

Ultimately, a base funding scheme for researchers could be seen as a way to stabilise and better target schemes like PBRF across the entire research system, so that workforce mobility and funding comparability exists across parallel or merged schemes supporting all New Zealand researchers. Thus, an important goal of any base funding scheme is to be a foundation for stacking competitive incentives and ensuring permeability across government, business and higher education research – to enable more anticipatory and rapid responses to the big, thorny challenges of the 21st century.

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References

- (1) Baisden, W. T.; Stewart, L.; Stevens, C.; Wehi, P.; McDonald, F. Lead Brief: Addressing Te Ara Paerangi Future Pathways to Deliver Transformation. Zenodo February 2022. <https://doi.org/10.5281/zenodo.5952846>.
- (2) Baisden, W. T. 2. A New Paradigm to Deliver Prioritisation: Towards Collaboration. Zenodo February 2022. <https://doi.org/10.5281/zenodo.6300595>.
- (3) Moss, S. Research Is Set up for Bullies to Thrive. *Nature*, 2018, *560*, 529–530.
- (4) Täuber, S.; Mahmoudi, M. How Bullying Becomes a Career Tool. *Nature Human Behaviour*, 2022. <https://doi.org/10.1038/s41562-022-01311-z>.
- (5) Ostrom, E. A Behavioral Approach to the Rational Choice Theory of Collective Action: Presidential Address, American Political Science Association, 1997. *American political science review*, 1998, *92*, 1–22.

- (6) Ostrom, E. A Diagnostic Approach for Going beyond Panaceas. *Proc Natl Acad Sci U S A*, 2007, 104, 15181–15187. <https://doi.org/10.1073/pnas.0702288104>.
- (7) Ostrom, E.; Hess, C. Understanding Knowledge as a Commons : From Theory to Practice, 2011.
- (8) Hardin, G. The Tragedy of the Commons. *Science*, 1968, 162, 1243–1248. <https://doi.org/10.1126/science.162.3859.1243>.
- (9) Morton, J. “Flatly Embarrassing”: 700 Scientists Call for Pay Hike for Marsden Students. *New Zealand Herald*. September 28, 2021.
- (10) OECD. OECD Reviews of Innovation Policy: New Zealand 2007, 2007. <https://doi.org/doi:https://doi.org/10.1787/9789264037618-en>.
- (11) Rauika Māngai. A Guide to Vision Mātauranga: Lessons from Māori Voices in the New Zealand Science Sector. *Wellington, NZ*, 2020.
- (12) Tönurist, P.; Hanson, A. Anticipatory Innovation Governance, 2020. <https://doi.org/doi:https://doi.org/10.1787/cce14d80-en>.
- (13) Parliamentary Commissioner for the Environment. *Overseer and Regulatory Oversight: Models, Uncertainty and Cleaning up Our Waterways*; Report; 2018.
- (14) *Overseer Whole-Model Review: Assessment of the Model Approach MPI by the Science Advisory Panel. Technical Paper No: 2021/12*; Report; Ministry of Primary Industries and Ministry of the Environment, 2021.
- (15) Ebadi, A.; Schiffauerova, A. How to Boost Scientific Production? A Statistical Analysis of Research Funding and Other Influencing Factors. *Scientometrics*, 2016, 106, 1093–1116. <https://doi.org/10.1007/s11192-015-1825-x>.
- (16) Savage, J. D. Funding Science in America: Congress, Universities, and the Politics of the Academic Pork Barrel, 2000. Pp 7-10.
- (17) Upton, S. Review of Crown Research Institutes Finds Just the Right Balance. *Dominion Post*. March 9, 2010.
- (18) Beattie, D. Key to Prosperity, Science & Technology : Report of the Ministerial Working Party, 1986.
- (19) Arbuckle, R. H. Science and Technology Review : A New Deal, 1988.
- (20) Ashenfelter, O.; Card, D. Did the Elimination of Mandatory Retirement Affect Faculty Retirement? *American Economic Review*, 2002, 92, 957–980.
- (21) Ho, D. E.; Mbonu, O.; McDonough, A. Mandatory Retirement and Age, Race, and Gender Diversity of University Faculties. *American Law and Economics Review*, 2021, 23, 100–136. <https://doi.org/10.1093/aler/ahab002>.
- (22) Cui, H.; Wu, L.; Evans, J. A. Aging Scientists and Slowed Advance. *arXiv preprint arXiv:2202.04044*, 2022.
- (23) Parliamentary Commissioner for the Environment. *A Review of the Funding and Prioritisation of Environmental Research in New Zealand*; Report; 2020.
- (24) Stokes, D. E. Pasteur’s Quadrant : Basic Science and Technological Innovation, 1997.