

2. A New Paradigm to Deliver Prioritisation: Towards Collaboration W Troy Baisden

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Te Ara Paerangi Future Pathways [Green Paper](#) seeks a major transformation of Aotearoa New Zealand's research, science and technology (RS&T) system and places 'prioritisation' at the head of its consultation process. Work to date has found that prioritisation is the most challenging topic, yet one that can provide a powerful test of whether proposed changes in all other categories can transform Aotearoa New Zealand's research system as desired. This work analyses the potential to use more effective prioritisation as a target for transformational and feasible reform by sequentially applying frameworks identified by Meadows and Ostrom, to prioritise interventions in systems and manage common pool resources, respectively. The analysis identifies how to reframe the historic paradigms driving reform to prioritise and maximise the appropriation of well-being benefits of RS&T expenditure within Aotearoa, using an 'NZ inc' perspective. The analysis supports reframing and managing the nation's RS&T institutions, infrastructure and funding as a common resource pool.

This paper is part of a combined effort by Te Pūnaha Matatini and New Zealand Association of Scientists (NZAS), using Donella Meadows' strategy for understanding how intervention in systems can be achieved by identifying the most powerful leverage points¹ (Figure 1). Analysis of key historical documents and institutional memories, along with a literature review has generated a narrative and understanding the paradigms driving the research system and its interactions with the 'Machinery of Government' (MoG). This analysis leads to the selection of a framework to guide self-organising transformational change.

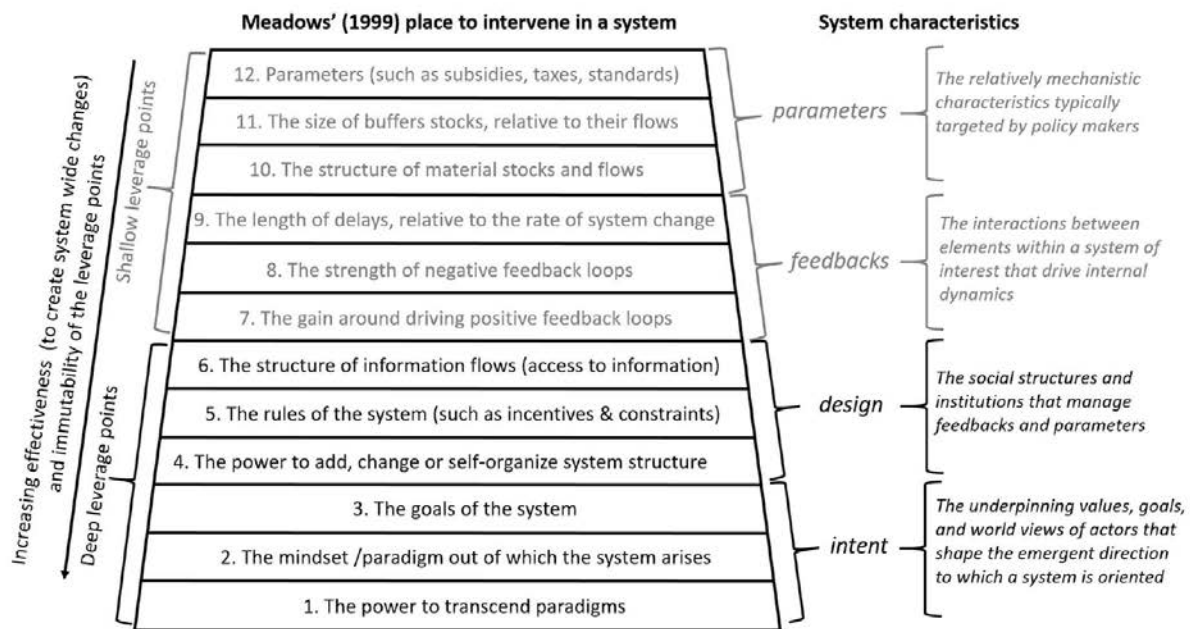


Figure 1. The Meadows framework for intervening in systems, as presented by Abson et al.²

The *contract between science and society*^{3,4} defines the potential to satisfy the trust of the public and politicians in the national research system, resulting in increased funding, stability and independence for RS&T to deliver work that enhances well being. This *contract* was important and well understood in the United States and many Western democracies in the decades following the second world war, and continues to renew itself within many nations according to their unique history and identity.^{4,5} Despite

generally positive position of science in New Zealand media, there is little recognition of a contract between our nation and our research system. If one asks why, it may be an intuitive result of the paradigms, goals, rules and structure imposed over the last 30 years, and one that deserves further exploration given concerns raised about the system⁶⁻⁸. The current push for major reform appears to reaffirm the OECD's 2007 conclusion⁹ that the New Zealand research system suffers from an 'automatic steering syndrome' driven by "excessive reliance on a few policy principles."

New Zealand's government and public administration show motivation and skills in learning from international best practices and determination in submitting public policy design to strict discipline, based on solid economic foundations, such as principal-agent theory or market failure analysis. However, this appears to have been done to the detriment of some pragmatism in ensuring efficacious implementation and to have weakened the role of evaluation in monitoring and formulating policy and of cooperation in implementing it. One example is the strict application of the customer-contractor principle to public funding of R&D, which might have overlooked in some cases the fact that the contractor (CRIs, business) may be better placed than the customer (government agencies) to say what societal, business or even government needs might be, and the further fact that the capabilities needed to satisfy the customer can only be built up over a period of time and in expectation of a regular flow of future work. Time-consuming vertical relationships imposed by the "purchaser-provider model" work at the expense of horizontal coordination.

The concerns described by the OECD in 2007 have re-emerged and expanded despite major efforts to address them emanating from the 2010 CRI Task Force Report⁷, which suggested that CRIs are better placed than the Government to set priorities in their sphere of influence. Are there plausible reasons the research system has come full circle in little more than a decade, likely representing what complexity research refers to as the panarchy cycle¹⁰ depicted in Figure 2? Literature on the paradigms driving New Zealand's public administration appears very consistent with this cycle describing reorganisation, expansion, and stagnation, followed by a rapid release back to reorganisation. A system exhibiting panarchy cycles is also consistent with features such as rigidity and poverty traps and can be expected when fluctuating drivers of RS&T funding and activity remain distant from the paradigms driving its priorities and funding, as the following historical analysis explains.

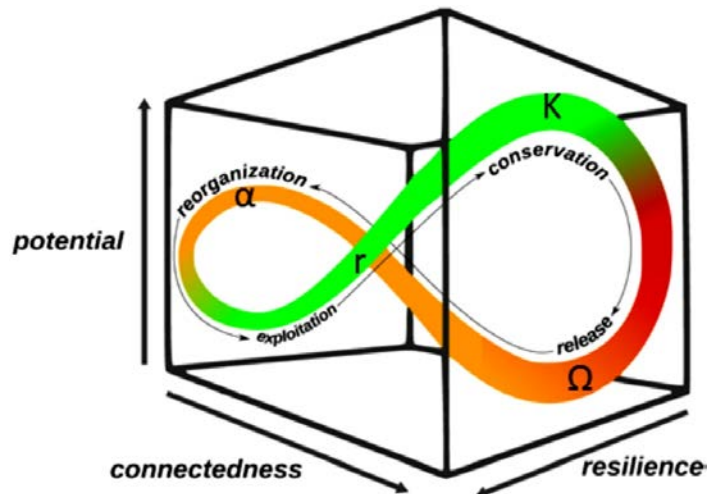


Figure 2. Depiction of a panarchy cycle, from a recent analysis¹¹ measuring the axes including connectivity. The concept is that a wide range of complex systems go through repeated cycles of reorganisation (α), exploitation or exponential growth (r), conservation (K) and release (Ω). The theory can be used to better manage and stabilise a system, or may be most useful to identify that complex systems undergo large repeated cycles due hidden forcing factors such as an 'automatic steering syndrome.'

The history and the paradigms

The near financial collapse of the New Zealand Government and election of the 4th Labour Government in 1984 unleashed a series of reforms driven by emerging economic and political theories that had not yet been exposed to empirical and practical testing. These reforms are categorised as 'neoliberalism' and justified at the time as necessary to replace unacceptably inefficient and unresponsive bureaucracy. As a result, New Zealand is considered to be the nation that most fully and deeply implemented reforms driven by paradigms. These included [New Public Management](#) (NPM), which is well known for suggesting that government activity should be run like a business. Within NPM, it was common to expect strict implementation of [principal-agent theory](#), suggesting that ministries act as agents of the Minister, and that a clear customer-contractor separation be maintained in the administration of RS&T agencies. The OECD notes (above) that this arrangement prevents effective prioritisation by making vertical relationships cumbersome, also limiting horizontal relationships conveying trust. The implementation of user-pays and full contestability of funding¹² leads to full costs and contracting procedures applying everywhere within a highly transactional system¹³ that remains unusual internationally. Unsurprisingly, current analysis suggests a need to restore collaboration¹⁴.

The damage to trusted relationships caused by public research organisations both seeking and competing for transactional funding for nearly every endeavour became apparent early, and is frequently cited as a major frustration associated with the research system. Problems and reviews led to what has been termed a Post-NPM era, yet literature suggests changes have confused but not replaced the paradigms driving the MoG system¹⁵. The justifications for several major changes to the applied science funding pools are remembered as episodes of confusion, such as the unintended elimination of all groundwater research and half the soil science research when outcome-oriented sustainability research programmes were selected in 2003. Moreover, the Treasury played an outsize role imposing NPM paradigms, but operated non-transparently outside Principal-Agent expectations¹⁶ in ways that appear to have removed the potential of a complex and capable research system from being maintained or redeveloped. Within institutions, NPM's implementation is often characterised as *managerialism*, with similar consequences and confusion of complex research activity. The case is therefore clear that the unique paradigms driving the system remain fuzzy and highly resistant to change unless a major transformation can be designed.

Meadows¹ provided clear insights on how resistance can be perceived, plays out within systems and can be overcome to allow transformations to move forward:

One way to deal with policy resistance is to try to overpower it. If you wield enough power and can keep wielding it, the power approach can work, at the cost of monumental resentment and the possibility of explosive consequences if the power is ever let up.

The alternative to overpowering policy resistance is so counterintuitive that it's usually unthinkable. Let go. Give up ineffective policies. Let the resources and energy spent on both enforcing and resisting be used for more constructive purposes. You won't get your way with the system, but it won't go as far in a bad direction as you think, because much of the action you were trying to correct was in response to your own action.

The most effective way of dealing with policy resistance is to find a way of aligning the various goals of the subsystems, usually by providing an overarching goal that allows all actors to break out of their bounded rationality. If everyone can work harmoniously toward the same outcome (if all feedback loops are serving the same goal), the results can be amazing. The most familiar examples

of this harmonization of goals are mobilizations of economies during wartime, or recovery after war or natural disaster.

An overarching driver of resistance in the system is the need to fund research while lacking the ability to achieve a trusted two-way information transfer for big decisions and prioritisation. The role of Chief Science Advisors now enables a trusted flow from the researchers and research institutions back to the MoG¹⁷, with recognition that relationships, confidentiality and face-to-face interactions matter. Yet, there appears to be no good mechanism to bring the needed knowledge to bear on decisions if the RS&T system has not prioritised substantive resources and time required to create and document the needed understanding. Early in the development of Chief Science Advisor roles, it was seen as ideal to avoid the prioritisation of funding¹⁸ or at least remain at arms length¹⁷.

How then does prioritisation of research funding pools occur? Are we left to ask if being able to navigate the MoG–science relationship has proven more important than being a good scientist? Clearly some mechanism that aligns incentives from the top of the system to early career researchers and technical staff at the bottom of the system would be ideal, yet also appears to have been a casualty between the 1986 analysis¹⁹ confirming the value of work at the ‘coal face’ and the simplified considerations presented as a path for paradigmatic reform²⁰ in 1988. Reforms tended to eliminate any activity or connectivity without clear links to funding or economic activity, and the rationale for maintaining or rebuilding activity has been inconsistent and unstable.

A well-known framework provides for better alignment of RS&T resources, funding and institutions to create a resilient and responsive system capable of maximising gains across the trust–reciprocity–reputation loop defined by Ostrom²¹ (Figure 3). The framework made Elinor Ostrom the first woman to win the Nobel Prize in Economics (2009), and the ideas provide a powerful fix to issues created by paradigms of the 1980s that formed New Zealand’s current RS&T system. Her replicable approach was to identify and solve social dilemmas, such as the well-known Tragedy of the Commons²².

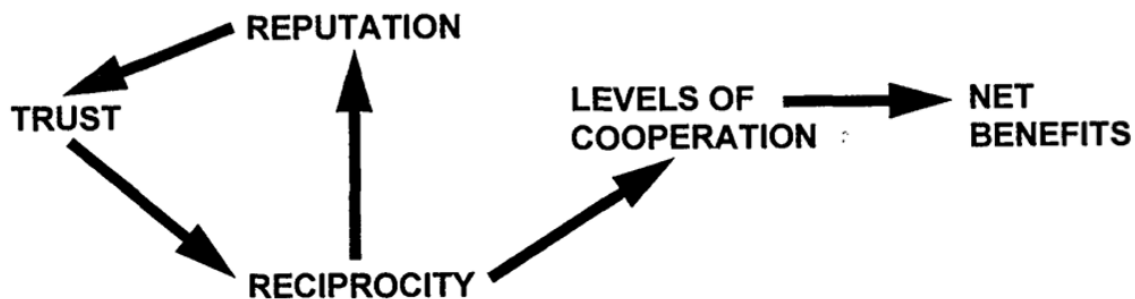


Figure 3. Ostrom 1998's figure describing "Core Relationships", which was supported by a more comprehensive system diagram.

Can Ostrom’s framework inspire a researcher-led system that delivers more effectively, generates more trust, and helps the nation prioritise its future research needs? Ostrom’s approach may provide a lens to view the consultation and submission processes in ways that will clarify the current alignment of incentives, as well as the dilemmas operating in the research system. Ostrom’s principles can plausibly be converted to poll questions or metrics to broadly identify how current systems (including funding mechanisms, institutions and policies) are performing (See Box).

Box: Ostrom identified eight "[design principles](#)" of successful common pool resource management:

1. Clearly define the boundaries of the common resources;
2. Use rules that fit local circumstances*;
3. Ensure those affected by rules can participate in rulemaking*;
4. Effective monitoring creates accountability;
5. Graduated sanctions can be applied when community rules are violated;
6. Conflict resolution is low-cost and accessible;
7. Higher authorities respect and value the community's rules and self-determination; and
8. Develop multiple tiers or layered nodes to manage large and complex resource pools.*

Additional principles may also be identified as important.

***please note potential to support women, under-represented groups, communities, Māori research teams, and partnerships honouring Te Tiriti, and to build regional, sectoral and disciplinary research communities commonly encouraged by research funding agencies in North America and Europe.**

Structure matters as transformation cascades through the leverage points identified by Meadows. We recommend the consideration of the big complex issues listed in the cabinet paper to serve as examples, within which the trust–reciprocity–reputation cycle amplifies positive interactions with government and society. Climate change may be the most useful because high profile New Zealand teams align effectively with long-standing international efforts. It is also one where we formally recognise the value of IPCC assessment reports that have evolved from Holling's leadership of the 1978 United Nations definition of scientific assessment²³ to inform adaptive processes on big issues and prioritise future science. An ideal system for New Zealand will support the IPCC process, yet be more responsive and able to prioritise as has been suggested for environmental research²⁴, and able to support proactive policy and the OECD's concept of *Anticipatory Innovation Governance*²⁵.

Conclusion

Meadows and Ostrom, taken together, suggest that significant transformation is possible. This analysis serves as background to related work suggesting that a first step of providing base funding aligned to the researchers in the system would build a strong *contract between science and society* within Aotearoa that better aligns with successful international examples. The first steps toward transformation could enable self-organisation within institutions and funding toward a system that is more responsive and better prioritised through common-pool resource management principles. In practice, this should lead to incentives that optimise stability and productivity by also improving the well being of the research workforce. The transformation pathway achieves net benefits through a trust–reciprocity–reputation cycle that can deliver net benefits to well-being measures, including economic outcomes and reforges a modern contract between science and society justifying public support of RS&T.

Work will follow outlining details, and far more work will be required over time to overcome concerns and reshape Aotearoa's unique research system towards desired goals, notably a more collaborative, healthier, better connected and better trusted RS&T system. A transformational self-organising approach appears possible, largely by realigning funding, with only one further requirement signalled correctly by Easton. In warning of the dangers of what was to come for the research system, he recommended an enduring programme in science policy²⁶, which appears to have been needed yet missing.

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